

LIBRARY  
OF THE  
UNIVERSITY  
OF ILLINOIS

572.05

FA

v. 41-43

The person charging this material is responsible for its return to the library from which it was withdrawn on or before the **Latest Date** stamped below.

Theft, mutilation, and underlining of books are reasons for disciplinary action and may result in dismissal from the University.

To renew call Telephone Center, 333-8400

UNIVERSITY OF ILLINOIS LIBRARY AT URBANA-CHAMPAIGN

BUILDING USE ONLY

OCT 12 1980  
OCT 12 1980

DEC 21 1981

AUG 13 1987  
JUL 13 1987

OCT 17 1991

MAY 24 1993

OCT 20 1999

L161—O-1096  
L101—O-1096









72.5  
FA  
v. 42

# CAVES OF THE RESERVE AREA

PAUL S. MARTIN

JOHN B. RINALDO

ELAINE BLUHM

FIELDIANA: ANTHROPOLOGY

VOLUME 42

*Published by*

CHICAGO NATURAL HISTORY MUSEUM

JUNE 11, 1954



# FIELDIANA: ANTHROPOLOGY

*A Continuation of the*

ANTHROPOLOGICAL SERIES

*of*

FIELD MUSEUM OF NATURAL HISTORY

---

VOLUME 42



CHICAGO NATURAL HISTORY MUSEUM

CHICAGO, U. S. A.

1954

THE LIBRARY OF THE  
JUN 14 1954  
UNIVERSITY OF ILLINOIS



## CAVES OF THE RESERVE AREA

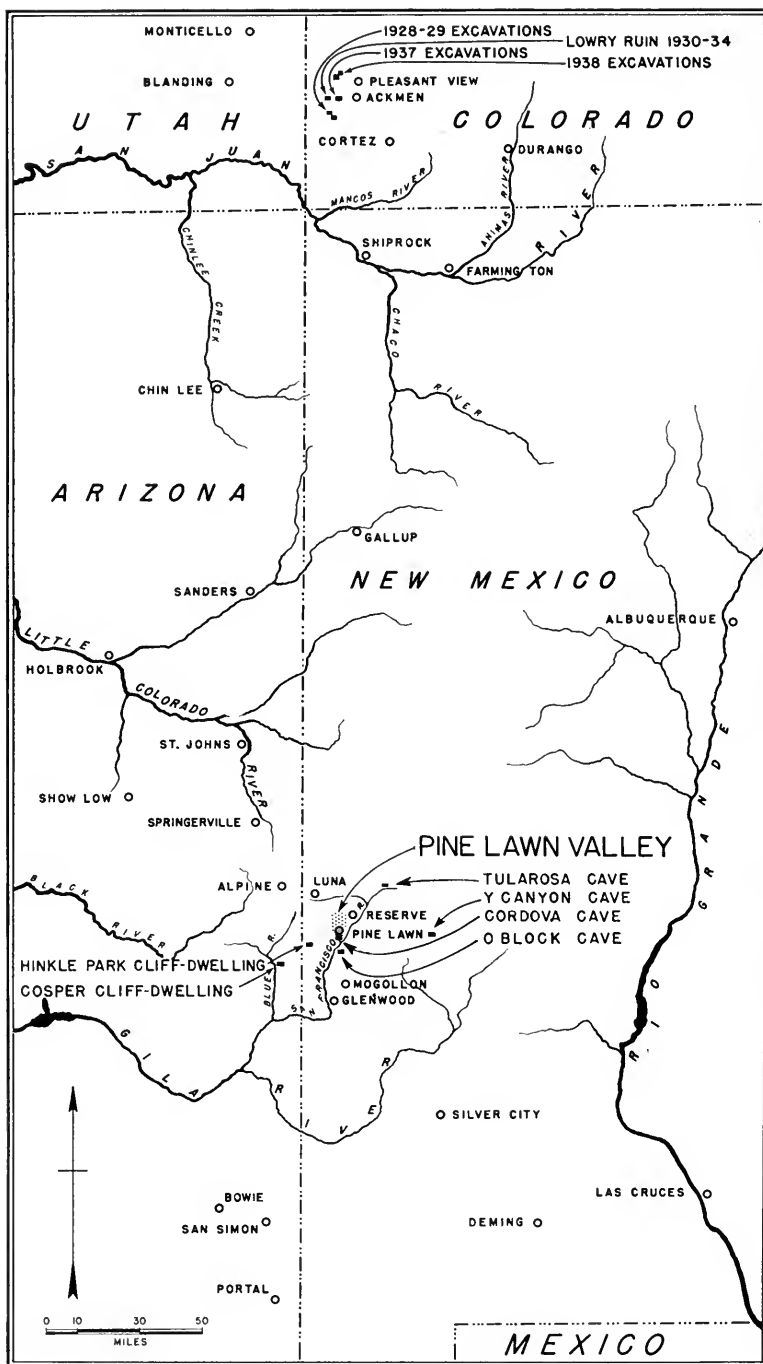


FIG. 1. Map showing location of caves.



# CAVES OF THE RESERVE AREA

PAUL S. MARTIN

*Chief Curator, Department of Anthropology*

JOHN B. RINALDO

*Assistant Curator, Archaeology*

ELAINE BLUHM

*Assistant, Archaeology*

FIELDIANA: ANTHROPOLOGY

VOLUME 42

*Published by*

CHICAGO NATURAL HISTORY MUSEUM

JUNE 11, 1954

PRINTED IN THE UNITED STATES OF AMERICA  
BY CHICAGO NATURAL HISTORY MUSEUM PRESS

## Preface

During the summer of 1952, we continued our archaeological researches of the Mogollon culture of west-central New Mexico. We excavated a large rectangular kiva in an open site and four caves, two of which contain cliff-houses. This work was done under permits issued to Chicago Natural History Museum by the Forest Service, Department of Agriculture.

A report on the kiva is not included in this volume since excavation of the site has not been finished.

The names of the four caves are: Y Canyon Cave, Cosper Cliff-Dwelling, Hinkle Park Cliff-Dwelling, and O Block Cave.

Y Canyon Cave is in Gila National Forest and the others are within the boundaries of Apache National Forest. Y Canyon Cave is located about fifty miles due east of Reserve, New Mexico; Cosper Cliff-Dwelling is on the Blue River in east-central Arizona, about fifty miles west and a little south of Reserve; Hinkle Park Cliff-Dwelling is about thirty miles west of Reserve (almost on the Arizona-New Mexico boundary line); and O Block Cave is about seventeen miles due south of Reserve on the San Francisco River. The exact location by township, range, and section of each site is given in Chapter I, "The Caves."

Continuation of our work in Pine Lawn Valley has been made possible by the interest and generosity of President Stanley Field, Colonel C. C. Gregg, Director, and our Board of Trustees. We appreciate their trust and interest.

Our accomplishments would have been few, indeed, had we not had the support, the interest, and unflagging energy of our loyal friends and assistants. In this instance, we are proud to be debtors to:

Mr. Robert M. Adams and Miss Marjorie Kelly, assistants to Dr. Rinaldo; Mr. Thomas P. Alder, photographer and general assistant; Miss Elaine Bluhm, in charge of cataloguing and of over-all operations at the Saw Mill Site (large kiva); Miss Vivian Broman; Mr. W. T. Egan, in charge of excavations at Saw Mill Site; Messrs. Juan Armijo, Wayne Gaines, Abe Jiron, David Mabon, Alain Petit, Michael Snyder, and Wayne Spurgeon; and Mrs. Martha Perry, our cook.

We are also grateful to Messrs. Edward and Robert Atwood, Mr. Harold Bluhm, Mr. Robert E. Carey, Ranger, Hood Ranger Station, Mr. John Cosper, Mrs. Mary Crackel, Mr. Clair E. Gurley, Dr. Charles W. Keney, Mr. Emil O. Kiehne, Mr. Horace Spurgeon and Mr. Frank Turner.

Miss Lillian A. Ross, Associate Editor, Scientific Publications, has caught our errors of commission and omission and has made possible, as before, a format and arrangement of which we are proud.

Mrs. Dorothy Foss, Osteologist, identified the animal bones, and Dr. Robert Wyant, Curator, Economic Geology, the materials of which the tools of stone are made. Mr. Robert Skinner and Miss Patricia J. Anderson helped with the sorting and statistical work. Mr. Gustaf Dalstrom, staff artist in the Department of Anthropology, made the line drawings of sandals, matting, and cordage. Mr. George Thompson made the maps, plans, sections, and seriation charts.

*May, 1953*

PAUL S. MARTIN

# Contents

	PAGE
LIST OF ILLUSTRATIONS . . . . .	13
LIST OF TABLES . . . . .	16
I. THE CAVES . . . . .	17
Y Canyon Cave . . . . .	17
Cosper Cliff-Dwelling . . . . .	18
Hinkle Park Cliff-Dwelling . . . . .	20
O Block Cave . . . . .	23
Methods of Excavation . . . . .	24
Excavation Procedure . . . . .	29
II. ARCHITECTURAL DETAILS . . . . .	33
Cosper Cliff-Dwelling . . . . .	33
Hinkle Park Cliff-Dwelling . . . . .	37
III. POTTERY . . . . .	53
Pottery Types by Phase . . . . .	53
Mended, Restored, and Whole Pots . . . . .	64
Trends in Ceramic Popularity . . . . .	66
Summary . . . . .	72
Alphabetical List of Pottery Types . . . . .	72
IV. SPECIMENS OF STONE, BONE, AND CLAY . . . . .	87
Manos . . . . .	87
Rubbing Stones . . . . .	96
Polishing Stones . . . . .	99
Metates . . . . .	101
Small Metate-like Grinding Stones . . . . .	104
Paint Grinding Stones . . . . .	104
Worked Slabs . . . . .	108
Hammerstones . . . . .	110
Abrading Stones . . . . .	110
Awl Sharpeners . . . . .	110
Arrow Shaft Tools . . . . .	110
Stone Balls . . . . .	112
Stone Pipe . . . . .	114

	PAGE
Ceremonial(?) Objects . . . . .	114
Miniature Jar Stoppers(?) . . . . .	115
Pit Covers . . . . .	115
Stone Axes . . . . .	115
Projectile Points . . . . .	116
Flake Knives . . . . .	128
Scrapers . . . . .	128
Discoidal . . . . .	134
Choppers . . . . .	135
Drills . . . . .	136
Saw . . . . .	138
Gravers . . . . .	138
Stone Beads . . . . .	141
Stone Pendants . . . . .	142
Shell Bracelets . . . . .	142
Shell Pendants . . . . .	144
Shell Needle . . . . .	144
Shell Bead . . . . .	144
Bone Awls . . . . .	146
Bone Flakers . . . . .	147
Antler Flakers . . . . .	147
Notched Rib . . . . .	147
Dice . . . . .	147
Bone Dart Bunt . . . . .	148
Bone Tubes . . . . .	149
Worked Sherds . . . . .	149
Figurine . . . . .	152
Animal Effigies . . . . .	152
Pot Covers . . . . .	152
Miniature Ladles . . . . .	152
Pigments . . . . .	156
Crystals . . . . .	157
Summary . . . . .	157
V. CORDAGE, SANDALS, AND TEXTILES . . . . .	159
Cordage . . . . .	159
Fur and Feather Cord . . . . .	163
Knots . . . . .	164
Fiber Coils . . . . .	165
Carrying-Loop Chain . . . . .	165
Sandals . . . . .	166
Plain Weave Cloth . . . . .	170

# CONTENTS

11

PAGE

Netting . . . . .	171
Basketry . . . . .	173
Twilled Matting . . . . .	173
Plaiting . . . . .	176
Summary and Conclusions . . . . .	178

## VI. WOODEN ARTIFACTS . . . . . 181

Atlatls and Atlatl Equipment . . . . .	181
Bows and Arrows . . . . .	185
Digging Sticks . . . . .	189
Bark and Wood Trowels . . . . .	190
Bark and Wood Hoes . . . . .	191
Fire Drill Hearths . . . . .	192
Fire Drills . . . . .	193
Spatulas . . . . .	194
Split-Stick Tongs . . . . .	194
Toggles(?) . . . . .	195
Burred Sticks (Feather Carders?) . . . . .	195
Charred, Shouldered, Pointed Sticks . . . . .	195
Wooden Awl . . . . .	196
Yucca Leaf Spine Needle . . . . .	196
Wooden Cylinders . . . . .	196
Painted Sticks . . . . .	198
Tablitas . . . . .	200
Reed Cigarettes . . . . .	202
Reed Flute . . . . .	203
Wooden Die . . . . .	204
Pahos . . . . .	204
Miscellaneous Objects . . . . .	206
Summary and Conclusions . . . . .	208

## VII. SUMMARY . . . . . 212

## BIBLIOGRAPHY . . . . . 216

## INDEX . . . . . 223





# List of Illustrations

## TEXT FIGURES

	PAGE
1. Map showing location of caves . . . . .	Frontispiece
2. View of Y Canyon Cave . . . . .	18
3. View of Cosper Cliff-Dwelling from below; Blue River in foreground . . . . .	19
4. View of Hinkle Park Cliff-Dwelling from tower; Rooms F and G in center foreground . . . . .	21
5. View of O Block Cave from below . . . . .	25
6. View of interior of O Block Cave . . . . .	27
7. Interior of O Block Cave, showing excavated area . . . . .	28
8. Plan and sections of O Block Cave . . . . .	30
9. Plan and section of Cosper Cliff-Dwelling . . . . .	32
10. Interior of Room A, Cosper Cliff-Dwelling; firepit in foreground; white line indicates level of fill before digging . . . . .	33
11. Masonry, Room A (north wall), Cosper Cliff-Dwelling . . . . .	34
12. Cosper Cliff-Dwelling; doorway to Room B at left; remnant of wall of Room A at right . . . . .	35
13. Interior of Room B, Cosper Cliff-Dwelling . . . . .	36
14. Plan and sections of Hinkle Park Cliff-Dwelling . . . . .	38
15. Doorway to Room A, Hinkle Park Cliff-Dwelling . . . . .	39
16. Doorway from Room E to Room B, Hinkle Park Cliff-Dwelling . . . . .	41
17. Room D, Hinkle Park Cliff-Dwelling; slab-sided firepit, left center; post-holes and storage pits in floor. White line on wall indicates original depth of fill . . . . .	43
18. View of central block of rooms, Hinkle Park Cliff-Dwelling . . . . .	44
19. Ceiling of Room F, Hinkle Park Cliff-Dwelling . . . . .	45
20. Room G, Hinkle Park Cliff-Dwelling, before excavation . . . . .	47
21. Room K, Hinkle Park Cliff-Dwelling . . . . .	49
22. Trash Area, Hinkle Park Cliff-Dwelling . . . . .	51
23. Trash Area, Hinkle Park Cliff-Dwelling; detail of storage pit with bit of masonry at right . . . . .	52
24. Chart showing relationships of principal pottery types by selected squares and levels in O Block Cave . . . . .	54
25. Chart showing relationships of principal pottery types by selected squares and levels for Hinkle Park Cliff-Dwelling, Cosper Cliff-Dwelling, South Leggett Pueblo, Wet Leggett Pueblo, and Three Pines Pueblo . . . . .	55
26. Reserve Black-on-White and Tularosa Black-on-White potsherds . . . . .	57
27. Potsherds: Wingate Black-on-Red, St. Johns Polychrome, Pinedale Black-on-Red with sub-glaze, Tularosa White-on-Red, Tusayan Polychrome, Encinas Red-on-White(?), San Francisco Red Punched, and Cerros Red-on-White . . . . .	58

	PAGE
28. Potsherds: Punched Corrugated; Gray ware, corrugated neck, tooled; Alma Neck Banded; Plain and Indented Corrugated; Alma Plain with applied nodes; Plain Corrugated; Mimbres Indented Corrugated; and MacDonald Indented Corrugated(?) . . . . .	59
29. Smudged Decorated potsherds . . . . .	60
30. Puerco Black-on-White and Mimbres Black-on-White potsherds . . . . .	61
31. Alma Plain variant with fugitive red interior. Bowl from Square A-2, level 2, O Block Cave . . . . .	62
32. Miniature jars from Trash Area G, Hinkle Park Cliff-Dwelling . . . . .	62
33. Incised Corrugated jar from Room A, pit, Cosper Cliff-Dwelling . . . . .	63
34. Indented Corrugated Smudged Interior bowl from Room A, floor, Cosper Cliff-Dwelling . . . . .	64
35. Plain and Indented Corrugated jar from Room J, level 4, Hinkle Park Cliff-Dwelling . . . . .	65
36. Reserve Smudged bowl from Trash Area F, levels 3-5, Hinkle Park Cliff-Dwelling . . . . .	66
37. Three Circle Neck Corrugated jar from Square A-3, level 2, O Block Cave . . . . .	67
38. Tularosa Indented Corrugated jar from Room A, pit, Cosper Cliff-Dwelling . . . . .	68
39. Tularosa Fillet Rim pottery bowl from Square C-2, levels 1 and 2, O Block Cave . . . . .	69
40. Tularosa White-on-Red bowl from Room A, Cosper Cliff-Dwelling . . . . .	69
41. Schematic diagram of stratigraphy in O Block Cave . . . . .	71
42. Occurrence of ground and pecked stone artifacts by phases . . . . .	88
43. Occurrence of projectile points and blades by phases . . . . .	89
44. Occurrence of knives, scrapers, drills, and ornaments by phases . . . . .	90
45. Occurrence of bone and baked clay artifacts by phases . . . . .	91
46. Oval and rectangular two hand manos . . . . .	92
47. Rectangular two hand manos . . . . .	93
48. Oval and rectangular one hand manos . . . . .	94
49. Rectangular two hand manos with two grinding surfaces . . . . .	97
50. Rubbing stones . . . . .	98
51. Polishing stones . . . . .	99
52. Small metate-like grinding stone and slab type metate . . . . .	102
53. Shallow basin type metate from O Block Cave . . . . .	103
54, 55. Trough type metates from Hinkle Park Cliff-Dwelling . . . . .	105
56. Pit cover and paint grinding stones . . . . .	106
57. Worked slab from Hinkle Park Cliff-Dwelling . . . . .	108
58. Hammerstones and axes . . . . .	109
59. Arrow shaft tools, awl sharpeners, and abrading stones . . . . .	111
60. Stone pipe, ceremonial objects, double stone balls, jar stoppers, and single stone balls . . . . .	113
61-64. Projectile points . . . . .	117, 119, 123, 126
65. Projectile points or blades from O Block Cave . . . . .	127
66. Knives: biface and random flake types . . . . .	129
67. Scrapers: large, rough, thick, random flake, and small, rough, thick types . . . . .	131

## LIST OF ILLUSTRATIONS

15

	PAGE
68. Scrapers: thin flake, small keel-shaped, and serrate types . . . . .	132
69. Biface, hollow-edged, and end scrapers . . . . .	133
70. Choppers . . . . .	135
71. Drills, gravers, and saw . . . . .	137
72. Pendants, bracelets, needle, and beads . . . . .	143
73. Bone awls . . . . .	146
74. Bone tubes, dice, flakers, dart bunt, and notched rib . . . . .	148
75. Antler flakers . . . . .	150
76. Worked sherds, human figurine, and miniature ladle fragments . . . . .	151
77. Animal effigies . . . . .	153
78. Pot cover from Room E, Hinkle Park Cliff-Dwelling . . . . .	154
79. Occurrence of unworked animal bones from Squares A-2, B-1, C-2, O Block Cave, and Trash Area D, Hinkle Park Cliff-Dwelling . . . . .	155
80. Occurrence of cordage types by phases . . . . .	160
81. Occurrence of knots and cordage artifacts by phases . . . . .	161
82. Occurrence of sandals and textiles by phases . . . . .	162
83. Drawings of cordage types . . . . .	163
84. Two-warp wickerwork, four-warp wickerwork, and plaited sandals. . . . .	167
85. Drawings of two-warp wickerwork, four-warp wickerwork, and plaited sandals . . . . .	167
86. Large rabbit-net, tied with granny knots, from Three Circle Phase level of O Block Cave. Right: drawing of granny knot . . . . .	171
87. Two-rod-and-bundle, bunched foundation basket fragment from O Block Cave and drawing showing construction . . . . .	172
88. Fragment of large twilled mat from O Block Cave . . . . .	174
89. Small fragment of twilled mat with design produced by shift in direction of pattern and detailed drawing of section showing method of weaving to create shift in pattern . . . . .	175
90. Fragments of wide and narrow plaited bands . . . . .	177
91. Occurrence of wooden artifacts by phases . . . . .	180
92. Atlatl fragment; wooden cylinder; atlatl dart foreshaft, slotted; charred, shouldered, pointed stick; spatula; toggle; burred stick; and cigar-shaped object . . . . .	182
93. Functional bows; ceremonial bow, flat cross section; ceremonial bow, round cross section . . . . .	183
94. Digging sticks and ceremonial bow . . . . .	184
95. Arrow mainshafts and fragments of mainshafts with foreshafts inserted . . . . .	186
96. Shouldered arrow foreshafts and tapered arrow foreshafts . . . . .	188
97. Notched bark hoe, bark trowel, bark hoe with hole for hafting, and notched wooden hoe with bark attached . . . . .	191
98. Drilled piece of wood, cylindrical fire drill hearth, plano-convex fire drill hearth, fire drill, and fire drill also used as hearth . . . . .	193
99. Reed cigarettes, cane tube painted red, yucca leaf spine needle, wooden awl, wooden die, and split-stick tongs . . . . .	197
100. Peeled and unpeeled painted sticks . . . . .	199
101. Tablitas . . . . .	201
102. Reed flute, corn cob mounted on stick, knob-ended pahos(?), and ring paho . . . . .	205

TABLES: SHERD ANALYSES		PAGE
1.	Y Canyon Cave . . . . .	74
2.	Cosper Cliff-Dwelling . . . . .	77
3.	Hinkle Park Cliff-Dwelling . . . . .	78
4.	O Block Cave . . . . .	80

# I. The Caves

*By* JOHN B. RINALDO

## Y CANYON CAVE

(Figure 2)

### **Location and Physical Description**

Y Canyon Cave is the largest of a series of small caves in a conglomerate cliff on the north side of Y Canyon, a tributary canyon draining about two miles east to the San Augustin Plains. This site is located in Section 21, T. 7 S., R. 15 W., N.M.P.M., at an elevation of approximately 7,171 feet. It is actually more of a rock shelter than a cave, being of greater length than depth, and with a high arched roof which admits direct sunlight to the interior of the cave most of the day. It is situated about eighty feet up on the steep side of the canyon talus, where it overlooks a wide canyon floor sloping to the east at a very gentle gradient. At the foot of the talus a shallow dry gully flanked by scattered yellow pines meanders through the canyon. The flora is much like that of Tularosa Cave.

The mouth of the cave opens to the south and affords an excellent view both up and down the canyon. Although this cave mouth may be seen easily from the valley floor, the steep gradient of the rocky talus slope makes the cave somewhat difficult of access.

### **Surface Indications**

The cave floor is approximately fifty feet wide and thirty feet deep. However, the walls converge at the rear, so that there it is only twelve feet wide. The high broad arch of the cave permitted driving rain and snow to enter, so that there were no dried weeds, leaves, or other perishable materials in the front part of the cave. Some tumble weed and yucca leaves at the rear of the cave gave evidence of dry conditions there; the surface of the midden was fairly level but littered with large and small rocks. The cultural debris on the surface consisted of pottery, flint chips, and projectile points. Fragments of wooden or textile artifacts were lack-



FIG. 2. View of Y Canyon Cave.

ing. Both plain and textured pottery were picked up by the survey. Some scattered manure indicated that the area had been used as a shelter for cattle and sheep.

### COSPER CLIFF-DWELLING

(Figure 3)

#### **Location and Physical Description**

Cosper Cliff-Dwelling is located on the ranch of Mr. John Cosper, about twelve miles by road south of the present Blue, Arizona, Post Office



FIG. 3. View of Cospes Cliff-Dwelling from below; Blue River in foreground.

(Joy's Ranch), in Section 1, T. 3 N., R. 30 E., G. and S.R.M., at an elevation of about 5,000 feet.

The cave itself is a small one situated at the top of a rocky talus cliff about fifty feet above the Blue River, which in this place flows through a narrow canyon between towering cliffs. The surrounding country is rugged and semi-arid. Live oak, mesquite, cactus, and agave are common. However, some cottonwood trees grow along the river in the wider reaches of the canyon. Just where the Indians planted their crops is not certain, although there are several flats in the canyon and these may have been utilized for agriculture except during spring floods. Even in dry years the Blue River carries water. It seems likely, therefore, that in the twelfth and thirteenth centuries water would have been abundant. There may have been some irrigation from this stream, although we have no evidence on this point. We do know, however, from the pottery types, that trade up and down this river was common.

### **Surface Indications**

The cave appears to have originated from a fissure between a soft conglomerate stratum and a harder surrounding breccia formation. The back of the cave and the floor consist of this conglomerate; the roof and side walls are of breccia. The opening is more or less rectangular in shape and the inner walls of the cave are fairly vertical. The cave had been divided into two rooms by a crude masonry wall. The front wall of the northernmost room (Room B) is bedrock, and entry into this room is made through a rather small hole in this bedrock. On the other hand, a small remnant of masonry laid on the bedrock in front of Room A indicates that this room once had a masonry front wall.

The surface of the midden in both rooms was covered with small rocks, gravelly sand, corn cobs, yucca quids, cactus thorns, brown fibers, and potsherds. The pottery on the surface was predominantly of textured types.

## **HINKLE PARK CLIFF-DWELLING**

(Figure 4)

### **Location and Physical Description**

This cliff-dwelling is situated in a yellow pine and oak forest in the San Francisco Mountains on a divide between the Blue and the San Francisco River drainages. It is hidden from direct view in the end of a small box canyon just off the Forest Service road to Saddle Mountain Fire Tower.





FIG. 4. View of Hinkle Park Cliff-Dwelling from tower; Rooms F and G in center foreground.

On the Forest Service map of Apache National Forest it is located in Section 7, T. 3 N., R. 21 W., N.M.P.M., at an elevation of 7,200 feet. It is ten miles west and a little south of Pine Lawn Camp.

The cave opening faces southward and is about fifty feet long and ten feet high at the center. The greatest depth of the cave is about twenty-eight feet. Some time during the past century the front part of the cave roof broke off in gigantic pieces and smashed the outer rooms of the building. The boulders not only demolished portions of the building but also hid and somewhat protected it from all but the most curious. They also made excavation very difficult.

### Surface Indications

Before excavation nine rooms were in evidence, all contiguous with the exception of Room H, which stood up above the midden as a doorway and a short section of wall, less than a meter east of Room F. In the center front, Room G above Room F formed a two-story structure. It is likely that there was a second-story room over Room K, but that and any other portions of the two-story building were destroyed by the gigantic rock fall. The other rooms were grouped around this two-story structure in a general plan conforming to the oval shape of the cave.

The outermost rooms (I, J, K) were completely filled with rock and trash more than a meter deep, the rear rooms (A, B, C, etc.) contained shallower accumulations, and Room G, the second-story room, had virtually none. Fallen wall slabs and a certain amount of adobe occurred on the surface in all the rooms. In the dark back rooms these wall fragments were apparently the result of the efforts of curiosity seekers to provide light and ventilation by knocking holes in the outer walls.

Some larger slabs from the roof had fallen onto the surface of a trash-filled area in the east end of the cave. This rather large area revealed no evidence of rooms before excavation and was designated as "Trash Area."

The surface of the interior, between the wall and the roof slabs, was covered with bat, rat and other animal manure, sand, brown fibers, corn cobs, pinyon nut shells, acorns, walnuts, grass, pine cones, and some cane fragments. There were also manos, potsherds, flint chips, and portions of worked slabs scattered around.

On the north side of the "Trash Area" and about 1.5 meters above the cave floor was a shelf, a natural crevice that extended back into the bed-rock about 2 meters, and that was about 75 cm. high in front and only about 20 cm. high in the rear. On this shelf there was also an accumulation of cultural debris, sand, and manure.

## O BLOCK CAVE

(Figures 5-7)

**Location and Physical Description**

O Block Cave is one of a series of large and small caves which lie underneath and between massive rock bluffs that overlook a small park-like valley some two hundred feet above and a third of a mile east of the San Francisco River. It is situated in Section 16, T. 8 S., R. 19 W., N.M.P.M., at an elevation of about 6,260 feet.

The cave is hidden from the view of persons passing down the river canyon by a knoll and a thick growth of yellow pine, juniper, and oak trees, and from the direct view of persons moving through the small upper valley by its location around the corner of a prominent bluff. Thus it escaped the observation of most of those passing by and, with the exception of some shallow pits, remained untouched by digging.

When viewed from below (fig. 5), the mouth and roof of the cave resemble a vaulted arch some sixty feet high. The ground on the slope below the cave is carpeted patchwork fashion with a thick layer of oak leaves and pine needles which have accumulated in pockets between the small boulders and the rotten logs with which the slope is strewn. Here and there clumps of grass grow.

Not far from the cave, both the upper valley and the river canyon broaden out into flat, wide stretches of land that furnish good grazing for cattle at present and could easily have been arable land under slightly better climatic conditions. Possibly it was here that the corn was raised that we found in our excavations.

The cave appears to have originated as a rock fault between the huge breccia boulders which form the ceiling and the walls. The roof rock is split vertically in several places and enormous boulders in the center of the floor show how great sections of the roof have fallen in at some time in the past.

The cave floor was divided into two areas by the largest of these boulders—a lower cave with a fairly deep midden deposit, and an upper cave featured by two narrow tunnels at the rear, in which the deposit was shallower and consisted predominantly of rock, sand, and other natural detritus.

**Surface Indications**

Before excavation, the midden surface of the lower cave was littered with corn cobs, fragments of matting, arrow foreshafts, bow fragments,

pottery, flint chips, and other occupational debris. In one front area (Square A-3) the roof of the cave sloped down to within a few inches of the midden, but inclined upward toward the rear. Although this feature hampered excavation in the front section or two, it had protected the wooden artifacts and other perishable materials from rains which penetrated into the interior of the other side of the cave or dripped down through the cracks in the overhang near the center. For this reason many of the perishable objects were found on this side of the cave, and here there were some scattered pits made by curiosity seekers.

Hornets lived in a cleft in the rock, and on occasion deer and bear or their spoor were seen in the vicinity and even up in the cave. On the other hand, there was less animal manure on the surface than in the other caves excavated by us; this cave did not appear to have been extensively used by domestic animals or even by rats and bats.

The pottery collected from the surface consisted primarily of Alma Plain, although a fair number of plain corrugated, indented corrugated and even black and white sherds were found. Some flint chips were observed.

## METHODS OF EXCAVATION

To facilitate the keeping of records and as a horizontal control over the find spots of specimens, cave areas not included in rooms were divided into sections two meters square. However, a different system of designation was used in each cave. In O Block Cave, the four trenches were designated by the letters A to D, and the squares or subdivisions of the trenches were numbered consecutively from the back of the cave toward the mouth (fig. 8). In Y Canyon Cave, the two trenches were differentiated by labeling the east trench Sq. 5R1 to distinguish it from Sq. 5 of the central trench. The other squares of the central trench were numbered (1 to 4) from the mouth of the cave toward the rear. These were also two-meter squares. The trash area of Hinkle Park Cliff-Dwelling was divided off into sections of approximately equal size designated by letters from A to G (see map, fig. 14). The rooms of the two cliff-dwellings were designated by letters in the order of their excavation. Room A, Cosper Cliff-Dwelling, was at first divided into north and south halves, but as excavation proceeded this division did not appear to yield significant differences, and the floor-level was excavated as a unit.

Generally, levels 20 cm. in thickness were used as a vertical control. However, this standard was modified in a few instances; for example, the surface levels of all the caves were excavated to a varying depth to achieve a level floor so that subsequent levels might be of uniform thickness.



FIG. 5. View of O Block Cave from below.

Natural levels were noted in both Y Canyon Cave and O Block Cave. However, with two exceptions the upper and lower limits of these "beds" were so vague as to be virtually indistinct. In two exceptional instances—a gray ashy layer in Y Canyon Cave (level 1B) and a yellowish sand layer in O Block Cave—natural levels were used as vertical controls. However, the majority of the levels were excavated in the arbitrary 20 cm. thickness.

### The Fill

The fill in Y Canyon Cave consisted of a brown fiber layer and an ashy gray layer. The brown fiber layer was confined to the uppermost level (1A) and the ashy gray layer to the lower artificial levels (levels 1B and 2). At the bottom, in level 2, gravel and bedrock were encountered.

In O Block Cave the top levels consisted of gray dust with a considerable admixture of fiber. Below this and blending into it was an ashy level with occasional distinct lenses of ash and charcoal. This level also contained large sections of yellow pine bark. Underneath the ashy fill the soil grew steadily darker, with some diminution in charcoal and ash content. The bottom layer was composed of sand and loose rock ranging in color from a yellowish buff to a pinkish tan. Toward the mouth of the cave this sand layer was sterile. In the rear of the cave, excavations were carried through this sand to bedrock.

There were also some differences of more limited extent. Next to the rear wall of O Block Cave there was a considerable element of fine light-colored pink to gray sand mixed into the top two levels (about 40 cm.). This sand is believed to have weathered out of the rear wall. At the mouth of the cave, especially near the center, moisture had been driven in by storms and the top levels were more earthy in nature. The average depth of occupational debris in this cave was 172 cm.

The fill in Hinkle Park Cliff-Dwelling and Cosper Cliff-Dwelling was uniform in nature, consisting of bat, rat, and other animal manure, fine sand, some gravel, much fiber, corn cobs, nut shells, acorns, and an occasional grass nest. The depth of fill varied from room to room but averaged about one meter. All of the fill in the Cosper Cliff-Dwelling rooms and in the Trash Area and rear rooms of Hinkle Park Cliff-Dwelling was dry. However, the east end of the Trash Area and the unprotected front rooms at this cliff-dwelling had been subject to moisture. In all of the caves a certain amount of condensation was evident in the levels next to bedrock, walls or floor. Although this moisture was not always sufficient to disintegrate perishable materials completely in the late cliff-dwellings, it was enough to make textiles and wooden artifacts found in these areas very fragile.



FIG. 6. View of interior of O Block Cave. Meter stick in foreground.



Fig. 7. Interior of O Block Cave, showing excavated area. Meter stick in background; arrow (50 cm. long) points north.



## EXCAVATION PROCEDURE

Before actual digging began in each cave, the undivided area to be excavated was staked out into a grid system of co-ordinates; a metal tape was used for measurements and to check angles. Then a level chalk line was set up between a nail driven into the wall of the cave at one end of the central trench and a point at the other end of the trench (a nail driven into the roof in O Block, a point on an outer wall at Hinkle Park Cliff-Dwelling, and a stake at Y Canyon Cave). This chalk line was made level by means of a carpenter's level and served as a datum for the determination of vertical positions and the leveling of the lower limits or floor of the levels.

The initial trenches in Y Canyon Cave, O Block Cave, and Cosper Cliff-Dwelling were started at the outer edge of the cave, as close to the center of the area to be excavated as possible. However, in Hinkle Park Cliff-Dwelling, the difficulties of finding a practical wheelbarrow path for the removal of the fill, due to the arrangement of the rooms and the character of the gigantic rock fall in front necessitated starting at the back of the cave. This was the darkest of the caves and we had to use artificial light (from large flashlights) anyway, whereas in the other caves we had the advantage of natural light on the face of the profile or vertical wall into which we were digging. In many difficult areas of Hinkle Park Cliff-Dwelling the fill had to be loaded into a bucket and passed up to the wheelbarrow.

As a rule, material was dug from a vertical face with a trowel or a small shovel, accumulated in a pile, and shoveled into a wheelbarrow. It was then taken out of the cave and poured on a large rigid sieve situated just over the edge of the talus slope. As it was put through the sieve the cultural material was put into boxes with fine mesh hardware cloth bottoms (to allow the dust to filter out).

As each section was completed the cultural material in these boxes was sorted out, and materials such as plants, bone, stone, pottery, and textiles were placed in separate sacks marked with the find spot designation. Large stone artifacts such as metates and manos were marked with lumber crayon with the find spot designation and kept in a separate pile for cataloguing, photographing, and selection of type specimens to be returned to the museum. Records were made at this time of the soil content of each section, the cultural materials found therein, artifact associations, and other pertinent information. Very few drawings were made of soil profiles because the distinctions between the natural levels were so vague as to render any measurements and drawings subjective.

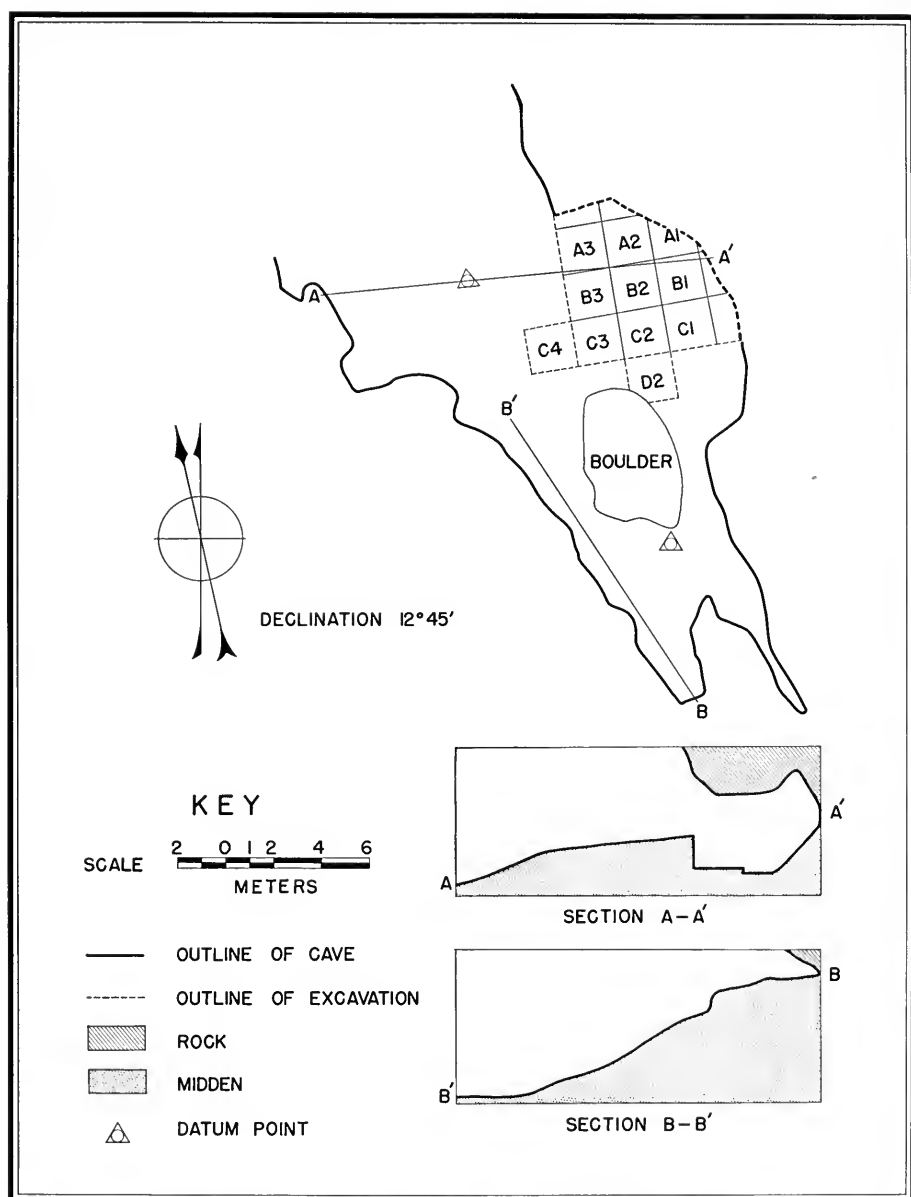


FIG. 8. Plan and sections of O Block Cave.

Rock falls of large slabs and boulders, which were particularly bothersome in the upper levels of the outer rooms at Hinkle Park Cliff-Dwelling and in the lower levels of O Block Cave, were broken up into portable pieces with a long-handled sledge hammer and a heavy four-foot pry bar.

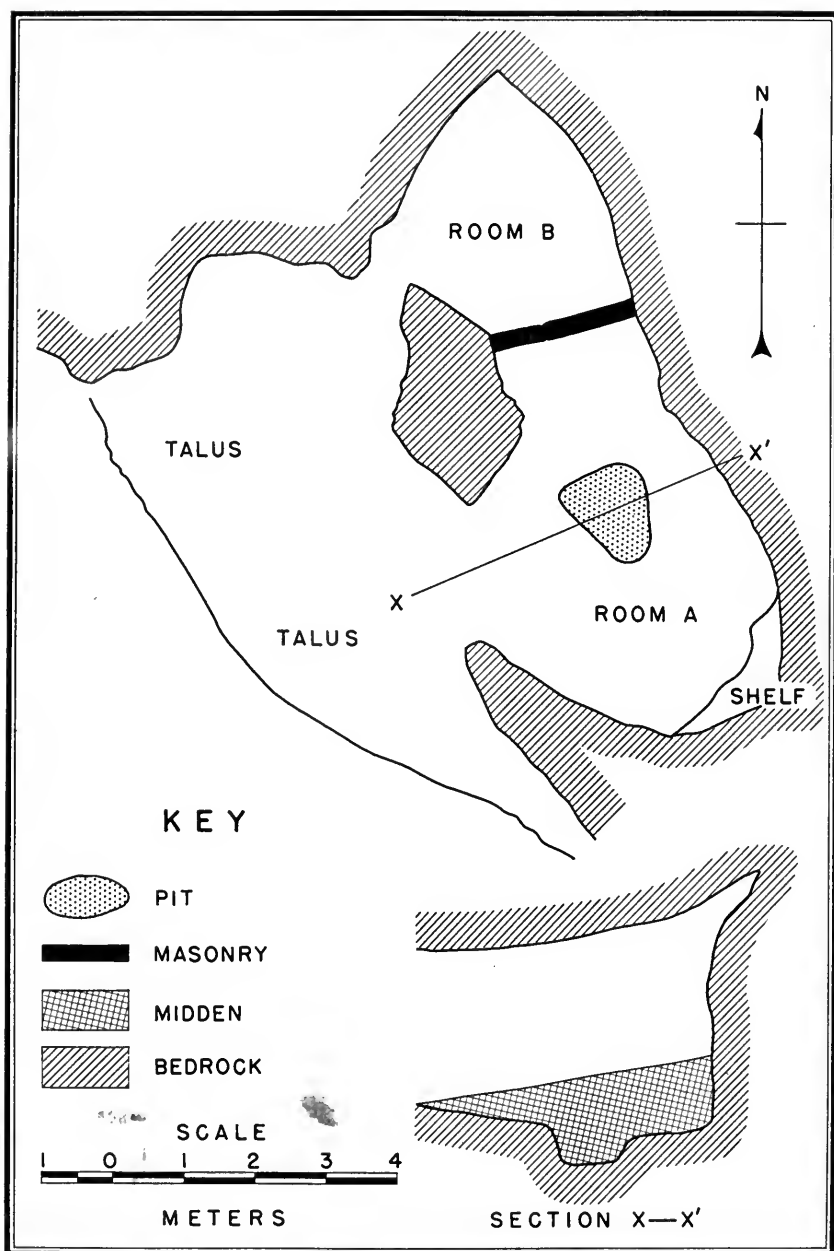


FIG. 9. Plan and section of Cosper Cliff-Dwelling.

## II. Architectural Details

*By* PAUL S. MARTIN

### COSPER CLIFF-DWELLING

(Figure 9)

The shelter or cliff-pueblo that lies within the cave is very crude. There are only two rooms, separated by a masonry wall. The fill was about 50 cm. to 1 meter deep; near the door in Room A was a layer of cottonwood bark laid flat, 1 meter by 50 cm.



FIG. 10. Interior of Room A, Cospes Cliff-Dwelling; firepit in foreground; white line indicates level of fill before digging. Meter stick in background; arrow (50 cm. long) points north.



FIG. 11. Masonry, Room A (north wall), Cosper Cliff-Dwelling. Meter stick in foreground.

### **Room A**

(Figures 10, 11)

*Shape:* Very irregular; more or less rectangular; conforms to form of cave.

*Walls:* Three sides of room formed by cave walls. Between this room and Room B was a crude wall of masonry; height 1.60 meters; thickness 25–30 cm.; water-worn boulders of basalt and granite, most of which were unshaped; a few roughly hewn; laid in thick adobe cushion with many angular pebbles tucked in around larger stones; no plaster.

*Doorway:* Entrance to room now merely a gaping hole in cave wall. Formerly there may have been a wall across this hole, because there is a short, stub end of wall on the south side of the doorway.

*Floor:* Unplastered bedrock (conglomerate).



FIG. 12. Cosper Cliff-Dwelling; doorway to Room B at left; remnant of wall of Room A at right.

*Pits:* Two; one in the fill (40 cm. from southwest corner) 45 cm. by 1.50 meters and 50 cm. deep; contained 2 pots (incised corrugated and indented corrugated jars) and mano. The other opposite the doorway; irregular in shape; 1 meter by 1.40 meters, and 45 cm. deep; contained burned rocks and much charcoal.

*Firepit:* See above under *Pits*.

*Ceiling:* Cave roof; 3.10 meters high.

*Phase:* Tularosa.

*General Comments:* Probably used primarily as a dwelling (firepit and bedding of grass). Later used as a trash area.



FIG. 13. Interior of Room B, Cosper Cliff-Dwelling. Meter stick in background; arrow (50 cm. long) points north.

### Room B

(Figures 12, 13)

*Shape:* Irregular; north side pointed; conforms to irregularities of cave.

*Walls:* Three walls of bedrock; fourth or south wall, of masonry, shared with Room A. Height of opening 45 cm.; width 75 cm.



*Doorway:* A natural opening in rock, unimproved by means of masonry.

*Ventilator Opening(?):* Over doorway, another natural hole in rock; height 30 cm.; width 45 cm.

*Floor:* Unplastered bedrock; uneven.

*Pits:* None.

*Firepit:* None.

*Ceiling:* Cave roof.

*Phase:* Early Tularosa.

*General Comments:* Probably used as a dwelling room. Along south wall and east walls was a horizontal pole supported by forked upright logs. Since the lower ends of the props were not set in postholes, we are of the opinion that this wooden framework is not prehistoric.

## HINKLE PARK CLIFF-DWELLING

(Figure 14)

*Shape:* Rooms built to conform to oval shape of cave.

*Number of Rooms:* Eleven, all contiguous, and a large area designated as "Trash Area."

*Number of Stories:* Two, in one place; Room G is above Room F and forms a second story. Probably there was a second story over Room K, and it and other portions of a two-story building were destroyed by a gigantic rock fall.

### Room A

(Figure 15)

*Shape:* More or less circular.

*Walls:* Laid directly on sandstone bedrock; the lowest portion of the wall (25–60 cm. up), also bedrock, had been cut and scraped away to fit the needs of the builders. Dimensions: 20 to 50 cm. thick; greatest height (north wall) 1.75 meters; least height (south wall) 1.13 meters. Construction: the corners were probably bonded, but they were covered with adobe plaster which we did not care to disturb. The core was composed of gravelly adobe and small angular stones, although there are many through stones. Type of masonry: small to medium flat slabs in a thick adobe cushion; resembles some masonry at Sierra Ancha (Haury, 1934, pl. XXVI, left). Materials used: igneous rock and sandstone; the size of the stones varied from thin slabs (about 4 cm. thick and 50 cm. long) to rectangular blocks (15 cm. thick and 40 cm. long). Surfaces: exposed

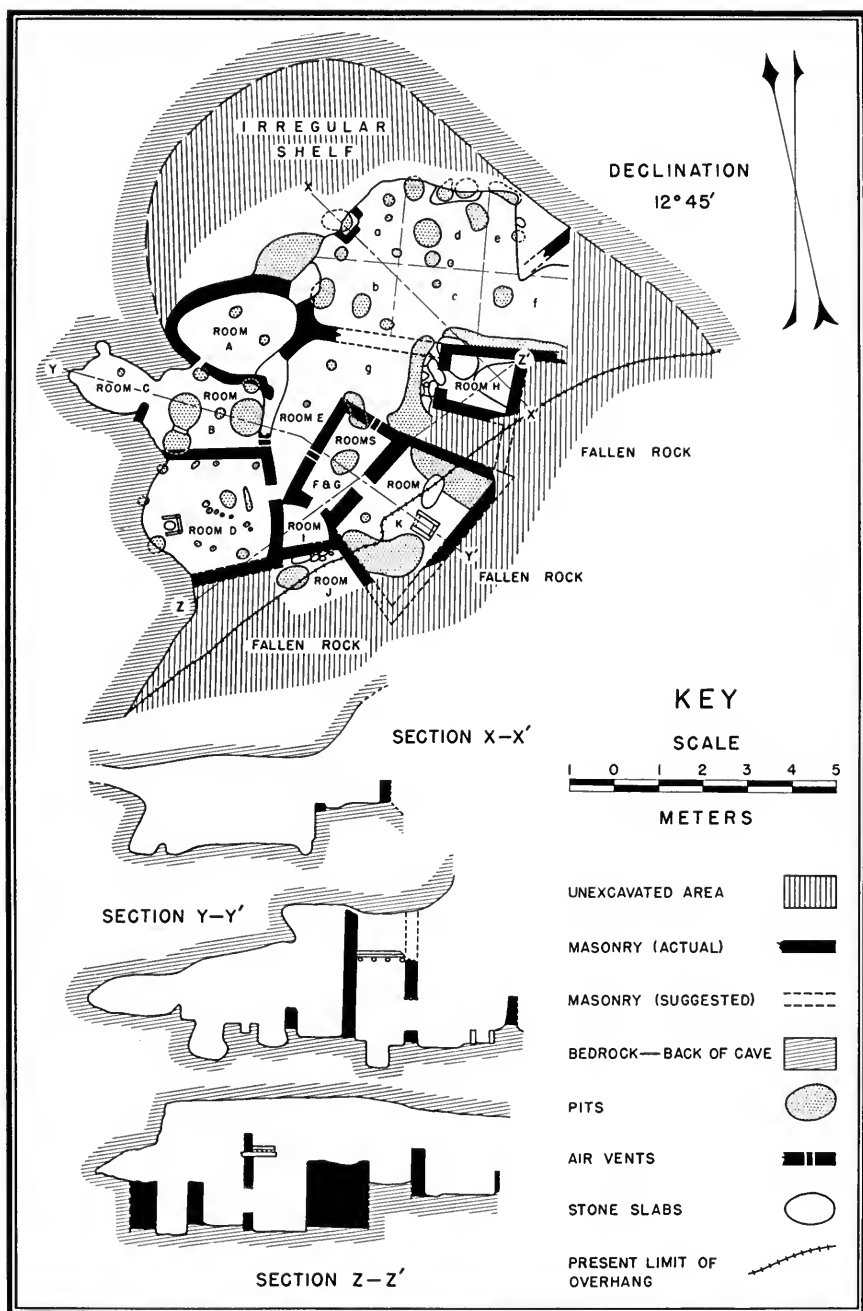


FIG. 14. Plan and sections of Hinkle Park Cliff-Dwelling.

faces of some stones were roughly tooled; others unshaped; dimpling absent. Joints: not consistently broken. Spalls: mostly false (wedge-shaped; used to swell mortar); a few, true-bearing spalls (touching stones above and below to transmit pressure); occasional sherds. Mortar: red to orange pink; sandy and gravel-tempered; could be scratched with a finger nail. Plaster: single layer, 0.5 cm. to 2.0 cm. thick; undecorated. In good condition and so well applied that masonry was not visible. Appearance fairly regular, in areas in which plaster had scaled off or we scraped it off. Our feeling was that the appearance of the masonry was unimportant to the builders, since they expected to plaster over all stonework.

*Doorway:* One; in east wall; height 50 cm., width 30 cm. Jamb, lintel, and sill of masonry, well covered with plaster. The sill was 35 cm. above the floor. No loops; the closing of the chamber was provided for by lateral

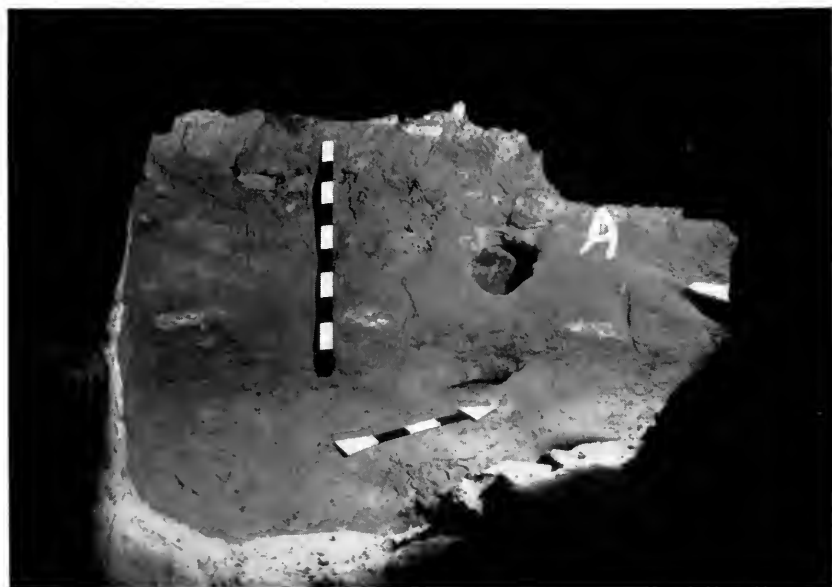


FIG. 15. Doorway to Room A, Hinkle Park Cliff-Dwelling. Meter stick against wall of Room A; arrow (50 cm. long) points north.

recesses or a “stop” of adobe against which a vertical door-slab leaned. No T-doorway.

*Ventilator Opening and Niches:* Vent opening 25 cm. above doorway; height 16 cm.; width 15 cm. There was one very small hole in the south wall at floor level, opening into Room B, just big enough to put one’s hand through. Its use is unknown. There were two oval niches in the

lower wall: one was just north of the doorway; height 17 cm., width 16 cm., depth 13 cm. Another was in the wall opposite the doorway; height 25 cm., width 24 cm., depth 30 cm.

*Floor:* Adobe plastered on bedrock; surface color gray; under color pink.

*Pits:* Two. One pit was an oval bin with undercut walls; diameters 30 and 22 cm., depth 23 cm.; located near the west wall opposite the door. Another pit was west of the door; diameters 14 and 13 cm., depth 18 cm.

*Firepit:* None.

*Ceiling* of room composed of natural cave roof; height near door 1.75 meters; height at south wall 1.13 meters.

*Phase:* Transitional Reserve-Tularosa.

*General Comments:* Used probably as a dwelling room. Trash was not extensive. It may have been one of the earlier rooms in the Pueblo, although there is probably very little time difference between the earlier and later rooms—15 to 25 years, perhaps.

### Room B

(Figure 16)

*Shape:* Rectangular.

*Walls:* Same as Room A. Dimensions: height 1.0 to 1.75 meters; thickness 20 to 25 cm.

*Doorways:* Two. One in east wall; height 132 cm.; width 75 cm.; sill 43 cm. above floor; jambs of pine pole (one to each side) about 12 cm. in diameter; sill and lintel of stone well covered with adobe. The other, in west wall, leading into Room C (see Room C for description). No T-doorway.

*Ventilator Openings and Niches:* Vent openings just south of door in east wall, the top on a level with the lintel; height 25 cm.; width 15 to 19 cm. An oval niche in the northwest corner, just above the floor; diameters 40 to 60 cm.; depth 35 cm.

*Floor:* Same as Room A.

*Pits:* Six; diameters from 22 to 86 cm.; depths 16 to 86 cm. All were floored over with sticks and adobe. The central one was lined with matting, and contained corn cobs and a worked stick (paho?).

*Firepit:* A shallow depression, with slab flooring, next to center of north wall. Margins of pit indefinite; ashes spread over floor of room.

*Ceiling:* Cave roof; height from 1.0 to 1.75 meters.



FIG. 16. Doorway from Room E to Room B, Hinkle Park Cliff-Dwelling. Meter stick at left.

*Phase:* Transitional Reserve-Tularosa.

*General Comments:* Probably a dwelling room. The east wall abuts at the north end on the south wall of Room A and at the south end on the north wall of Room D. No bonding at all. Probably a nuclear room.

### Room C

*Shape:* Elongated teat of cow.

*Walls:* All of bedrock, except south half of east wall. Masonry, therein, like that of Room A; height 70 cm.; thickness 30 cm.

*Doorway:* One, in east wall; height 75 cm.; width 60 cm.; height of sill above floor 25 cm. Sill and lintel of bedrock.

*Niches:* Three, all oval-shaped. One in north wall: diameter 15 cm., depth 30 cm. Two in south wall: diameters 20 and 50 cm.; heights 15 and 40 cm.; depths 15 and 35 cm.

*Floor:* Bedrock, unplastered.

*Pit:* One, undercut walls; top diameter 12 cm.; depth 30 cm. Covered with twigs and mud.

*Firepit:* None.

*Ceiling:* Cave roof, 80 cm. above floor.

*Phase:* Transitional Reserve-Tularosa.

*General Comments:* Used probably as a granary (some corn, nuts, vegetable materials recovered, and ceiling low).

### Room D

(Figure 17)

*Shape:* Rectangular.

*Walls:* Same as Room A, plus the following notations: the west wall is the rear wall of the cave and has no masonry in it. Thickness 20 to 25 cm.; greatest height 2 meters.

*Doorway:* One (rectangular) in east wall; height 72 cm.; width 50 cm.; height of sill above floor 31 cm. Lintel of wooden rods, each 4 to 5 cm. in diameter. Sill and jambs of plaster-covered stone. The lower portion is closed with a plug of masonry. Just below the sill is a grooved slab to support a vertical door slab.

*Niches:* Three, in south wall; lengths 20, 30, and 35 cm.; heights 15, 25, and 30 cm.; depths 30 and 40 cm.

*Floor:* Adobe plastered on bedrock; gray on surface; pink beneath.

*Pits:* Two; greatest diameters 32 and 35 cm.; depths 40 and 55 cm. The pit in the north half of the room had been floored over.

*Firepit:* Rectangular, with slab sides and bedrock bottom; length 35 cm., width 30 cm., and depth 50 cm.

*Slot:* Use unknown; may have been a receptacle for a deflector(?); length 59 cm., depth 5 cm.

*Postholes:* Eight holes stretching part way diagonally across room, more or less in line; diameters and depths 10 cm. Also in floor were several

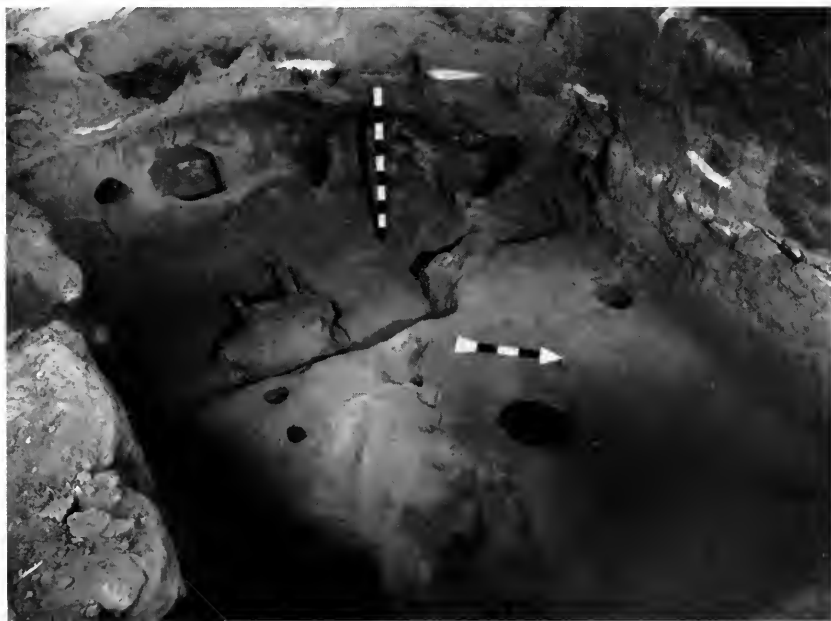


FIG. 17. Room D, Hinkle Park Cliff-Dwelling; slab-sided firepit, left center; postholes and storage pits in floor. White line on wall indicates original depth of fill; meter stick in background; arrow (50 cm. long) points north.

other such holes of approximately the same size, all filled and sealed with adobe plaster. The purpose is unknown; they may represent an earlier partition in the room.

*Ceiling:* Cave roof; 2 meters high.

*Phase:* Transitional Reserve-Tularosa.

*General Comments:* Firepit may indicate that room was used as living quarters. May have been one of the "nuclear rooms." Two "floors" were present, separated by refuse.



FIG. 18. View of central block of rooms, Hinkle Park Cliff-Dwelling; Room F, below, and G, above. Meter stick in foreground.



### Room E

In its present state, this room served mainly as a passageway to Rooms A, B, and D.

### Room F

(Figures 18, 19)

*Shape:* Rectangular; the lower story of a two-story section.

*Walls:* Similar to those of Room A, except that the front wall is composed of large stones in fairly even courses, whereas the other three walls are built of smaller slabs. Thickness 20–30 cm.; greatest height 1.94 meters.

*Doorways:* Two, both rectangular. Dimensions of east doorway: height 73 cm.; width 37 cm.; height of sill above floor 35 cm. Dimensions of south doorway (to I): height 55 cm.; width 35 cm.; height of sill above floor 43



FIG. 19. Ceiling of Room F, Hinkle Park Cliff-Dwelling.

cm. Both doorways were provided with stone and wooden lintels, the latter composed of three poles in each doorway, each pole about 6 cm. in diameter.

*Ventilator Opening:* In the north wall was a sealed doorway, with a rectangular opening in the upper part; dimensions 12 by 18 cm.

*Floor:* Adobe plastered on bedrock.

*Pits:* Two. One near east door; undercut walls; diameter 55 cm.; depth 65 cm. The second under north wall (extending into Trash Area); diameter 30 cm.; depth 30 cm.

*Firepit:* None.

*Ceiling:* One of the best preserved and documented in the Mogollon area; the first one found in Pine Lawn area. Four main beams (pinyon), diameter of each about 10 cm., lengths 2 meters; laid north to south; ends rounded to pointed, but showing ax marks. (One beam now missing.) All were in excellent condition. On top of these main beams were splints, the widths of which were 5 to 8 cm.; laid close together, one butted against the next. On top of splints, gray adobe 10 cm. thick, forming the floor of the room above (G).

*Phase:* Transitional Reserve-Tularosa.

*General Comments:* The only two-story room known in Pine Lawn Valley. Probably added after the rear rooms were built. Purpose unknown, but may have been dwelling room. In last days of pueblo was used for refuse.

### Room G

(Figure 20)

*Shape:* The same as Room F and is the upper story over F. The east wall is missing (destroyed by pot-hunters or by rock fall).

*Walls:* For the most part the same as those of Room A. Exception: few through stones, but many large slabs set in adobe cushion. Dimensions: thickness 24 to 32 cm.; height 1.5 meters (running up to cave roof).

*Doorways:* None.

*Ventilator Opening:* In rear wall, 12 by 15 cm.

*Floor:* Adobe (10 cm. thick) plastered on ceiling splints of Room F (see description of ceiling, Room F).

*Pits:* None.

*Firepit:* None.

*Ceiling:* Roof of cave, 1.5 meters above floor.

*Phase:* Transitional Reserve-Tularosa.



FIG. 20. Room G, Hinkle Park Cliff-Dwelling, before excavation.

*General Comments:* Purpose unknown; possibly used as granary. Built at the same time as the lower story (Room F).

### Room H

*Shape:* Rectangular.

*Walls:* Similar to those of Room A. Thickness 20–30 cm.; height 1 meter.

*Doorway:* In west wall; rectangular; height 57 cm.; width 40 cm. Lintel a stone slab; sill and jamb of stone and adobe. The lower portion of the doorway is plugged (25 cm. up from floor); possibly it was a recess or a support for a slab door.

*Ventilator Opening:* None.

*Floor:* Presently composed of large slabs, probably from roof-fall.

*Ceiling:* Missing.

*Phase:* Transitional Reserve-Tularosa.

### Room I

*Shape:* Wedge-shaped. The room looks like an afterthought or a make-shift attempt to utilize left-over space.

*Walls:* Same as Room A. Thickness 20–25 cm.; present height 155 cm.

*Doorway:* Described as south doorway under Room F.

*Beam Socket(?):* In south wall; 90 cm. above floor; length 14 cm.; height 13 cm.; depth 10 cm. Semicircular in shape.

*Wall Plate(?):* The pole on top of the northwest wall may be a ceiling splint or a wall plate.

*Floor:* Orange and gray adobe on bedrock.

*Ceiling:* Made up in part of small poles 5 cm. in diameter, laid in north-south direction.

*Phase:* Transitional Reserve-Tularosa.

*General Comments:* The room was probably used as a granary (much corn found therein). A second story may have existed and may have been demolished by falling rock.

### Room J

*Shape:* Not determined, since the room was not completely excavated due to fall of large rocks.

*Walls:* Same as Room A. Thickness 20–25 cm.; present height 1 meter.

*Doorway:* A sealed doorway in the west wall may have existed, but because of the rock fall this cannot be determined.

*Floor:* Smoothed, adobe floor, 40 cm. above bedrock.

*Pit:* Near west wall; vertical walls, flat bottom; diameter 65 cm., depth 30 cm.

*Ceiling:* Impossible to determine the type.

*Phase:* Transitional Reserve-Tularosa.

*General Comments:* No ventilator openings and no firepit. The use of the room is unknown. Possibly it was reoccupied, as the pit was sealed by a floor.

### Room K

(Figure 21)

*Shape:* Roughly pyramidal.

*Walls:* East and north walls were built on bedrock. Through stones are rare; north, south, and east walls are made of large slabs, west wall of



FIG. 21. Room K, Hinkle Park Cliff-Dwelling; slab-sided firepit in foreground; doorway to Room F in background. Meter stick in background; arrow (50 cm. long) points north.

small to medium slabs. All are set in thick adobe cushions. Both igneous and sandstone slabs were used. Thickness 25–30 cm.; maximum present height 1.70 meters.

*Doorway:* See under Room F, south doorway.

*Floor:* Adobe on bedrock.

*Pits:* Three. Two, adjoining, on southwest wall; diameters 60 and 80 cm.; depths 45 and 40 cm. One near northeast wall, irregular in shape; greatest width 85 cm.; depth 45 cm. The pits are both undercut and partially floored over with sticks and adobe.

*Firepit:* Rectangular, slab-lined; in the center of the room; length 45 cm.; width 34 cm.; depth 27 cm.

*Postholes:* Three(?); on the edge of the northeast pit; diameters range from 10 to 20 cm.; depths from 10 to 15 cm.

*Ceiling:* Type undetermined.

*Phase:* Transitional Reserve-Tularosa.

*General Comments:* Probably Room K was a dwelling room, perhaps only one story high.

### **Trash Area**

(Figures 22, 23)

The northeastern end of the cave, designated as the Trash Area, comprises about one-half of the total cave area. One or more rooms may have occupied part or all of this area. The stub end of a wall may be noted projecting eastward from Room A toward the north wall of Room H, and at the northeast end of this area another stub of a wall was found. Other cross walls probably existed, but of these few or no traces were discovered. It seems improbable that this large area was entirely used for storage or trash, since good living quarters could have been established therein and trash could have been dumped outside the cave.

Our excavations showed, however, that in the last days or years of occupation this undivided area was used for trash, since it was piled therein about 1 meter deep. Under the trash we found many storage pits (about 26) of varying sizes and depths. Many of these pits were sealed or "roofed" with poles and adobe or with circular stone lids. The diameters of these pits ranged from 22 to 60 cm., and the depths from 12 to 60 cm.; most of them were undercut. In these as well as in the uncovered pits were found manos, fragments of worked slabs, cigarette butts, basketry, hammerstones, arrow-shaft smoothers, pottery, three-quarter grooved axes, ornaments, matting, corn cobs, squash rinds, and other foods.

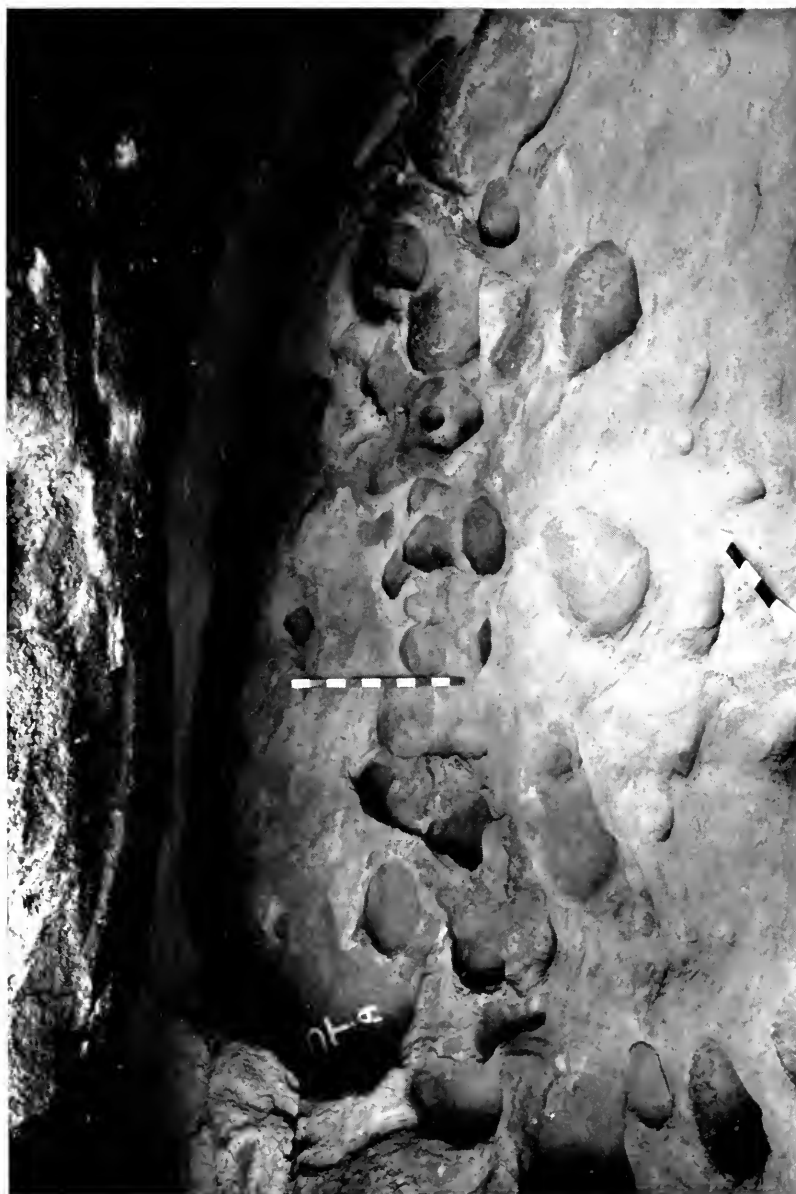


Fig. 22. Trash Area, Hinkle Park Cliff-Dwelling, showing storage pits. Meter stick in background; arrow (50 cm. long) points north.



FIG. 23. Trash Area, Hinkle Park Cliff-Dwelling; detail of storage pit with bit of masonry at right. Arrow (50 cm. long) in foreground.

Apparently, then, before the area was used for general trash this space had been largely given over to storage of foods, tools, paraphernalia and the like, and also had been used for cooking and preparation of foods (one or two pits contained ashes), for sleeping quarters(?) and for ceremonial purposes(?). In the walls of the cave in this area were scooped out cubby-holes that had been mudded over.



### III. Pottery

By PAUL S. MARTIN

Four caves were excavated in the season of 1952: Y Canyon Cave, Cosper Cliff-Dwelling, Hinkle Park Cliff-Dwelling, and O Block Cave. Houses with masonry walls ("cliff-houses") were found only in Cosper and Hinkle Park caves.

The methods of excavation of the caves and the classification and statistical analysis of the pottery were the same as those we formerly used (Martin, Rinaldo, and others, 1952, pp. 51-56).

Sherd counts for each cave (Tables 1-4) and a bar-type graph (fig. 24) showing the percentages for several squares and levels of O Block Cave accompany this chapter. Another bar graph shows the frequencies of pottery types and seriation for Hinkle Park and Cosper Cliff-Dwellings and three open sites (fig. 25).

The total number of sherds from Y Canyon Cave was 262; from Hinkle Park Cliff-Dwelling, 5,389; from Cosper Cliff-Dwelling, 291; and from O Block Cave, 982.

#### POTTERY TYPES BY PHASE<sup>1</sup>

##### **Tularosa Phase**

A. *Painted Wares*. 1, Tularosa Black-on-White (fig. 26); 2, St. Johns Polychrome (fig. 27); 3, Pinedale Black-on-Red (fig. 27); 4, Tularosa White-on-Red (figs. 27, f, 40).

B. *Textured Wares* (fig. 28, f, h, i-k). 1, Plain Corrugated; 2, Three Circle Neck Corrugated; 3, Mimbres Corrugated; 4, Incised Corrugated; 5, Plain Corrugated with smudged interior; 6, Reserve Indented Corrugated; 7, Plain and Indented Corrugated; 8, Tularosa Patterned-Plain-and-Indented Corrugated; 9, Tularosa Fillet Rim; 10, MacDonald Corrugated.

Also found among the textured wares for this period are many varieties of the types named above; for example, we found some Red Indented

<sup>1</sup>A list of all pottery types and references to their descriptions is given on pages 72-73.

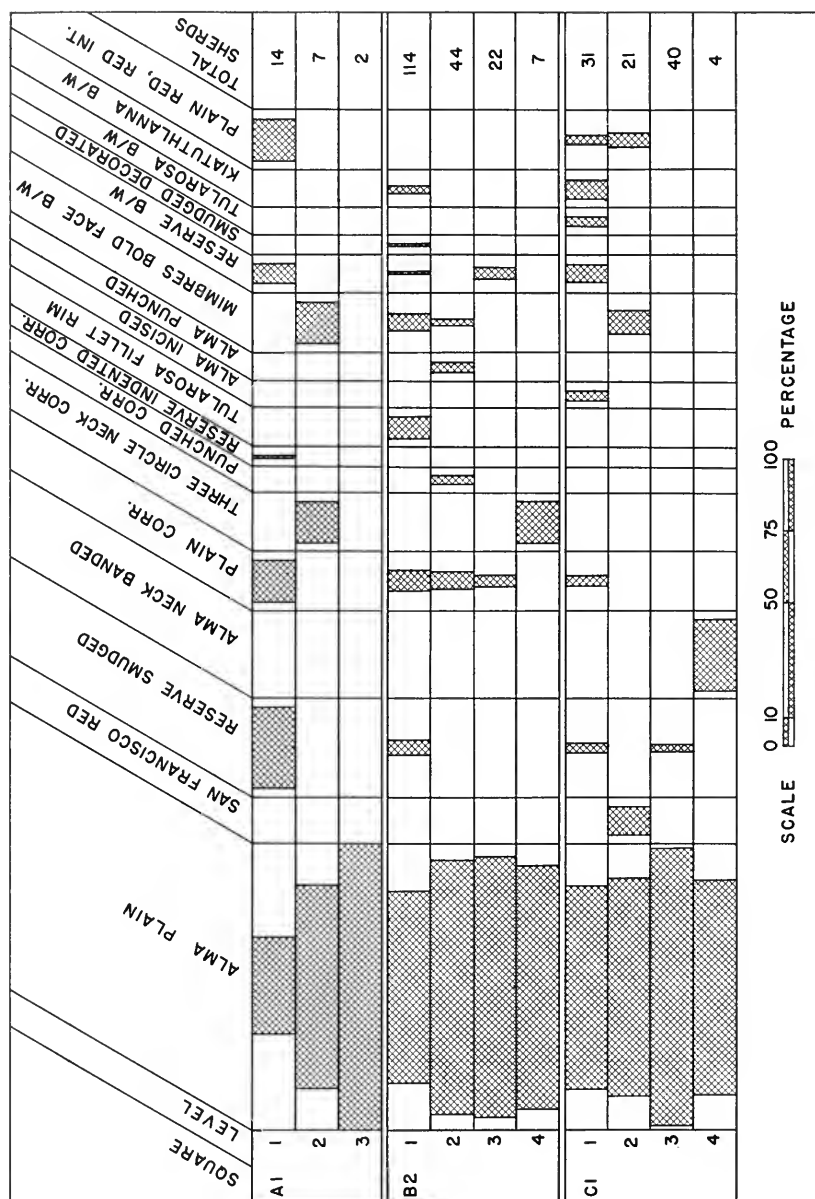


Fig. 24. Chart showing relationships of principal pottery types by selected squares and levels in O Block Cave.

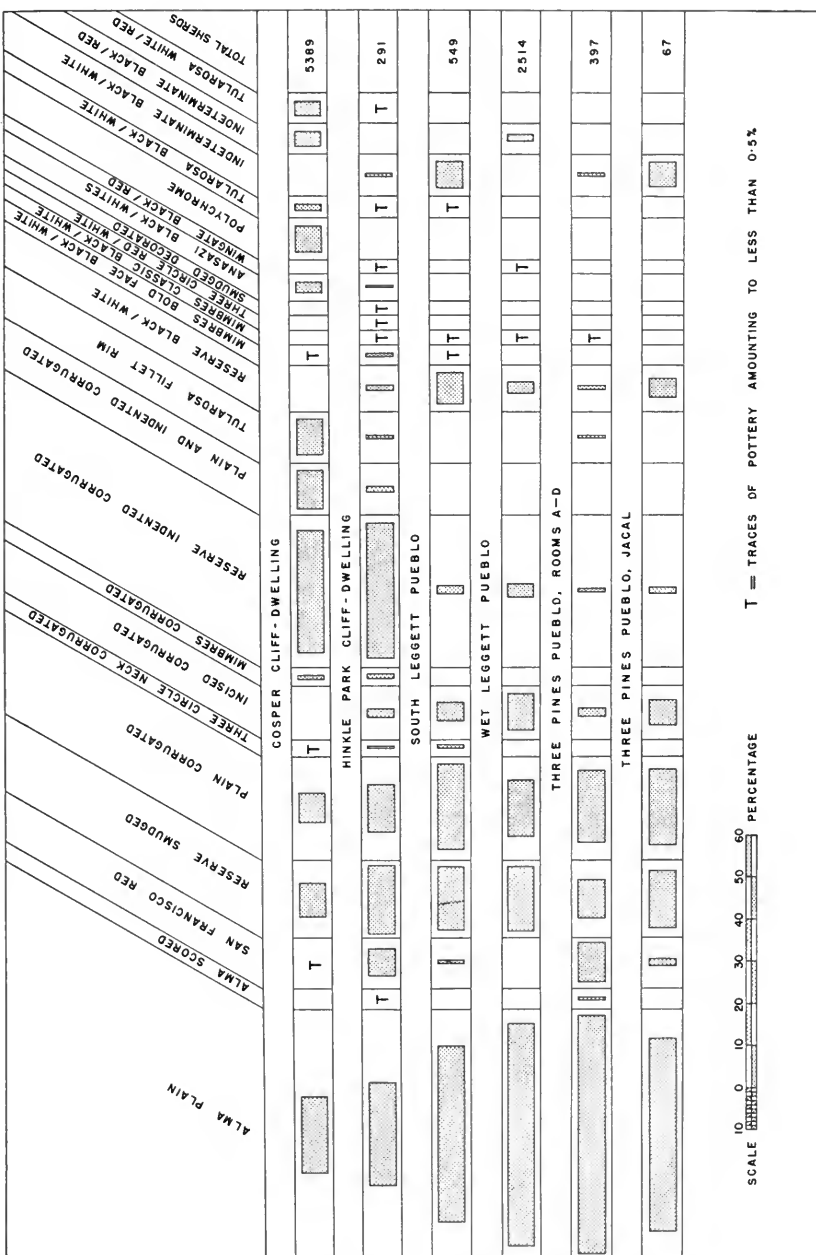


FIG. 25. Chart showing relationships of principal pottery types by selected squares and levels for Hinkle Park Cliff-Dwelling, Cosper Cliff-Dwelling, South Leggett Pueblo, Wet Leggett Pueblo, and Three Pines Pueblo.

Corrugated, Red Indented Corrugated with smudged interior, Indented Corrugated with smudged interior, Indented Corrugated with red interior, and Indented Corrugated with polished red, slipped interior. We think that these are merely variations of the main type, Reserve Indented Corrugated. In the table showing sherd counts by site, however, we have listed them without particular type name (e.g., Red Indented Corrugated or Indented Corrugated with smudged interior) so that if they are ever raised to the status of another type, these counts can be used in future studies.

We were reluctant to give names to these apparent varieties for several reasons, the chief ones being that we had only a handful of representative sherds and no whole pieces; that new types should be created only after discussion with other pottery experts; and that there are now probably too many pottery "types." Some day, Southwesterners may be able, in conference, to merge many of the hundreds of types—the bane of students and others.

C. *Plain Wares*. 1, Alma Plain; 2, San Francisco Red (including one or two variations); 3, Reserve Smudged.

D. *Trade Wares*. 1, Mimbres Classic Black-on-White (fig. 30); 2, Tusayan Polychrome; 3, Wingate Black-on-Red.

### Reserve Phase

A. *Painted Wares*. 1, Reserve Black-on-White (fig. 26); 2, Smudged Decorated (fig. 29).

B. *Textured Wares*. 1, Plain Corrugated; 2, Incised Corrugated; 3, Mimbres Corrugated; 4, Mimbres Neck Corrugated; 5, Tularosa Patterned-Plain-and-Indented Corrugated; 6, Plain and Indented Corrugated; 7, Punched Corrugated; 8, Reserve Indented Corrugated; 9, San Francisco Red with punched and smoothed corrugated exteriors; 10, Tularosa Fillet Rim; and 11, Reserve Fillet Rim. Smudged variants of most of these types were also found and are listed in the table of sherd counts.

C. *Plain Wares*. 1, Alma Plain; 2, San Francisco Red; 3, Reserve Smudged.

D. *Trade Wares*. 1, Cerros Red-on-White; 2, Gray ware, corrugated neck, tooled; 3, Linden Corrugated; 4, Mimbres Bold Face Black-on-White (fig. 30); 5, Puerco Black-on-White; 6, Red Mesa Black-on-White; 7, Wingate Black-on-Red.

*Remarks:* During the Reserve Phase, the Indians made chiefly textured pottery and experimented with various methods of tooling their



FIG. 26. Row on right, Reserve Black-on-White; remainder, Tularosa Black-on-White.

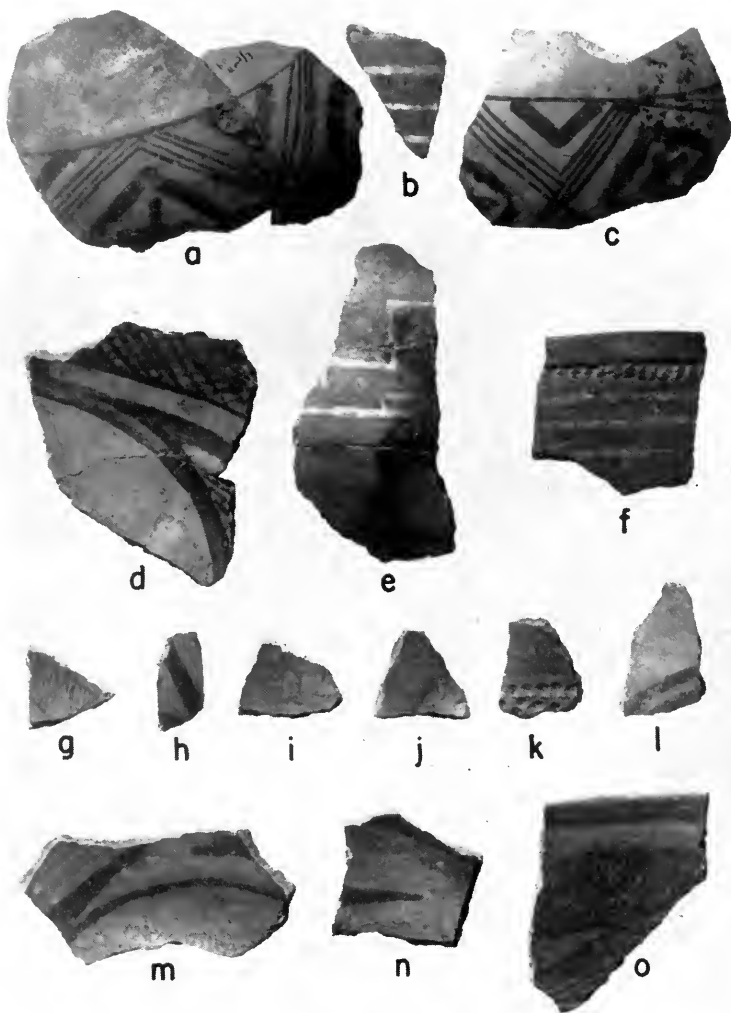


FIG. 27. Wingate Black-on-Red, *a, c, g, h, m, n, o*; St. Johns Polychrome, *b*; Pinedale Black-on-Red with sub-glaze, *d, e*; Tularosa White-on-Red, *f*; Tusayan Polychrome, *i*; Encinas Red-on-White(?), *j*; San Francisco Red Punched, *k*; Cerros Red-on-White, *l*.

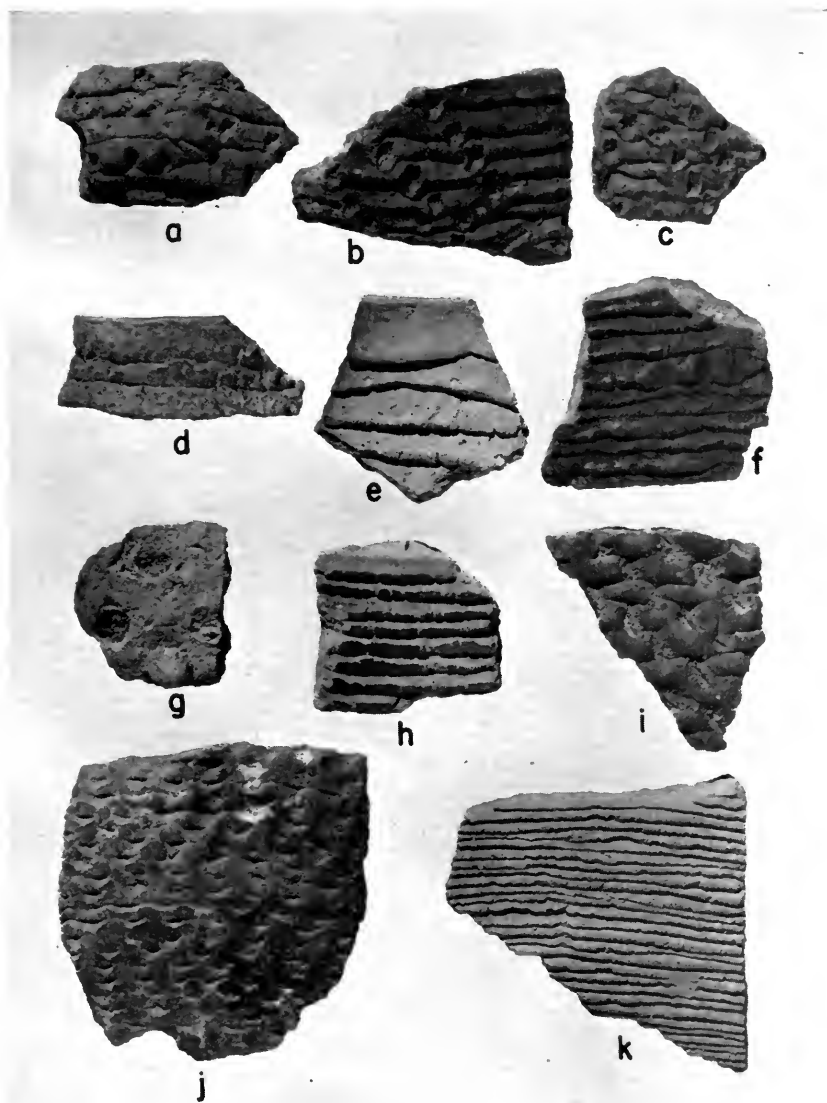


FIG. 28. Punched Corrugated, *a-c*; Gray ware, corrugated neck, tooled, *d*; Alma Neck Banded, *e*; Plain and Indented Corrugated, *f*; Alma Plain with applied nodes, *g*; Plain Corrugated, *h, k*; Mimbres Indented Corrugated, *i*; MacDonald Indented Corrugated(?), *j*.



FIG. 29. Smudged Decorated potsherds.





FIG. 30. Upper right corner, Puerco Black-on-White; remainder, Mimbres Black-on-White.



FIG. 31. Alma Plain variant with fugitive red interior. Bowl from Square A-2, level 2, O Block Cave. Height, 7.2 cm.; diameter, 30.7 cm.



FIG. 32. Miniature jars from Trash Area G, Hinkle Park Cliff-Dwelling. Diameter of jar on right, 6.7 cm.

culinary wares. It reminds one of a similar period among the Anasazi during Pueblo II and early Pueblo III periods.

### Three Circle Phase

A. *Painted Wares*. 1, Three Circle Red-on-White; 2, Mimbres Bold Face Black-on-White.



FIG. 33. Incised Corrugated jar from Room A, pit, Cosper Cliff-Dwelling. Height, 12.5 cm.; diameter, 12.5 cm.

B. *Textured Wares*. 1, Alma Incised; 2, Alma Punched; 3, Three Circle Neck Corrugated.

C. *Plain Wares*. 1, Alma Plain; 2, San Francisco Red; 3, Reserve Smudged.

D. *Trade Wares*. Kiatuthlanna Black-on-White.



FIG. 34. Indented Corrugated Smudged Interior bowl from Room A, floor, Cosper Cliff-Dwelling. Height, 10.5 cm.; diameter, 18.5 cm.

### Pine Lawn Phase

Painted and textured wares do not occur in this phase.

The pottery types present are: 1, Alma Plain; 2, Alma Rough; and 3, San Francisco Red, Saliz Variety.

### MENDED, RESTORED AND WHOLE POTS

1. Brown-ware bowl with fugitive red interior; probably a variant of Alma Plain (fig. 31). From O Block Cave; Reserve Phase; cat. no. 262764.

2. Three miniature pots; two "Alma Plain" and one neck-corrugated (fig. 32). From Trash Area, Hinkle Park Cliff-Dwelling; Transitional Reserve-Tularosa phases; cat. nos. 262662 (smallest), 262724 (neck-corrugated), and 262741.

3. Incised Corrugated jar (fig. 33). From Cosper Cliff-Dwelling; Tularosa Phase; cat. no. 262610.

4. Bowl with Reserve Indented Corrugated exterior, smudged interior (fig. 34). From floor of Room A, Cosper Cliff-Dwelling; Tularosa Phase; cat. no. 262629.

5. Plain and Indented Corrugated jar (fig. 35). From floor of Room J, Hinkle Park Cliff-Dwelling; Transitional Reserve-Tularosa phases; cat. no. 262801.

6. Reserve Smudged bowl (fig. 36). From Trash Area, Hinkle Park Cliff-Dwelling; Transitional Reserve-Tularosa phases; cat. no. 262810.

7. Three Circle Neck Corrugated jar (fig. 37). O Block Canyon; Three Circle Phase; cat. no. 263263.

8. Tularosa Indented Corrugated jar (neck missing) (fig. 38). From pit in floor of Room A, Cosper Cliff-Dwelling; Tularosa Phase; cat. no. 262609.

9. Tularosa Fillet Rim bowl (fig. 39). From O Block Cave; Tularosa Phase; cat. no. 262735.

10. Tularosa White-on-Red bowl (fig. 40). From floor of Room A, Cosper Cliff-Dwelling; Tularosa Phase; cat. no. 262648.



FIG. 35. Plain and Indented Corrugated jar from Room J, level 4, Hinkle Park Cliff-Dwelling. Height, 21.1 cm.; diameter, 25.3 cm.

## TRENDS IN CERAMIC POPULARITY

**Cosper and Hinkle Park Cliff-Dwellings**

The rooms and trash areas in Cosper and Hinkle Park caves were excavated in levels. After the sherds from these levels had been washed, classified, tabulated, and counted, we calculated the percentages of each pottery type. We then plotted these percentages on standard graph paper



FIG. 36. Reserve Smudged bowl from Trash Area F, levels 3-5, Hinkle Park Cliff-Dwelling. Height, 10.0 cm.; diameter, 17.5 cm.

and studied the results. We were unable to detect any trends or statistically significant changes in time between any of the levels in the rooms and trash areas or between rooms. We concluded, then, on the basis of this and other facts that Cosper and Hinkle Park caves had been occupied (not contemporaneously) for a short span of time, perhaps 15 to 40 years. This is a fortunate circumstance, since such sites (of a single, short occupation) greatly simplify some of our problems, notably those of general architectural analysis, of dating, and of reconstruction of the daily life, ceremonies, and social organization of the Indians who once lived there.

Therefore, since Cosper and Hinkle Park Cliff-Dwellings apparently represent one short occupation (although not *simultaneous* occupation), we totaled all the sherds of each type, irrespective of find spots, and calculated the percentages of each type. These percentages for each pottery type for each cave were drawn on bar graphs. The bar graphs were then ranked and placed in the seriation of previously excavated sites—Three Pines Pueblo, Wet Leggett Pueblo, and South Leggett Pueblo.



FIG. 37. Three Circle Neck Corrugated jar from Square A-3, level 2, O Block Cave. Height, 18 cm.; diameter, 20 cm.

We assume for a number of reasons (Martin, Rinaldo, Antevs, 1949, pp. 190-198; Martin and Rinaldo, 1950a, pp. 370-374, 1950b, pp. 530-532; Martin, Rinaldo, and others, 1952, pp. 53-56) that the position of each site in the series represents probably the correct relative chronological order. Thus, in the graph shown in figure 25, Three Pines Pueblo, Jacal, is the earliest site and Cosper Cliff-Dwelling the latest.

If this relative chronology is correct we can then note that:

1. Alma Plain, San Francisco Red, Reserve Smudged, Plain Corrugated, Three Circle Neck Corrugated, and Reserve Black-on-White are declining in popularity.
2. Plain and Indented Corrugated, Tularosa Fillet Rim, and Tularosa Black-on-White and other late types are increasing in popularity.



FIG. 38. Tularosa Indented Corrugated jar from Room A, pit, Cosper Cliff-Dwelling. Height, 20.0 cm.; diameter, 25.0 cm.

3. Plain wares as a whole are less popular, while painted or elaborately textured pottery is to continue in popularity.

### **O Block Cave**

Since there was no building or rooms in this cave, we dug it by squares and levels as in Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 40-42). There were no natural levels of refuse; we therefore stripped the





FIG. 39. Tularosa Fillet Rim pottery bowl from Square C-2, levels 1 and 2, O Block Cave. Diameter, 37.8 cm.; height, 13.4 cm.



FIG. 40. Tularosa White-on-Red bowl from Room A, Cosper Cliff-Dwelling. Height, 13.3 cm.; diameter, 24.1 cm.

refuse in squares (2 meters square) and in levels (20 cm. thick). Altogether, four trenches (A-D) and 69 levels were dug in this manner. Most squares yielded three pottery-bearing levels but some yielded five. In a few places, there were six levels below the pottery-bearing strata.

After the sherds had been classified we calculated the percentages of each type for each square and level and then plotted these percentages by squares on a wedge-bar graph. The percentages for three typical squares are presented in a graph (fig. 24), in which the percentages for the lowest levels are placed at the bottom and those for the highest levels at the top.

From a scrutiny of this graph we can see that: (1) the frequency of Alma Plain decreases from the lowest levels to the higher ones; (2) the proportion of Reserve Smudged and Plain Corrugated increases from bottom to top.

The general trends as shown in this graph corroborate what we have found in Tularosa Cave and in open sites, although the number of sherds from any one square is too small to be significant.

We assigned phases as follows (fig. 41):

Square A-1: level 1, Reserve; level 2, Three Circle; level 3, Pine Lawn; levels 4, 5, 6, Pre-Pottery.

Square B-2: levels 1, 2, Reserve; level 3, Three Circle; level 4, Pine Lawn; levels 5, 6, Pre-Pottery.

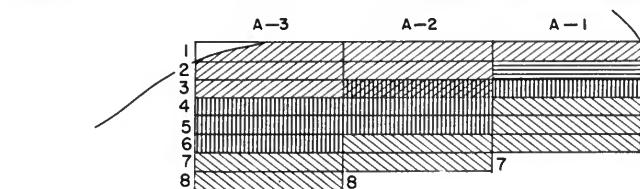
Square C-1: level 1, Reserve; level 2, Three Circle; levels 3 and 4, Pine Lawn; levels 5, 6, 7, 8, Pre-Pottery.

### **Y Canyon Cave**

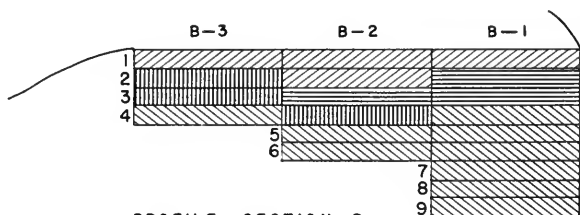
This cave likewise contained no architectural features, and, since natural levels were completely absent, the refuse was stripped by squares (2 meters square) and in levels (20 cm. thick). Altogether, six squares and thirteen levels were thus excavated and sherds were found at all levels. The refuse was thin, the deepest portion being only 60 cm. thick, and it had been much disturbed and jumbled.

After the sherds had been tabulated and percentages calculated and plotted, we found that there was such intermixture that we could not make any deductions from our data. We therefore wrote off the excavations more or less as a loss and assigned the materials from that cave to a chronological category that we termed "Pine Lawn through Reserve."

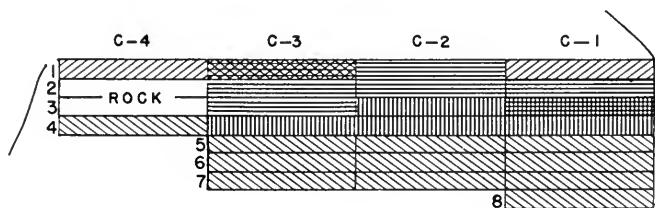
A few sherds of Apache pottery were found on the surface of this cave.



PROFILE SECTION A



PROFILE SECTION B



PROFILE SECTION C



PROFILE SECTION D

# KEY

	TULAROSA PHASE		PRE-POTTERY PHASE
	RESERVE PHASE		THREE CIRCLE THROUGH TULAROSA
	THREE CIRCLE PHASE		PINE LAWN THROUGH RESERVE
	PINE LAWN PHASE		PINE LAWN THROUGH THREE CIRCLE

FIG. 41. Schematic diagram of stratigraphy in O Block Cave.

## SUMMARY

The sequences and trends in popularity of the pottery types found in the four caves corroborated exactly that which we had found in previous seasons. No new types were discovered.

ALPHABETICAL LIST OF POTTERY TYPES  
AND REFERENCES TO THEIR DESCRIPTIONS

- Alma Incised (Haury, 1936b, p. 40).  
 Alma Neck Banded (Haury, 1936b, p. 35).  
 Alma Plain (Haury, 1936b, p. 32; Martin and Rinaldo, 1947, pp. 362-368).  
 Alma Punched (Haury, 1936b, p. 39).  
 Alma Rough (Martin and Rinaldo, 1940, pp. 78-80, and 1947, pp. 362-368; Martin, 1943, p. 238).  
 Alma Scored (Haury, 1936b, p. 38; Martin and Rinaldo, 1950a, p. 359).  
 Apache (Douglas, 1935, pp. 78-79).  
 Black pottery, indented decoration, scalloped rim (Apache).  
 Cerros Red-on-White (Sayles, 1945, pp. 42-43).  
 Gray ware, corrugated neck, tooled (unnamed and undescribed type).  
 Incised Corrugated (Martin and Rinaldo, 1950a, pp. 359-360, and 1950b, pp. 501, 529).  
 Incised Corrugated, Smudged Interior (13 sherds); a variety of Incised Corrugated?  
 Indented Corrugated, polished red interior, slipped; variety of Reserve Indented Corrugated?  
 Indented Corrugated, Red Interior; variety of Reserve Indented Corrugated?  
 Indented Corrugated, Smudged Interior; variety of Reserve Indented Corrugated?  
 Indeterminate Black-on-Red.  
 Indeterminate Black-on-White, no design showing, white.  
 Indeterminate Polychrome.  
 Kiatuthlanna Black-on-White (Roberts, 1931, pp. 130-149; Gladwin, 1945, pp. 41-42).  
 Linden Corrugated (Colton and Hargrave, 1937, p. 60).  
 MacDonald Corrugated (Colton and Hargrave, 1937, pp. 61-62; Martin and Willis, 1940, pl. 111).  
 Mimbres Bold Face Black-on-White (Cosgrove, 1932, p. 76).  
 Mimbres Classic Black-on-White (Cosgrove, 1932, pp. 72-75).  
 Mimbres Indented Corrugated (polish over coils) (Cosgrove, 1932, pl. 92).  
 Pinedale Black-on-Red with sub-glaze (may be Springerville Polychrome) (Haury and Hargrave, 1931; Martin and Willis, 1940, pls. 103-104).  
 Plain Corrugated (lacks polish) (Martin and Rinaldo, 1950b, pp. 500, 528; Martin, Rinaldo, and others, 1952, p. 64).  
 Plain Corrugated, Smudged Interior; variety of Plain Corrugated?  
 Plain and Indented Corrugated (Martin and Rinaldo, 1950b, pp. 526-530).  
 Plain and Indented Corrugated, Smudged Interior; variety of Plain and Indented Corrugated?  
 Plain, unpolished red, red interior; variety of Alma Plain (19 sherds) (letter from Haury, 1953).  
 Polished brown rim, tooled (1 sherd); a variety of Alma Plain?  
 Puerco Black-on-White (Gladwin, 1931, pp. 24-26; Martin and Willis, 1940, pls. 70-73).  
 Punched Corrugated; and Punched Corrugated, Smudged Interior (15 sherds; undescribed type).  
 Red Indented Corrugated; variety of Reserve Indented Corrugated?

- Red Indented Corrugated, Smudged Interior; variety of Reserve Indented Corrugated?
- Red Mesa Black-on-White (Gladwin, 1945, pp. 56-57; Martin and Willis, 1940, pls. 66-67).
- Reserve Black-on-White (Nesbitt, 1938, p. 138; Martin and Rinaldo, 1950b, pp. 502-519).
- Reserve Indented Corrugated (Gladwin, 1934, p. 18; Martin and Rinaldo, 1950b, pp. 501, 530).
- Reserve Smudged (Martin, Rinaldo, and Antevs, 1949, pp. 187-188; Martin and Rinaldo, 1950a, pp. 359-360, and 1950b, pp. 500, 534; Nesbitt, 1938, p. 139 [under Reserve Plain ware]).
- Reserve Smudged, dimpled exterior (1 sherd); variety of Reserve Smudged?
- St. Johns Polychrome (Gladwin, 1931, pp. 36-40; Martin and Willis, 1940, pls. 97-101).
- St. Johns Polychrome, sub-glaze; probably a variant of St. Johns Polychrome (Martin and Willis, 1940, pl. 100).
- San Francisco Red, Coiled Exterior (32 sherds); variety of San Francisco Red? (cf. Cloverdale Corrugated, Kidder and Cosgrove, 1949, fig. 12, and Reserve Redware, Nesbitt, 1938, pl. 38).
- San Francisco Red, Punched (1 sherd); variety of San Francisco Red?
- San Francisco Red, Saliz Variety (Haury, 1936b, pp. 28-31; Martin and Rinaldo, 1940, pp. 80-81, and 1947, pp. 364-368; Martin, 1943, p. 240).
- San Francisco Red, Smudged Interior (4 sherds); variety of San Francisco Red?
- Smudged Decorated (Martin, Rinaldo, and Antevs, 1949, p. 188; Martin and Rinaldo, 1950b, pp. 507, 524; Martin, Rinaldo, and others, 1952, p. 62).
- Three Circle Neck Corrugated (Haury, 1936b, p. 36; Martin, Rinaldo, and others, 1952, pp. 60, 80).
- Three Circle Red-on-White (Haury, 1936b, pp. 18-21; Martin and Rinaldo, 1950a, pp. 362-369; Nesbitt, 1938, p. 137).
- Tularosa Black-on-White (never completely described) (Gladwin, 1931, pp. 32-35; Hawley, 1936, pp. 46-47; Kidder, 1924, p. 98; Nesbitt, 1938, p. 139).
- Tularosa Fillet Rim (Gladwin, 1934, p. 18; Kidder, 1924, p. 98; Martin, Rinaldo, and others, 1952, p. 65).
- Tularosa Fillet Rim, San Francisco Red Interior (slipped?) (2 sherds); variety of Tularosa Fillet Rim?
- Tularosa Patterned-Plain-and-Indented Corrugated (Kidder, 1924, p. 98; Wendorf, 1950, p. 38 ["patterned corrugated"]).
- Tularosa Patterned-Plain-and-Indented Corrugated, Smudged Interior; variety of Tularosa Patterned-Plain-and-Indented Corrugated.
- Tularosa White-on-Red (formerly Reserve Polychrome) (Nesbitt, 1938, p. 139; Wendorf, 1950, p. 122).
- Tusayan Polychrome (Hargrave, 1932).
- Wingate Black-on-Red (Gladwin, 1931, pp. 29-31; Martin and Willis, 1940, pls. 89-96; Gladwin, 1945, pp. 71-73).

Table 1.—SHERD ANALYSIS, Y CANYON CAVE

Square 1

	Level		Total
	No.	%	No.
Alma Plain . . . . .	9	81.81	9
Apache . . . . .	2	18.19	2
Total . . . . .	11	100.00	11

Square 2

	Level 1		Level 2		Total
	No.	%	No.	%	No.
Alma Plain . . . . .	23	76.66	24	63.16	47
San Francisco Red . . . . .	2	6.66	6	15.79	8
Reserve Smudged . . . . .	1	3.34	..	.....	1
Incised Corrugated . . . . .	1	3.34	..	.....	1
Kiatuthlanna Black-on-White . . . . .	..	.....	1	2.63	1
Apache . . . . .	3	10.00	7	18.42	10
Total . . . . .	30	100.00	38	100.00	68

Table 1.—SHERD ANALYSIS, Y CANYON CAVE (continued)

Square 3

	Level 1		Level 2		Total	
	No.	%	No.	%	No.	%
Alma Plain . . . . .	29	64.44	4	44.45	33	
San Francisco Red . . . . .	4	8.89	1	11.12	5	
Reserve Smudged . . . . .	..	.....	2	22.22	2	
Apache . . . . .	12	26.67	2	22.22	14	
	—	—	—	—	—	—
Total . . . . .	45	100.00	9	100.01	54	

Square 4

	Level 1A		Level 1B		Level 2		Total	
	No.	%	No.	%	No.	%	No.	%
Alma Plain . . . . .	13	48.15	10	76.92	13	76.47	36	
San Francisco Red . . . . .	2	7.40	2	15.38	1	5.88	5	
Reserve Smudged . . . . .	1	3.70	..	.....	..	.....	1	
Plain Corrugated . . . . .	1	3.70	..	.....	..	.....	1	
Kiatuthlanna Black-on-White . . . . .	..	.....	..	.....	1	5.88	1	
Indeterminate Black-on-White (NDS) . . . . .	1	3.70	..	.....	1	5.88	2	
St. Johns Polychrome . . . . .	..	.....	..	.....	1	5.88	1	
Apache . . . . .	9	33.33	1	7.69	..	.....	10	
	—	—	—	—	—	—	—	—
Total . . . . .	27	99.98	13	99.99	17	99.99	57	

Table 1.—SHERD ANALYSIS, Y CANYON CAVE (continued)

Square 5						
	Level 1A		Level 1B		Level 2	
	No.	%	No.	%	No.	%
Alma Plain . . . . .	..	.....	9	33.33	10	62.50
San Francisco Red . . . . .	..	.....	1	3.70	1	6.25
Reserve Smudged . . . . .	..	.....	1	3.70	..	.....
Plain Corrugated . . . . .	1	9.09	1	3.70	1	6.25
Kiatuthlanna Black-on-White . . . . .	..	.....	2	7.40	..	.....
Apache . . . . .	10	90.91	13	48.15	4	25.00
Total . . . . .	11	100.00	27	99.98	16	100.00
						54

Square 5R1				
	Level 1		Level 2	
	No.	%	No.	%
Alma Plain . . . . .	6	42.86	4	100.00
San Francisco Red . . . . .	3	21.43	..	.....
Reserve Smudged . . . . .	3	21.43	..	.....
Apache . . . . .	2	14.28	..	.....
Total . . . . .	14	100.00	4	100.00
				18



Table 2.—SHERD ANALYSIS, COSPER CLIFF—DWELLING

	Total No.	%
Alma Plain . . . . .	53	18.21
San Francisco Red . . . . .	1	0.34
Reserve Smudged . . . . .	23	7.90
Plain Corrugated . . . . .	19	6.53
Plain Corrugated, Smudged Interior . . . . .	2	0.69
Three Circle Neck Corrugated . . . . .	2	0.69
Mimbres Corrugated . . . . .	3	1.03
Reserve Indented Corrugated . . . . .	37	12.72
Reserve Indented Corrugated, Smudged . . . . .	48	16.49
Tularosa Patterned Plain and Indented Corrugated . . . . .	26	8.93
Linden Corrugated . . . . .	2	0.69
MacDonald Corrugated . . . . .	1	0.34
Tularosa Fillet Rim . . . . .	24	8.25
Mimbres Bold Face Black-on-White . . . . .	1	0.34
Tularosa Black-on-White . . . . .	4	1.37
Puerco Black-on-White . . . . .	7	2.41
St. Johns Polychrome . . . . .	8	2.75
St. Johns Polychrome, Sub-glaze . . . . .	1	0.34
Springerville Polychrome . . . . .	7	2.41
Tularosa White-on-Red . . . . .	10	3.44
Indeterminate Polychrome . . . . .	2	0.69
Indeterminate Black-on-Red . . . . .	10	3.44
Total . . . . .	291	100.00

Table 3.—SHERD ANALYSIS, HINKLE PARK CLIFF—DWELLING

	Total No.	%
Alma Plain . . . . .	1,326	24.60
Alma Rough . . . . .	4	0.07
San Francisco Red . . . . .	343	6.35
San Francisco Red, Coiled Exterior . . . . .	10	0.19
San Francisco Red, Punched . . . . .	1	0.02
San Francisco Red, Smudged Interior . . . . .	4	0.07
Reserve Smudged . . . . .	862	15.99
Reserve Smudged, Dimpled Exterior . . . . .	1	0.02
Plain Corrugated . . . . .	468	8.68
Plain Corrugated, Smudged Interior . . . . .	131	2.43
Three Circle Neck Corrugated . . . . .	24	0.45
Incised Corrugated . . . . .	98	1.82
Incised Corrugated, Smudged Interior . . . . .	13	0.24
Reserve Indented Corrugated . . . . .	1,520	28.20
Reserve Indented Corrugated, Smudged Interior . . . . .	206	3.82
Punched Corrugated . . . . .	6	0.11
Punched Corrugated, Smudged Interior . . . . .	3	0.06
Plain and Indented Corrugated . . . . .	10	0.19
Plain and Indented Corrugated, Smudged Interior . . . . .	4	0.07
Tularosa Patterned Plain and Indented Corrugated . . . . .	40	0.74
Tularosa Patterned Plain and Indented Corrugated, Smudged Interior . . . . .	3	0.06
Indented Corrugated, Polished Red Interior . . . . .	20	0.37
Red Indented Corrugated . . . . .	17	0.32
Red Indented Corrugated, Smudged Interior . . . . .	3	0.06
Polished Brown Rim, Tooled . . . . .	1	0.02

Table 3.—SHERD ANALYSIS HINKLE PARK CLIFF—DWELLING (continued)

	Total No.	%
Gray Ware, Corrugated Neck, Tooled . . . . .	1	0.02
Black, Indented Design, Scalloped Rim (Apache?) . . . . .	5	0.09
Tularosa Fillet Rim . . . . .	33	0.61
Tularosa Fillet Rim, San Francisco Red Interior . . . . .	2	0.04
Alma Scored . . . . .	13	0.24
Alma Punched . . . . .	1	0.02
Alma Incised . . . . .	1	0.02
Lino Gray . . . . .	1	0.02
Reserve Black—on—White . . . . .	65	1.21
Mimbres Bold Face Black—on—White . . . . .	41	0.76
Mimbres Classic Black—on—White . . . . .	3	0.06
Three Circle Red—on—White . . . . .	1	0.02
Smudged Decorated . . . . .	5	0.09
Puerco Black—on—White . . . . .	8	0.15
Kiatuthlanna Black—on—White . . . . .	11	0.20
White Mound Black—on—White . . . . .	1	0.02
Red Mesa Black—on—White . . . . .	3	0.06
Wingate Black—on—Red . . . . .	15	0.28
Tularosa Black—on—White . . . . .	19	0.35
Indeterminate Black—on—White . . . . .	37	0.69
Cerro Red—on—White . . . . .	1	0.02
Tusayan Polychrome . . . . .	1	0.02
Tularosa White—on—Red . . . . .	3	0.06
Total . . . . .	5,389	100.00

TABLE 4.—SHERD ANALYSIS, O BLOCK CAVE

## Square A-1

	Level 1		Level 2		Level 3		Total
	No.	%	No.	%	No.	%	
Alma Plain . . . . .	5	35.71	5	71.42	2	100.00	12
Plain Red, Red Interior . . . . .	2	14.29	..	.....	..	.....	2
Reserve Smudged . . . . .	4	28.57	..	.....	..	.....	4
Plain Corrugated . . . . .	2	14.29	..	.....	..	.....	2
Three Circle Neck Corrugated . . . . .	..	.....	1	14.29	..	.....	1
Mimbres Bold Face Black-on-White. . . . .	..	.....	1	14.29	..	.....	1
Reserve Black-on-White . . . . .	1	7.14	..	.....	..	.....	1
Total. . . . .	14	100.00	7	100.00	2	100.00	23

## Square A-2

	Level 1		Level 2		Level 3		Level 4		Level 5		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	
Alma Plain . . . . .	17	41.46	52	71.22	15	83.33	3	75.00	7	100.00	94
Plain Red, Red Interior . . . . .	6	14.63	2	2.74	..	.....	..	.....	..	.....	8
San Francisco Red . . . . .	..	.....	6	8.23	..	.....	..	.....	..	.....	6
Reserve Smudged . . . . .	10	24.39	..	.....	..	.....	..	.....	..	.....	10
Plain Corrugated . . . . .	3	7.32	7	9.59	2	11.11	..	.....	..	.....	12
Three Circle Neck Corrugated. . . . .	1	2.44	..	.....	..	.....	..	.....	..	.....	1
Mimbres Bold Face Black-on-White. . . . .	3	7.32	4	5.48	1	5.56	1	25.00	..	.....	9
Indeterminate Black-on-White (NDS)	1	2.44	2	2.74	..	.....	..	.....	..	.....	3
Total . . . . .	41	100.00	73	100.00	18	100.00	4	100.00	7	100.00	143

Table 4.—SHERD ANALYSIS, O BLOCK CAVE (continued)

Square A-3

	Level 1		Level 2		Level 3		Level 4	
	No.	%	No.	%	No.	%	No.	%
Alma Plain . . . . .	14	56.00	22	70.96	5	71.42	4	66.66
Alma Neck Banded . . . . .	..	.....	3	9.68	..	.....	..	.....
Plain Corrugated . . . . .	8	32.00	2	6.45	1	14.29	1	16.67
Three Circle Neck Corrugated . . . . .	..	.....	2	6.45	..	.....	..	.....
Tularosa Fillet Rim . . . . .	2	8.00	1	3.23	..	.....	..	.....
Mimbres Bold Face Black-on-White . . .	1	4.00	1	3.23	1	14.29	1	16.67
Total . . . . .	25	100.00	31	100.00	7	100.00	6	100.00

	Level 5		Level 6		Total	
	No.	%	No.	%	No.	%
Alma Plain . . . . .	3	100.00	3	100.00	51	
Alma Neck Banded . . . . .	..	.....	..	.....	3	
Plain Corrugated . . . . .	..	.....	..	.....	12	
Three Circle Neck Corrugated . . . . .	..	.....	..	.....	2	
Tularosa Fillet Rim . . . . .	..	.....	..	.....	3	
Mimbres Bold Face Black-on-White . . .	..	.....	..	.....	4	
Total . . . . .	3	100.00	3	100.00	75	

Table 4.—SHERD ANALYSIS, O BLOCK CAVE (continued)

Square B-1

	Level 1		Level 2		Level 3		Level 4	
	No.	%	No.	%	No.	%	No.	%
Alma Plain . . . . .	30	61.24	49	81.67	10	76.93	..	.....
Plain Red, Red Interior . . . . .	..	.....	3	5.00	..	.....	..	.....
San Francisco Red . . . . .	1	2.04	..	.....	..	.....	..	.....
Reserve Smudged . . . . .	6	12.24	..	.....	..	.....	..	.....
Alma Neck Banded . . . . .	1	2.04	..	.....	..	.....	..	.....
Three Circle Neck Corrugated . . . . .	5	10.20	5	8.33	2	15.38	..	.....
Tularosa Fillet Rim . . . . .	5	10.20	..	.....	..	.....	..	.....
Mimbres Bold Face Black-on-White . . . . .	1	2.04	3	5.00	1	7.69	..	.....
Total . . . . .	49	100.00	60	100.00	13	100.00	..	.....

	Level 5		Level 6		Total	
	No.	%	No.	%	No.	%
Alma Plain . . . . .	..	.....	2	100.00	91	
Plain Red, Red Interior . . . . .	..	.....	..	.....	3	
San Francisco Red . . . . .	..	.....	..	.....	1	
Reserve Smudged . . . . .	..	.....	..	.....	6	
Alma Neck Banded . . . . .	..	.....	..	.....	1	
Three Circle Neck Corrugated . . . . .	..	.....	..	.....	12	
Tularosa Fillet Rim . . . . .	..	.....	..	.....	5	
Mimbres Bold Face Black-on-White . . . . .	..	.....	..	.....	5	
Total . . . . .	..	.....	2	100.00	124	

Table 4.-SHERD ANALYSIS, O BLOCK CAVE (continued)

Square B-2

	Level 1		Level 2		Level 3		Level 4		Total
	No.	%	No.	%	No.	%	No.	%	No.
Alma Plain . . . . .	77	66.94	39	88.64	20	90.90	6	85.71	142
Reserve Smudged . . . . .	6	5.22	..	.....	..	.....	..	.....	6
Plain Corrugated . . . . .	8	6.96	3	6.82	1	4.55	..	.....	12
Three Circle Neck Corrugated . . . . .	..	.....	..	.....	..	.....	1	14.29	1
Punched Corrugated . . . . .	..	.....	1	2.27	..	.....	..	.....	1
Reserve Indented Corrugated . . . . .	1	0.87	..	.....	..	.....	..	.....	1
Tularosa Fillet Rim . . . . .	9	7.83	..	.....	..	.....	..	.....	9
Alma Punched . . . . .	2	1.74	..	.....	..	.....	..	.....	2
Mimbres Bold Face Black-on-White. . . . .	7	6.09	1	2.27	..	.....	..	.....	8
Reserve Black-on-White. . . . .	1	0.87	..	.....	1	4.55	..	.....	2
Smudged Decorated. . . . .	1	0.87	..	.....	..	.....	..	.....	1
Kiatuthlanna Black-on-White. . . . .	3	2.61	..	.....	..	.....	..	.....	3
Total. . . . .	115	100.00	44	100.00	22	100.00	7	100.00	188

Square B-3

	Level 1		Level 2		Level 3		Total
	No.	%	No.	%	No.	%	No.
Alma Plain . . . . .	28	87.50	6	100.00	4	100.00	38
San Francisco Red . . . . .	1	3.13	..	.....	..	.....	1
Plain Corrugated . . . . .	2	6.24	..	.....	..	.....	2
Alma Incised . . . . .	1	3.13	..	.....	..	.....	1
Total. . . . .	32	100.00	6	100.00	4	100.00	42

Table 4.—SHERD ANALYSIS, O BLOCK CAVE (continued)

Square C-1

	Level 1		Level 2		Level 3		Level 4		Total
	No.	%	No.	%	No.	%	No.	%	No.
Alma Plain . . . . .	22	70.95	19	76.00	39	97.50	3	75.00	83
Plain Red, Red Interior . . . . .	1	3.23	1	4.00	..	.....	..	.....	2
San Francisco Red . . . . .	..	.....	3	12.00	..	.....	..	.....	3
Reserve Smudged . . . . .	1	3.23	..	.....	1	2.50	..	.....	2
Alma Neck Banded . . . . .	..	.....	..	.....	..	.....	1	25.00	1
Plain Corrugated . . . . .	1	3.23	..	.....	..	.....	..	.....	1
Alma Incised . . . . .	1	3.23	..	.....	..	.....	..	.....	1
Mimbres Bold Face Black-on-White. . . . .	..	.....	2	8.00	..	.....	..	.....	2
Reserve Black-on-White. . . . .	2	6.45	..	.....	..	.....	..	.....	2
Tularosa Black-on-White . . . . .	1	3.23	..	.....	..	.....	..	.....	1
Kiatuthlanna Black-on-White . . . . .	2	6.45	..	.....	..	.....	..	.....	2
Total . . . . .	31	100.00	25	100.00	40	100.00	4	100.00	100



Table 4.—SHERD ANALYSIS, O BLOCK CAVE (continued)

Square C-2

	Level 1		Level 2		Level 3		Level 4		Total
	No.	%	No.	%	No.	%	No.	%	No.
Alma Plain . . . . .	54	83.07	40	85.10	4	100.00	3	100.00	101
Plain Red, Red Interior . . . . .	..	.....	3	6.38	..	.....	..	.....	3
Plain Corrugated . . . . .	5	7.69	2	4.26	..	.....	..	.....	7
Three Circle Neck Corrugated . . . . .	2	3.08	1	2.13	..	.....	..	.....	3
Three Circle Red-on-White . . . . .	1	1.54	..	.....	..	.....	..	.....	1
Mimbres Bold Face Black-on-White . . . . .	3	4.62	1	2.13	..	.....	..	.....	4
Total . . . . .	65	100.00	47	100.00	4	100.00	3	100.00	119

Square C-3

	Level 1		Level 2		Level 3		Level 4		Level 5		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Alma Plain . . . . .	37	64.92	29	74.37	12	92.31	2	66.67	..	.....	80
San Francisco Red . . . . .	1	1.75	..	.....	..	.....	..	.....	..	.....	1
Reserve Smudged . . . . .	3	5.26	..	.....	..	.....	..	.....	..	.....	3
Alma Neck Banded . . . . .	7	12.28	3	7.69	..	.....	1	33.33	..	.....	11
Plain Corrugated . . . . .	2	3.51	3	7.69	..	.....	..	.....	1	100.00	6
Three Circle Neck Corrugated . . . . .	1	1.75	1	2.56	..	.....	..	.....	..	.....	2
Tularosa Fillet Rim . . . . .	4	7.02	..	.....	..	.....	..	.....	..	.....	4
Mimbres Bold Face Black-on-White . . . . .	..	.....	3	7.69	1	7.69	..	.....	..	.....	4
Kiatuthlanna Black-on-White . . . . .	1	1.75	..	.....	..	.....	..	.....	..	.....	1
Indeterminate . . . . .	1	1.75	..	.....	..	.....	..	.....	..	.....	1
Total . . . . .	57	99.99	39	100.00	13	100.00	3	100.00	1	100.00	113

Table 4.—SHERD ANALYSIS, O BLOCK CAVE (continued)

Square C-4

	Level 1		Total
	No.	%	No.
Alma Plain.....	7	87.50	7
Reserve Black-on-White .....	1	12.50	1
	<hr/>	<hr/>	<hr/>
Total .....	8	100.00	8

Square D-2

	Level 1		Level 2		Level 3		Total
	No.	%	No.	%	No.	%	No.
Alma Plain.....	2	28.57	19	95.00	14	100.00	35
Reserve Smudged.....	5	71.43	..	.....	..	.....	5
Alma Neck Banded .....	..	.....	1	5.00	..	.....	1
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total.....	7	100.00	20	100.00	14	100.00	41

Square E-2

	Level 1		Total
	No.	%	No.
Alma Plain.....	6	100.00	6

## IV. Specimens of Stone, Bone, and Clay

By JOHN B. RINALDO

### MANOS

(Figures 46-49)

#### Single Grinding Surfaces

##### TYPE A

*Description:* Oval in outline, one with surfaces parallel, the other wedge-shaped in cross section, grinding surfaces convex (fig. 46, *c*). Total 2.

*Materials:* Fine-grained basalt.

*Dimensions:* Length, 21.7 cm., one fragment; width, 12.4, 9.6 cm.; thickness, 4.6, 6.3 cm.

##### TYPE B

*Description:* Oval in outline, surfaces parallel, grinding surface slightly convex (figs. 46, *d*, 48, *a*). Total 6.

*Materials:* Rhyolite, basalt.

*Dimensions:* Length, 11.4, 20.5, 15.8 cm., remainder fragments; width, 10.5, 14.9, 10.3, 9.8, 9.8, 9.5 cm.; thickness, 4.5, 4.3, 5.2, 1.7, 3.4, 5.4 cm.

##### TYPE C

*Description:* Oval in outline, surfaces parallel, grinding surface flat (fig. 46, *a*). Total 5.

*Materials:* Basalt.

*Dimensions:* Length, 15.3 cm., remainder fragments; width, 8.5, 9.0, 5.2, 10.4, 11.7 cm.; thickness, 5.5, 3.9, 2.4, 6.3, 2.3 cm.

##### TYPE D

*Description:* Rectangular in outline, surfaces parallel, grinding surface convex (fig. 46, *b*). Total 3.

*Materials:* Rhyolite, biotite.

*Dimensions:* Length, 22.4, 26.0 cm., one fragment; width, 12.4, 11.7, 9.0 cm.; thickness, 5.6, 3.1, 3.1 cm.

[illegible]

Fig. 42. Occurrence of ground and pecked stone artifacts by phases.





[illegible]

Fig. 45. Occurrence of bone and baked clay artifacts by phases.

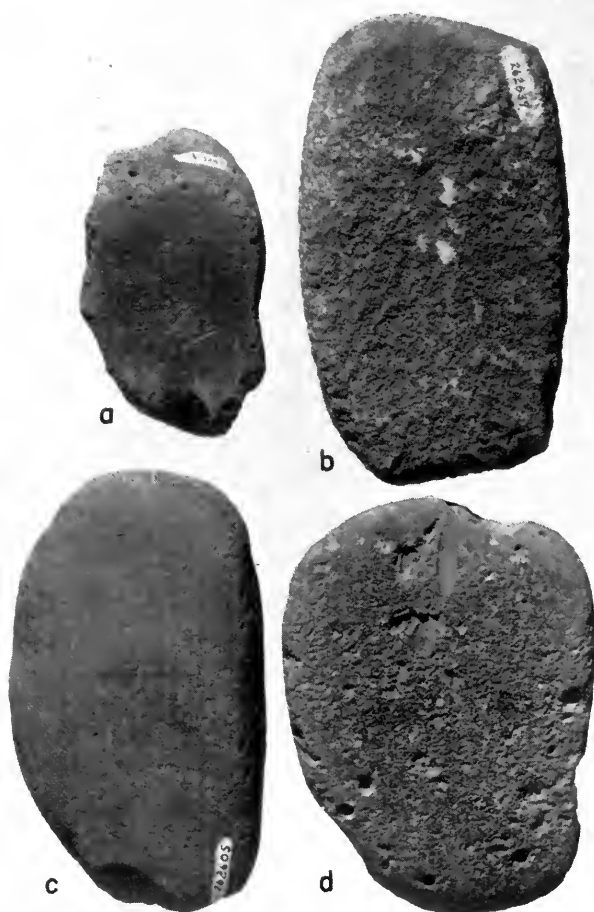


FIG. 46. Oval and rectangular two hand manos. Length of *d*, 20.5 cm.

#### TYPE E

*Description:* Rectangular in outline, surfaces parallel, grinding surface slightly convex (figs. 47, *a*, 48, *c*). Total 10.

*Materials:* Rhyolite, scoria.

*Dimensions:* Length, 9.7–21.5 cm., average, 17.0 cm.; width, 7.5–11.8 cm., average, 10.1 cm.; thickness, 3.7–7.1 cm., average, 4.6 cm.



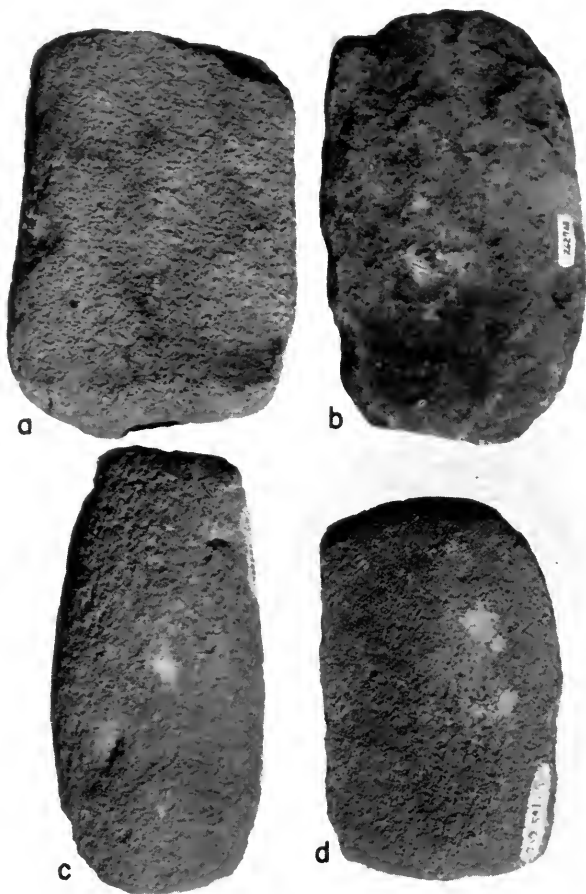


FIG. 47. Rectangular two hand manos. Length of *d*, 17.6 cm.

#### TYPE F

*Description:* Rectangular in outline, surfaces parallel, grinding surface flat (fig. 47, *b*). Total 9.

*Materials:* Rhyolite.

*Dimensions:* Length, 13.1–20.0 cm., average, 15.0 cm.; width, 6.0–12.1 cm., average, 10.2 cm.; thickness, 2.6–7.1 cm., average, 4.8 cm.

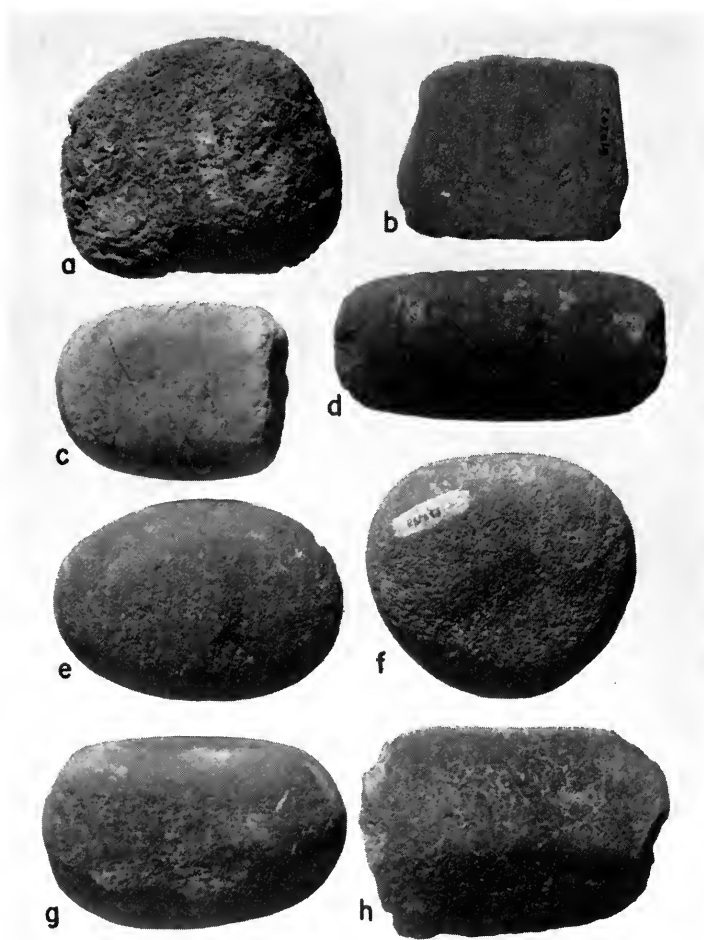


FIG. 48. Oval and rectangular one hand manos. Length of *h*, 1.30 cm.

### Two Grinding Surfaces

#### TYPE A

*Description:* Oval in outline, surfaces parallel, convex (fig. 48, *e*, *f*).  
Total 2.

*Materials:* Basalt, quartz cobble.

*Dimensions:* Length, 11.0, 12.1 cm.; width, 10.5, 8.6 cm.; thickness, 4.7, 4.7 cm.

## TYPE B

*Description:* Oval in outline, surfaces parallel, slightly convex (fig. 48, *g*). Total 4.

*Materials:* Basalt.

*Dimensions:* Length, one fragment, 12.6, 15.6, 11.9 cm.; width, 4.6, 8.0, 12.0, 8.5 cm.; thickness, 2.9, 5.7, 5.3, 4.7 cm.

## TYPE C

*Description:* Oval in outline, surfaces parallel, flat. Total 4.

*Materials:* Scoria.

*Dimensions:* Length, 14.5 cm., remainder fragments; width, 5.4, 9.5, 8.1, 5.8 cm.; thickness, 3.9, 5.1, 3.6, 5.4 cm.

## TYPE D

*Description:* Rectangular in outline, one wedge-shaped in cross section, the others with surfaces parallel, one flat, one convex (fig. 47, *c*). Total 5.

*Materials:* Sandstone.

*Dimensions:* Length, 20.3, 20.7 cm., remainder fragments; width, 10.0, 9.8, 10.1, 10.6, 10.1 cm.; thickness, 2.7, 3.5, 3.6, 3.4, 3.2 cm.

## TYPE E

*Description:* Rectangular in outline, one wedge-shaped in cross section, the others with surfaces parallel, slightly convex. Total 11.

*Materials:* Discarded in field.

*Dimensions:* Length, all fragments; width, 9.4–12.5 cm., average, 10.8 cm.; thickness, 2.5–5.6 cm., average, 4.9 cm.

## TYPE F

*Description:* Square in outline, surfaces parallel, flat (fig. 48, *b*). Total 1.

*Material:* Sandstone.

*Dimensions:* Length, 9.6 cm.; width, 7.7 cm.; thickness, 1.7 cm.

## TYPE G

*Description:* Rectangular with rounded corners in outline, one grinding surface convex lengthwise, slightly convex crosswise, the other convex; one specimen wedge-shaped in cross section, the other with surfaces parallel (fig. 48, *d*). Total 2.

*Materials:* Basalt.

*Dimensions:* Length, 20.0, 13.8 cm.; width, 10.2, 5.5 cm.; thickness, 2.9, 2.4 cm.

#### TYPE H

*Description:* Rectangular with rounded corners in outline, one grinding surface convex lengthwise, slightly convex crosswise, the other slightly convex; four specimens wedge-shaped in cross section, the others with surfaces parallel (fig. 49, *a, c, d*). Total 9.

*Materials:* Rhyolite, scoria, sandstone.

*Dimensions:* Length, 15.4–21.2 cm., average, 17.5 cm.; width, 8.6–11.3 cm., average, 10.0 cm.; thickness, 3.1–6.6 cm., average, 4.3 cm.

#### TYPE I

*Description:* Rectangular in outline, surfaces parallel, convex lengthwise, slightly convex crosswise (fig. 47, *d*). Total 2.

*Materials:* Sandstone, scoria.

*Dimensions:* Length, 17.6, 15.1 cm.; width, 10.9, 10.4 cm.; thickness, 3.5, 3.7 cm.

#### TYPE J

*Description:* Rectangular in outline, surfaces parallel, flat (fig. 49, *b*). Total 4.

*Materials:* Sandstone.

*Dimensions:* Length, 18.7, 15.0, 26.8 cm., one fragment; width, 10.1, 10.3, 11.4, 6.8 cm.; thickness, 3.1, 2.8, 4.4, 5.7 cm.

#### TYPE K

*Description:* Oval in outline with one beveled grinding surface in a double plane with a longitudinal ridge between, and one slightly convex grinding surface (fig. 48, *h*). Total 6.

*Materials:* Basalt.

*Dimensions:* Length, all fragments; width, 9.0, 6.8, 9.3, 9.7, 7.8, 11.0; thickness, 2.5, 2.8, 2.7, 2.8, 3.6, 2.8 cm.

### RUBBING STONES

(Figure 50)

#### TYPE A

*Description:* Smooth, roughly oval to rectangular pebbles with single slightly convex rubbing surfaces (fig. 50, *c*). Total 5.

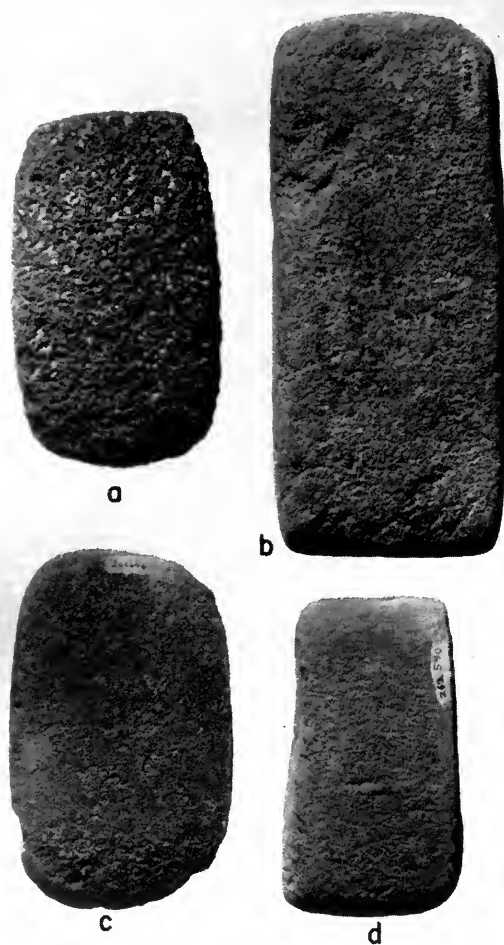


FIG. 49. Rectangular two hand manos with two grinding surfaces. Length of *d*, 15.9 cm.

*Materials:* Rhyolite, limestone.

*Dimensions:* Length, 8.2, one fragment, 8.6, 8.2, 6.9 cm.; width, 4.3, 5.1, 7.2, 5.3, 6.4 cm.; thickness, 1.7, 3.5, 3.2, 3.7, 4.3 cm.

#### TYPE B

*Description:* Smooth, roughly oval pebbles with two flat rubbing surfaces (fig. 50, *a*, *b*). Total 2.

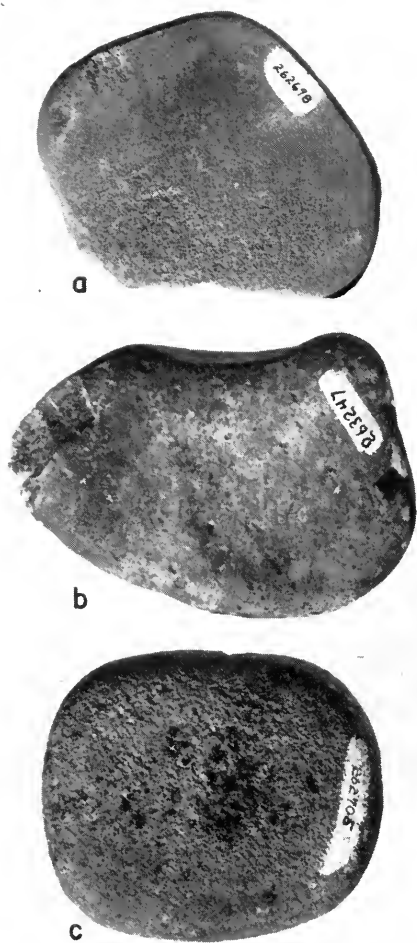


FIG. 50. Rubbing stones. Length of *c*, 8.6 cm.



FIG. 51. Polishing stones. Length of lower right specimen, 6.5 cm.

*Materials:* Basalt, sandstone.

*Dimensions:* Length, 9.8, 8.3 cm.; width, 6.9, 7.5 cm.; thickness, 2.5, 2.2 cm.

### POLISHING STONES

(Figure 51)

*Description:* Small pebbles, oval or circular in outline, with one or more flat polishing surfaces. Total 4.

*Materials:* Limestone.

*Dimensions:* Length, 4.5, 6.5, 4.4, 4.1 cm.; width, 3.5, 3.8, 2.2, 4.1 cm.; thickness, 1.1, 2.5, 0.8, 2.5 cm.

## DISCUSSION

The handstones (manos, rubbing stones, and polishing stones), as a group, typically have one or more broad working surfaces worn by considerable use. On the smaller handstones, such as polishing stones and rubbing stones, these working surfaces have the nature of quite smooth facets ranging in curvature from almost flat to convex. The analogous grinding surfaces of the manos, especially the larger specimens, are more frequently characterized by dimpling and minute crosswise scratches (fig. 47). These marks probably resulted from pecking with a hammerstone and prolonged back and forth grinding on the metate.

The late rectangular manos were probably given additional shaping by pecking and grinding. Not only are the grinding surfaces of these altered, but the edges and ends show dimpling as well. Moreover, these manos are far too symmetrical in outline to have been shaped so evenly by rubbing against the metate walls alone. On the other hand, most of the manos have ends that were rounded or squared off to some extent by wear on the margins of the metate grinding surfaces. Those used so much as to be worn wedge-shaped in cross section frequently are the most regularly rounded; and the short one hand manos, which were more common in the levels where basin type metates were recovered, are more frequently oval. Furthermore, the rectangular manos with grinding surfaces that are more convex lengthwise than crosswise were probably used on trough type metates and were squared off by a linear back-and-forth motion in the trough.

Several of the earlier one hand manos and a few of the late two hand manos show no particular wear or shaping of the ends. This seems to indicate that natural pebbles of handy size and convenient weight were selected—that the raw material for the manos was not broken out of larger rocks. The beveled mano (see p. 96) was probably formed by a unique type of grinding (Kidder, 1932, p. 71). These manos generally show considerable wear. No whole specimens of this type were recovered during the 1952 season. One of the rectangular manos (cat. no. 262652) from the trash area in Hinkle Park Cliff-Dwelling had dried juniper berry seeds and pulp in the interstices of its porous grinding surface.

Six manos out of the thirty-odd brought back to the Museum have pits or grooves in their edges for finger grips.

*Distribution:* The majority of the manos occurred in the later levels of the caves and in the cliff-dwellings. Most of them are of the longer two hand



type. One hand manos (here defined as less than 15 cm. long) came from both the lower (Pine Lawn and Pre-Pottery) levels and the cliff-dwellings; but those from the cliff-dwellings appear to be exceptional specimens, such as the one example that looks like a child's version of one of the later types. Most of the manos are rounded-rectangular in outline. All the specimens with grinding surfaces more convex lengthwise than crosswise are from the cliff-dwellings, as are the beveled manos. This late distribution is in agreement with the distribution of these types in Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, pp. 109-110) and in the Reserve Phase sites in the Pine Lawn Valley (Martin and Rinaldo, 1950b, p. 451). This also agrees with their distribution in other areas of the Southwest; for example, beveled manos are reported only from Pueblo II-IV of the Anasazi, or the coeval periods in the south (Kidder, 1932, p. 71; Bartlett, 1934, pp. 27-28; Sayles, 1945, pl. 31; Kidder and Cosgrove, 1949, p. 140).

All the rubbing stones collected came from the cliff-dwellings and the later levels of the caves. Rubbing stones have been recovered from Anasazi and Hohokam sites as well as Mogollon sites.

The few polishing stones that were recovered may be a concomitant of the late occupation of the sites excavated. These implements were found to decrease in frequency in inverse proportion to the increase in the quantity of corrugated pottery (Martin, Rinaldo, and Antevs, 1949, p. 215; Martin, Rinaldo, and others, 1952, p. 110).

## METATES

(Figures 52-55)

### TYPE A

*Description:* Slab type, large slab, generally oblong in outline with flat or slightly concave upper surface; bottom and sides of slab unworked; grinding surface usually smooth, sometimes pecked. Total 10.

*Dimensions:* Length, 28.0-52.0 cm., average, 38.0 cm.; width, 22.0-47.0 cm., average, 33.0 cm.; thickness, 4.7-13.0 cm., average, 9.1 cm.

### TYPE B

*Description:* Shallow basin type, unshaped slabs of stone, generally rectangular to broadly triangular in outline, with shallow oval grinding surface. Total 7.

*Dimensions:* Length, 31.0-40.0 cm., average, 35.5 cm.; width, 21.0-30.0 cm., average, 25.3 cm.; thickness, 6.0-11.0 cm., average, 8.6 cm.



FIG. 52. Upper specimen, small metate-like grinding stone; lower specimen, slab type metate. Length of lower specimen, 35.0 cm.

## TYPE C

*Description:* Deep basin type, unshaped blocks of stone, generally rectangular or boat-shaped in outline with oval grinding surface, somewhat basin-shaped. Total 7.



FIG. 53. Shallow basin type metate from O Block Cave. Length, 37.0 cm.

*Dimensions:* Length, 41.0–52.0 cm., average, 45.0 cm.; width, 21.0–42.0 cm., average, 36.0 cm.; thickness, 7.0–16.0 cm., average, 10.6 cm.

*Basin Dimensions:* Length, 14.0–29.0 cm., average, 20.6 cm.; width, 13.0–22.0 cm., average, 14.8 cm.; depth, 3.0–5.0 cm., average, 4.0 cm.

## TYPE D

*Description:* Through trough type, generally oblong blocks of stone with shallow trough-shaped grinding surface open at both ends. Total 8.

*Dimensions:* Length, 26.0–47.0 cm., average, 35.6 cm.; width, 21.0–36.0 cm., average, 26.8 cm.; thickness, 3.0–10.0 cm., average, 7.7 cm.

#### TYPE E

*Description:* Generally oblong blocks of stone with trough-shaped grinding surfaces open at one end only. Total 3.

*Materials:* Scoria.

*Dimensions:* Length, 34.0, one fragment, 33.0 cm.; width, 27.0, one fragment, 24.0 cm.; thickness, 10.0, 7.0, 5.0 cm.

### SMALL METATE-LIKE GRINDING STONES

(Figure 52, top)

*Description:* Thick slabs of stone, one rectangular, the other generally triangular in outline, with smooth slightly depressed grinding surface; sides and bottoms of slabs unworked, one wedge-shaped in cross section. Total 3.

*Dimensions:* Length, 20.0, 19.0, 20.0 cm.; width, 15.0, 16.0, 18.0 cm.; thickness, 3.0, 6.0, 8.0 cm.

### PAINT GRINDING STONES

(Figure 56)

#### TYPE A

*Description:* Large rough thick narrow blocks of stone, with trough-like grinding surfaces showing traces of red paint. Total 2.

*Dimensions:* Length, 31.0, 41.0 cm.; width, 10.0, 17.0 cm.; thickness, 10.0, 10.0 cm.

#### TYPE B

*Description:* Irregular small slabs with traces of paint on one surface; one specimen with paint in slight depression. Total 2.

*Materials:* Rhyolite with hematite on surface.

*Dimensions:* Length, 11.9, 13.4 cm.; width, 6.9, 10.4 cm.; thickness, 1.8, 5.1 cm.

### DISCUSSION

The lower milling stones (metates, small metate-like grinding stones and paint grinding stones) all have large broad grinding surfaces characterized by some polish and a smaller amount of dimpling. In general, the grinding surfaces of the lower milling stones tend to be smoother and more highly polished than do the corresponding surfaces of the manos and other upper



FIG. 54. Trough type metate from Hinkle Park Cliff-Dwelling. Length, 34.0 cm.



FIG. 55. Trough type metate from Hinkle Park Cliff-Dwelling. Length, 36.0 cm.



FIG. 56. Upper specimen, pit cover; lower specimens, paint grinding stones. Length of lower right specimen, 11.9 cm.

milling stones, which are more often characterized by dimpling, which is the result of pecking them with a hammerstone. Only one of the larger trough type metates appears to have been intentionally shaped. The bottom and sides of all the other metates were unworked. Consequently, the slabs and blocks of stone that were selected for use as metates conform only in a general way to geometric shapes such as "rectangular"; actually their contours are somewhat irregular.

Although green pigment was found on some of the paint grinding stones from Tularosa Cave, red (hematite) was the more common pigment there (Martin, Rinaldo, and others, 1952, p. 138) and was the only pigment to be found on these stones from O Block Cave and Hinkle Park Cliff-Dwelling. In turn, this corroborates the evidence from the open sites in the Pine

Lawn Valley, where a few of the paint grinding stones have hematite on their surfaces. Hematite was also found on the grinding surfaces of three early basin metates from O Block Cave and a late trough metate from Cosper Cliff-Dwelling. This indicates, of course, a departure from the putative normal use of metates for grinding corn and other food products.

*Distribution:* As may be seen from the listing of occurrences by sites and phases (see fig. 42), basin metates had predominantly an early distribution, in that most of them were recovered from the Pre-Pottery and Pine Lawn Phase levels of O Block Cave, although a very few were recovered from later levels of the same cave. Conversely, the trough metate had predominantly a late distribution in the caves and cliff-dwellings excavated. The slab type metates, on the other hand, were almost equally divided early and late. These, however, should be distinguished from the slab metates normally found in mealing bins in the late Pueblo II and III ruins of the Chaco and San Juan districts (Pepper, 1920, pp. 295-297; Morris, 1919, pp. 29, 235). Both the northern and the southern slab metates have plain surfaces; however, those from the Reserve area are more irregular in outline, and with only one possible exception (Martin and Rinaldo, 1950b, p. 440) were not placed in slab-sided mealing bins. No mealing bins of this type were uncovered in the cliff-dwellings. Metates and manos were recovered from both the rooms and the trash areas of the cliff-dwellings. This seems to indicate that the metates were probably used in the passageways between the rooms, as well as inside the rooms. All of the metates came from rooms or other areas near the mouth of the cave at Hinkle Park Cliff-Dwelling.

This typological distribution of metates is essentially similar to that reported from sites previously investigated in the Reserve area (Martin and Rinaldo, 1950b, pp. 560-561; Martin, Rinaldo, and others, 1952, p. 111). It also has applications in a broader geographical context. In this sequence the basin metate precedes the trough metate with trough open at one end only, and this trough type metate is in turn succeeded by the through trough type. The precedence of the basin metate over the trough metate has been noted by Haury and Sayles (1947, p. 77), Woodbury (*in* Kluckhohn and Reiter, 1939, pp. 66-67), and others. Its survival into modern times and use by tribes such as the Havasupai (Spier, 1928, p. 114) may account for its sporadic distribution in later levels and sites. The through trough metate typically occurs in the later phases and sites in the south. It is the characteristic type in the late phases of the San Simon Branch (Sayles, 1945, p. 50), at the Swarts Ruin (Cosgrove, 1932, p. 36), in the Babocomari Village (Di Peso, 1951, p. 131), and in other late sites of this region.

**WORKED SLABS**

(Figure 57)

*Description:* Thin stone slabs, roughly rectangular in outline; surfaces smooth; flat, edges worked. Total 9.

*Dimensions:* Length, 19.0–54.0 cm., average, 41.9 cm.; width, 23.0–52.0 cm., average, 36.4 cm.; thickness, 1.0–10.5 cm., average, 5.1 cm.



FIG. 57. Worked slab from Hinkle Park Cliff-Dwelling. Length, 42.0 cm.

*Discussion:* The worked slabs were apparently made from relatively thin natural slabs. The broad surfaces are relatively smooth, but not polished. The edges of the thinner specimens have been finished with a crude percussion chipping, probably done with a hammerstone; the thicker specimens have some edges battered to shape, whereas other edges retain a natural wind- or water-worn finish. The broad surfaces showed no traces of fire, so it does not seem probable that they were used as griddles. None were painted or sculptured, and none were found as paving slabs. There is a possibility that they were used as door slabs because their size and shape approximate that of the doors, and because some of the doors had recesses



or projections in which such slabs would have fitted. In general these slabs are symmetrical and indicate a certain degree of skill and care in workmanship.

*Distribution:* Worked slabs were recovered only from Hinkle Park Cliff-Dwelling. Their absence in O Block Cave and Y Canyon Cave is possibly

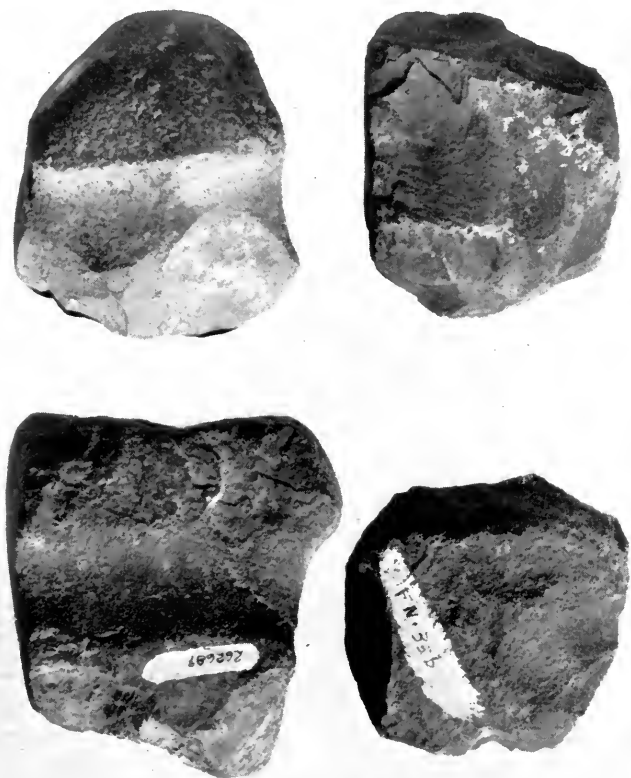


FIG. 58. Right, hammerstones; left, axes. Length of lower right specimen, 8.0 cm.

due to the lack of houses in these sites, for they are most often recovered from pueblo rooms. Their absence in Cosper Cliff-Dwelling might be explained by the degree to which this dwelling had been vandalized. These slabs were common in the open sites of the Reserve Phase in Pine Lawn Valley (Martin and Rinaldo, 1950b, p. 452), and they were equally com-

mon in Starkweather Ruin (Nesbitt, 1938, p. 104) and at the Swarts Ruin (Cosgrove, 1932, p. 49). In fact, it has been pointed out by Hough (1914, pp. 31-32) that they are particularly characteristic of the Upper Gila.

### **HAMMERSTONES**

(Figure 58)

*Description:* Battered and chipped angular pebbles, some round. Total 8.

*Materials:* Fine-grained basalt, chalcedony.

*Dimensions:* Length, 5.9-8.9 cm., average, 7.5 cm.; width, 4.7-8.1 cm., average, 6.0 cm.; thickness, 3.3-6.5 cm., average, 5.1 cm.

### **ABRADING STONES**

(Figure 59)

*Description:* Thin oblong pebbles of coarse-grained stone with worked surfaces that show use for grinding. Total 2.

*Materials:* Sandstone.

*Dimensions:* Length, 5.1, 6.1 cm.; width, 2.7, 5.2 cm.; thickness, 1.0, 1.3 cm.

### **AWL SHARPENERS**

(Figure 59)

*Description:* Long narrow pebbles with a lengthwise groove worn in one surface. Total 2.

*Materials:* Fine-grained basalt, volcanic sinter.

*Dimensions:* Length, 6.5, 9.6 cm.; width, 1.9, 3.2 cm.; thickness, 1.6, 1.9 cm.

### **ARROW SHAFT TOOLS**

(Figure 59)

*Description:* Generally oval pebbles with a single groove across one surface at right angles to the long axis of the stone; one with ridge at right angles to groove; groove polished. Total 3.

*Materials:* Limestone.

*Dimensions:* Length, 6.7, 7.2, 9.0 cm.; width, 5.0, 6.1, 6.7 cm.; thickness, 3.8, 2.5, 2.8 cm.; width of groove, 1.2, 1.0, 0.9 cm.



FIG. 59. Left, arrow shaft tools; upper right, awl sharpeners; lower right, abrading stones. Length of lower left specimen, 7.2 cm.

## DISCUSSION

The hammerstones grade from fairly sharp angular cores to ball-like objects. Presumably the more rounded specimens represent the end product of protracted use of the more angular specimens. These were probably tools with multiple uses ranging from roughening the faces of milling stones to crude percussion chipping.

The grooves of both the awl sharpeners and the arrow shaft tools exhibit minute scratches that are probably the result of use, although they differ in several respects. The grooves of the awl sharpeners are irregular, and the ends taper off in width. The scratches within the groove run in different directions both across and parallel to the groove. The grooves of the arrow shaft tools are uniform in width for their entire length, and the tiny scratches are parallel. These grooves are polished, whereas the awl sharpener grooves are not.

One of the abrading stones has a sharp straight edge which is slightly beveled on one surface, and this tool could have been used as a knife.

*Distribution:* Arrow shaft tools occurred only at Hinkle Park Cliff-Dwelling. Their polished grooves indicate that they were used as arrow shaft straighteners, rather than smoothers (Toulouse *in* Kluckhohn and Reiter, 1939, p. 81). They occur at sites dated at about A.D. 1000 and later. In area, their distribution is limited to the Southwest, including west Texas and northern Chihuahua, and the Pacific Coast (Toulouse, *op. cit.*, p. 86). Since Toulouse made his study, arrow shaft straighteners similar to those found at Hinkle Park have been reported from the Bradfield site and from the Alamogordo sites in south central New Mexico (Lehmer, 1948, pp. 50-51, 64), the Babocomari and Tres Alamos sites in southeastern Arizona (Di Peso, 1951, pp. 173-176; Tuthill, 1947, p. 75) and other Classic period sites.

## STONE BALLS

(Figure 60)

### TYPE A

*Description:* Small round objects roughly formed of coarse-grained stone. Total 7.

*Materials:* Sandstone concretions.

*Dimensions:* Diameter, 2.0-4.8 cm., average, 2.9 cm.

### TYPE B

*Description:* Coarse-grained stone worked to shape of two tangent balls. Total 4.

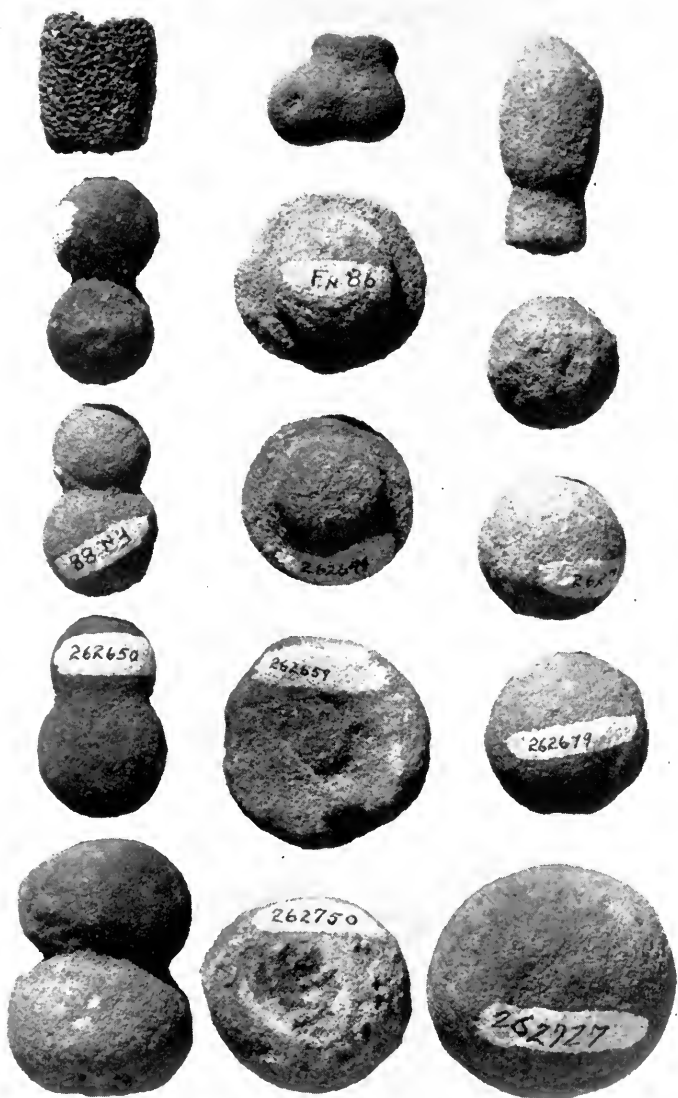


FIG. 60. Top row of specimens, left to right, stone pipe, ceremonial objects. Lower specimens, left to right, first column, double stone balls, second column, jar stoppers, third column, single stone balls. Diameter of lower right specimen, 4.8 cm.

*Materials:* Sandstone concretions.

*Dimensions:* Length, 4.1, 4.0, 5.0, 3.8 cm.; width, 2.0, 2.5, 3.6, 2.2 cm.; thickness, 2.0, 2.5, 3.6, 2.0 cm.

### STONE PIPE

(Figure 60)

*Description:* Tubular type, tapers very little from larger bowl end to smaller stem end; central perforation through pipe narrows to small hole (ca. 4 mm. diameter) about 18 mm. from stem end. Total 1.

*Materials:* Scoria.

*Dimensions:* Length, 2.7 cm.; diameter, 2.3 cm.

### CEREMONIAL(?) OBJECTS

(Figure 60)

#### TYPE A

*Description:* Roughly cylindrical piece of sandstone; groove around it near one end, other end roughly conical; possibly phallic. Total 1.

*Materials:* Sandstone concretions.

*Dimensions:* Length, 4.4 cm.; width, 2.0 cm.; thickness, 1.8 cm.

#### TYPE B

*Description:* Small pebble, shaped like two tangent balls, one slightly larger than the other; short projection on one side. Total 1.

*Materials:* Sandstone concretions.

*Dimensions:* Length, 2.7 cm.; width, 2.2 cm.; thickness, 1.5 cm.

### DISCUSSION

The single and double sandstone balls and other concretions of different shapes exhibit a minimum of workmanship. All the surfaces of the stone pipe were carefully worked. Concretions of various shapes and sizes have been found on many sites in different sections of the Southwest. These objects may have had some ritual significance.

*Distribution:* Stone balls and similar concretions were recovered only from Hinkle Park Cliff-Dwelling, and this evidence alone would limit their distribution to the Reserve and Tularosa phases; however, their distribution elsewhere in the Reserve area indicates that they were used throughout the period of occupation of the area. They have been reported from Tularosa Cave (Martin, Rinaldo, and others, 1952, p. 112), the SU site

(Martin and Rinaldo, 1940, p. 62) and Turkey Foot Ridge (Martin and Rinaldo, 1950a, p. 327). A similar distribution has been noted for other areas of the Southwest. Stone balls were recovered at Pecos (Kidder, 1932, p. 61), at Betatakin (Judd, 1931, p. 55), and from a Modified Basket Maker site near Ackmen, Colorado (Martin, 1939, p. 388). The general southern distribution of tubular pipes was noted in the report on Tularosa Cave (Martin, Rinaldo, and others, 1952, p. 112).

### MINIATURE JAR STOPPERS(?)

(Figure 60)

*Description:* Small objects, circular in outline; two hemispheres joined on their flat planes, one of smaller diameter than the other. Total 4.

*Materials:* Sandstone concretions.

*Dimensions:* Diameter, 4.3, 3.4, 3.8, 4.1 cm.

### PIT COVERS

(Figure 56)

*Description:* Circular stone slabs chipped along edges; one worked on one surface to fit opening of pit. Total 3.

*Materials:* Sandstone.

*Dimensions:* Diameter, 19.1, 8.6, 26.8 cm.

### STONE AXES

(Figure 58)

*Description:* Three quarters grooved type, bit crudely flaked, broken and battered. Total 2.

*Materials:* Fine-grained basalt.

*Dimensions:* Length, 9.4, 8.2 cm.; width, 8.4, 7.1 cm.; thickness, 5.3, 6.6 cm.

### DISCUSSION

The objects termed miniature jar stoppers are called that because of their resemblance to mushroom-shaped stone jar stoppers of larger size found at the Village of the Great Kivas on the Zuni Reservation (Roberts, 1932, p. 141). Similar objects were termed pigment grinders by Fewkes (1904, p. 104), and they also appear in the collections from Chetro Ketl at the Museum of New Mexico. The specimens from Hinkle Park Cliff-Dwelling are too small for use on anything but miniature vessels.

These jar stoppers were subjected to a minimum of modification in shape. The natural outlines of one or two specimens have been sharpened and emphasized by deepening the groove separating the two halves of the specimen (as was done with the double stone balls), but otherwise they were left unworked. The pit covers were likewise only worked on their edges or made to fit the mouth of the pit by beveling the lower surface. They lack well-smoothed flat surfaces or regular edges. In fact, they remain very nearly as they were when they were split off from larger slabs.

The axes, on the other hand, although now mere battered relics of what they must have been when new, do show considerable workmanship. The grooves, or channels, are uniform and smooth, the heads, or polls, and sides well worked and possibly even polished at one time. They appear to have been flaked to sharpen their bits, and their present battered condition indicates that they ended up by being used as hammerstones, or mauls.

One of the pit covers was in place over the mouth of a small pit.

*Distribution:* Hinkle Park Cliff-Dwelling was the only one of the four sites in which miniature jar stoppers, pit covers, and axes were found. No other stone mushroom-shaped jar stoppers have been recovered in the Pine Lawn Valley. Stone disks which may have been pit covers were recovered at the SU site (Martin, 1943, p. 222) and at Turkey Foot Ridge (Martin and Rinaldo, 1950a, p. 328). These objects are reported from numerous Anasazi sites, as well as Mogollon sites. They have been reported in situ as pit covers at Pecos (Kidder, 1932, pp. 75-76), at the Babocomari village (Di Peso, 1951, p. 145), at the Village of the Great Kivas (Roberts, 1932, p. 144), and at a Modified Basket Maker site near Ackmen, Colorado (Martin, 1939, p. 372).

The three quarters grooved ax is typical of the Hohokam and probably has an ultimate source farther to the south (Reed, 1951, p. 45). It is found in Chihuahua, San Simon, Dragoon, Mimbres, Sinagua, Cibola and Salado branches and also in late prehistoric Hopi and Zuni sites. Three quarters grooved axes were reported both from the Turkey Foot Ridge site (Martin and Rinaldo, 1950a, p. 334) and the Reserve Phase sites in the Pine Lawn Valley (Martin and Rinaldo, 1950b, p. 480).

## PROJECTILE POINTS

(Figures 61-65)

### TYPE A-1

*Description:* Corner notched, slightly expanding stem narrower than shoulder, thinned, concave base (fig. 61, *a*, *b*, *c*). Total 6.

*Materials:* Obsidian, fine-grained basalt, jasper.



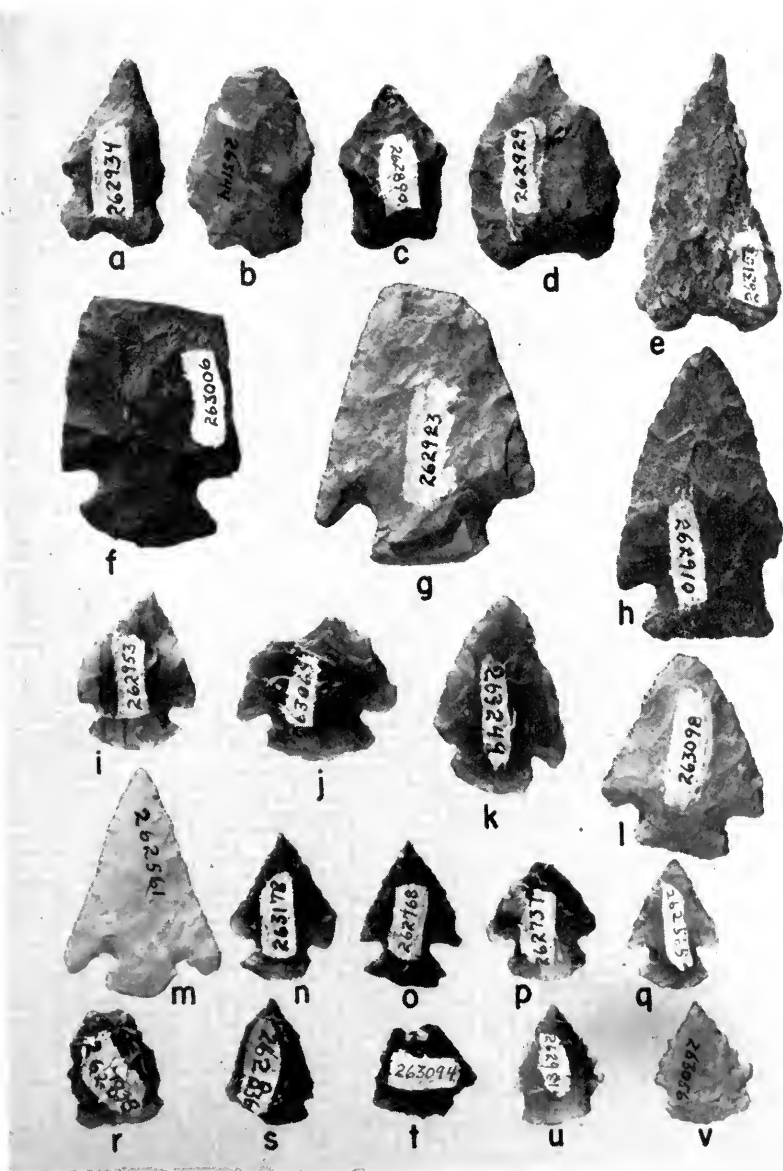


FIG. 61. Projectile points, types A, B, and D. Length of v, 2.1 cm.

*Dimensions:* Length, 3.2, 3.2, 2.8 cm., remainder fragments; width, 1.8, 2.2, 1.9, 1.9, 1.4, 1.2 cm.; thickness, 0.6, 0.8, 0.8, 0.5, 0.6, 0.5 cm.

#### TYPE A-2

*Description:* Leaf shape, concave base (fig. 61, *d, e*). Total 2.

*Materials:* Fine-grained basalt.

*Dimensions:* Length, 3.5, 4.9 cm.; width, 2.6, 2.4 cm.; thickness, 1.0, 0.9 cm.

#### TYPE B-1

*Description:* Diagonal notched, expanding stem narrower than shoulder, base straight to convex; down-raking barbs, relatively large size (fig. 61, *f, g, h*). Total 6.

*Materials:* Fine-grained basalt, chert.

*Dimensions:* Length, 4.9 cm., remainder fragments (3.8–5.8 cm.); width, 2.6, 2.8, 3.0, 3.6, 3.1, 2.8 cm.; thickness, 0.6, 0.7, 0.7, 0.8, 0.7, 0.5 cm.

#### TYPE B-2

*Description:* Diagonal notched, expanding stem narrower than shoulder, base convex, broad blade, down-raking barbs, medium size (fig. 61, *i, j, k, l*). Total 19.

*Materials:* Obsidian, chert, chalcedony, fine-grained basalt.

*Dimensions:* Length, 2.4–3.5 cm., average, 3.0 cm.; width, 1.8–2.7 cm., average, 2.1 cm.; thickness, 0.3–0.7 cm., average, 0.4 cm.

#### TYPE B-3

*Description:* Diagonal notched, expanding stem narrower than shoulder, base convex, down-raking barbs, longer and narrower proportions (fig. 61, *m*). Total 1.

*Materials:* Chert.

*Dimensions:* Length, 3.8 cm.; width, 2.6 cm.; thickness, 0.5 cm.

#### TYPE B-4

*Description:* Diagonal notched, expanding stem narrower than shoulder, base convex, broad blade, down-raking barbs, smaller and thinner points (fig. 61, *n, o, p, q*). Total 14.

*Materials:* Obsidian, chert.

*Dimensions:* Length, 1.4–2.5 cm., average, 2.1 cm.; width, 1.1–1.8 cm., average, 1.5 cm.; thickness, 0.2–0.5 cm., average, 0.3 cm.

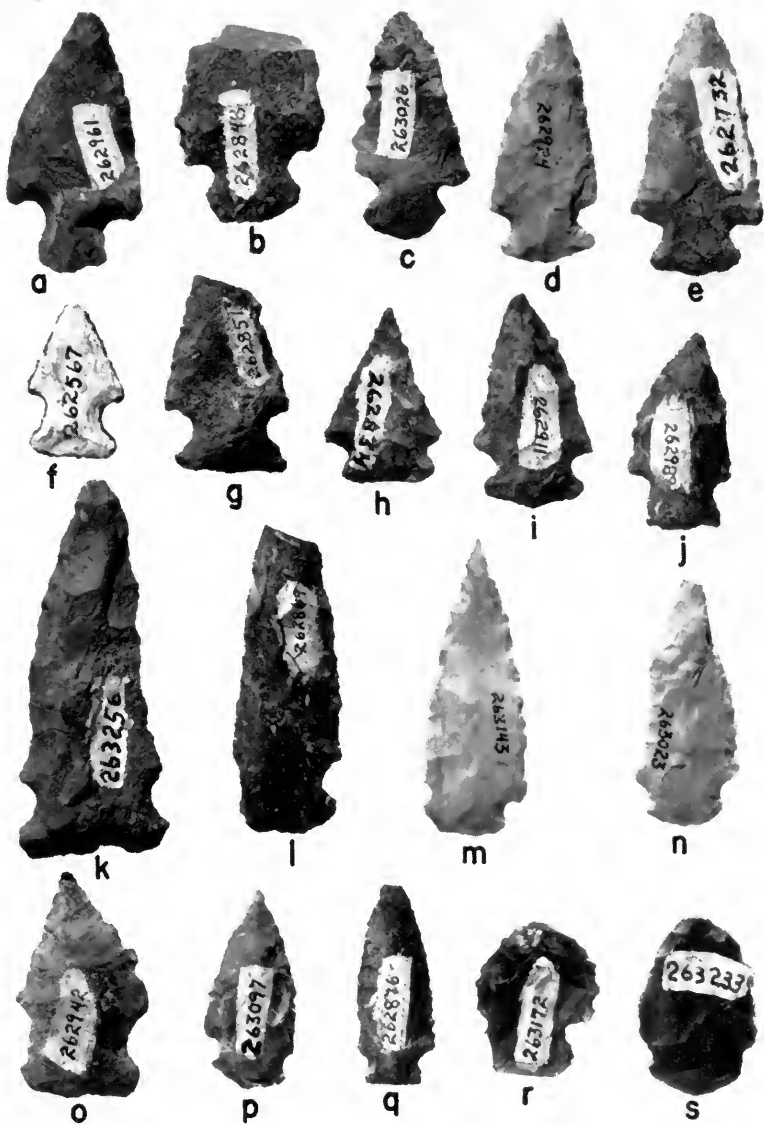


FIG. 62. Projectile points, types C and E-G. Length of s, 3.0 cm.

## TYPE C

*Description:* Deep lateral notched, straight base, expanding stem narrower than shoulder, sharp lateral barbs (fig. 62, *f*). Total 1.

*Material:* Chert.

*Dimensions:* Length, 2.6 cm.; width, 1.6 cm.; thickness, 0.5 cm.

## TYPE D

*Description:* Small, shallow lateral notched, straight base narrower than shoulder, two specimens with serrate edges (fig. 61, *r-v*). Total 14.

*Materials:* Obsidian, fine-grained basalt, jasper, chert.

*Dimensions:* Length, 1.7–3.0 cm., average, 2.3 cm.; width, 1.4–2.1 cm., average, 1.6 cm.; thickness, 0.3–0.7 cm., average, 0.5 cm.

## TYPE E-1

*Description:* Lateral notched, slender, expanding base narrower than shoulder, base straight to convex, sharp lateral barbs (fig. 62, *a-e*). Total 13.

*Materials:* Fine-grained basalt, flint.

*Dimensions:* Length, 3.6–4.4 cm., average, 4.1 cm.; width, 1.8–2.5 cm., average, 2.1 cm.; thickness, 0.5–0.8 cm., average, 0.6 cm.

## TYPE E-2

*Description:* Lateral notched, expanding base narrower than shoulder, straight base, lateral barbs; thick broad blade (fig. 62, *g-j*). Total 10.

*Materials:* Fine-grained basalt, chert, obsidian.

*Dimensions:* Length, 2.9–3.6 cm., average, 3.3 cm.; width, 1.7–2.1 cm., average, 1.9 cm.; thickness, 0.4–0.7 cm., average, 0.5 cm.

## TYPE E-3

*Description:* Lateral notched, expanding base as wide as shoulder, barbs small (fig. 62, *k, l*). Total 4.

*Materials:* Fine-grained basalt, chert.

*Dimensions:* Length, 5.1, 6.2 cm., remainder fragments; width, 1.8, 1.8, 2.5, 3.3 cm.; thickness, 0.8, 0.3, 0.8, 0.7 cm.

## TYPE E-4

*Description:* Large, shallow lateral notched, expanding base slightly convex (fig. 62, *m, n*). Total 9.

*Materials:* Fine-grained basalt, flint, chalcedony.

*Dimensions:* Length, 3.4–4.9 cm., average, 3.9 cm.; width, 1.3–1.8 cm., average, 1.5 cm.; thickness, 0.4–0.7 cm., average, 0.5 cm.

#### TYPE F-1

*Description:* Lateral notched, expanding base wider than shoulder, base straight, sharp lateral barbs (fig. 62, *o*). Total 1.

*Material:* Fine-grained basalt.

*Dimensions:* Length, 3.7 cm.; width, 2.2 cm.; thickness, 0.7 cm.

#### TYPE F-2

*Description:* Shallow lateral notched, expanding base narrower than shoulder, small points with convex edges (fig. 62, *p, q*). Total 4.

*Materials:* Obsidian, fine-grained basalt, chert.

*Dimensions:* Length, 3.3, 3.3 cm., remainder fragments; width, 1.5, 1.5, 1.3, 1.4 cm.; thickness, 0.5, 0.6, 0.4, 0.3 cm.

#### TYPE G

*Description:* Shallow lateral notched, convex base, convex edges (fig. 62, *r, s*). Total 4.

*Materials:* Obsidian, chalcedony.

*Dimensions:* Length, 3.0, 2.5, 3.0, 2.5 cm.; width, 1.8, 2.0, 1.9, 1.6 cm.; thickness, 0.6, 0.7, 0.5, 0.3 cm.

#### TYPE H

*Description:* Small, lateral notched and barbed, expanding stem narrower than shoulder, convex base (fig. 63, *a-e*). Total 17.

*Materials:* Obsidian, fine-grained basalt, chalcedony.

*Dimensions:* Length, 2.1–3.1 cm., average, 2.5 cm.; width, 1.4–1.9 cm., average, 1.6 cm.; thickness, 0.3–0.6 cm., average, 0.5 cm.

#### TYPE I

*Description:* Broad straight stem, straight base, sharp lateral barbs (fig. 63, *f, g*). Total 2.

*Materials:* Fine-grained basalt.

*Dimensions:* Length, 3.3, 3.9 cm.; width, 2.3, 2.3 cm.; thickness, 0.7, 0.6 cm.

## TYPE J

*Description:* Shallow lateral notched, expanding stem as wide as shoulder, sharp lateral barbs, relatively small points (fig. 63, *h*). Total 1.

*Materials:* Chalcedony.

*Dimensions:* Length, 2.0 cm.; width, 1.6 cm.; thickness, 0.5 cm.

## TYPE K

*Description:* Oval, single corner notched, one edge less convex than the other (fig. 63, *i*). Total 1.

*Materials:* Obsidian.

*Dimensions:* Length, 1.6 cm.; width, 1.5 cm.; thickness, 0.4 cm.

## TYPE L

*Description:* Roughly leaf-shaped; upper portion of edges convex, basal portion straight (fig. 63, *j-n*). Total 10.

*Materials:* Obsidian, fine-grained basalt, flint.

*Dimensions:* Length, 2.0–3.4 cm., average, 2.4 cm.; width, 1.6–2.4 cm., average, 1.9 cm.; thickness, 0.4–0.8 cm., average, 0.5 cm.

## TYPE M-1

*Description:* Roughly leaf-shaped to ovoid, convex base, convex edges, relatively thin specimens (fig. 63, *o, p, q*). Total 10.

*Materials:* Obsidian, fine-grained basalt, chert.

*Dimensions:* Length, 2.1–3.6 cm., average, 2.8 cm.; width, 1.5–2.1 cm., average, 1.7 cm.; thickness, 0.4–0.6 cm., average, 0.5 cm.

## TYPE M-2

*Description:* Thick, roughly leaf-shaped to ovoid, large blades (fig. 65). Total 7.

*Materials:* Fine-grained basalt.

*Dimensions:* Length, 11.0, 9.7, 11.4, 11.5, 12.4, 10.3, 5.6 cm.; width, 5.1, 4.9, 4.1, 4.5, 4.7, 3.0, 3.7 cm.; thickness, 1.2, 0.8, 0.9, 1.0, 1.1, 0.9, 1.2 cm.

## TYPE M-3

*Description:* Leaf-shaped, convex base, convex edges, thick (fig. 63, *r, s*). Total 3.

*Materials:* Chert, flint.

*Dimensions:* Length, 3.4, 3.5, 4.1 cm.; width, 1.6, 1.9, 2.1 cm.; thickness, 1.0, 0.8, 0.9 cm.

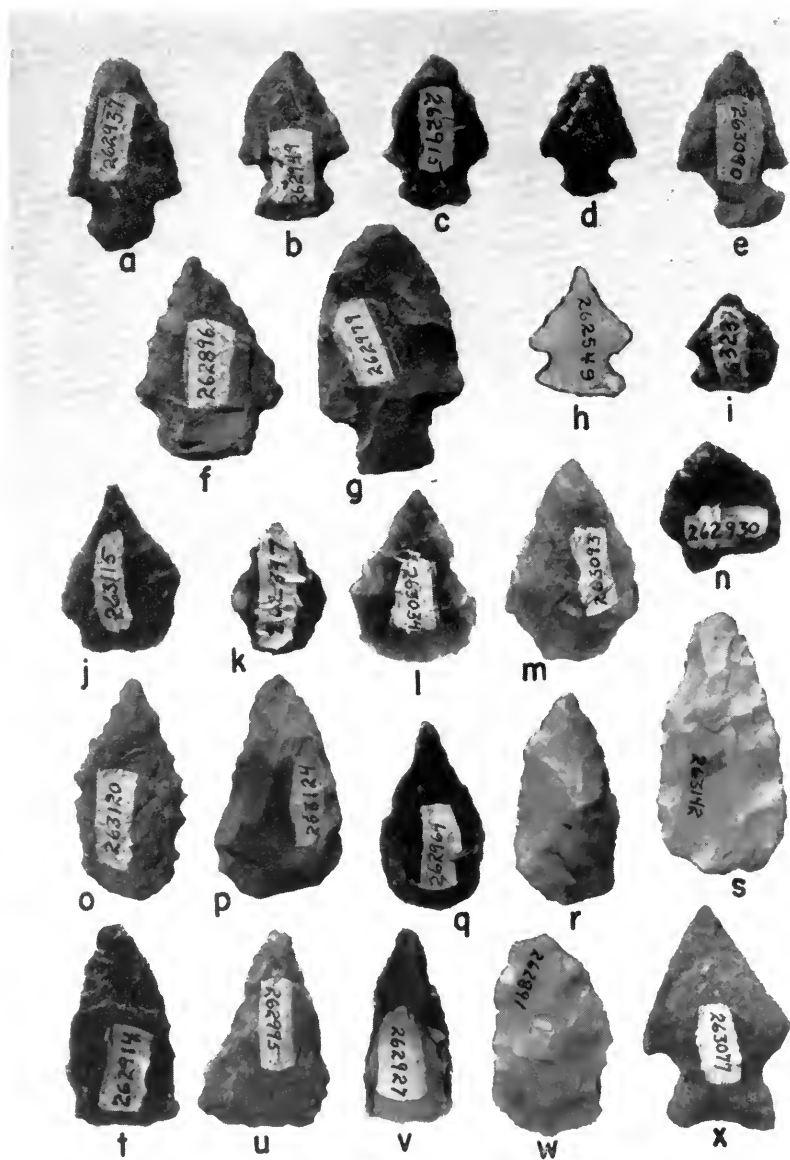


FIG. 63. Projectile points, types H-M-1, M-3, N-1, O, P. Length of x, 3.6 cm.

## TYPE M-4

*Description:* Narrow, leaf-shaped, convex base (fig. 64, *a, b, c*). Total 3.

*Materials:* Fine-grained basalt.

*Dimensions:* Length, 3.8, 3.7, 3.1 cm.; width, 1.4, 1.7, 1.5 cm.; thickness, 0.6, 0.6, 0.4 cm.

## TYPE M-5

*Description:* Convex base fragments possibly of leaf-shaped points. Total 5.

*Materials:* Obsidian, fine-grained basalt, flint.

*Dimensions:* Length (all fragments); width, 2.9, 2.2, 2.5, 2.2, 2.2 cm.; thickness, 0.8, 0.6, 0.8, 0.5, 0.6 cm.

## TYPE N-1

*Description:* Leaf-shaped, straight base (fig. 63, *t, u, v*). Total 3.

*Materials:* Obsidian, flint.

*Dimensions:* Length, 3.2, 3.2, 3.1 cm.; width, 1.8, 1.4, 2.2 cm.; thickness, 0.6, 0.6, 0.8 cm.

## TYPE N-2

*Description:* Straight base fragments, some with parallel edges. Total 8.

*Materials:* Fine-grained basalt, obsidian, chert.

*Dimensions:* Length (all fragments); width, 1.5–3.4 cm., average, 2.3 cm.; thickness, 0.4–0.9 cm., average, 0.7 cm.

## TYPE O

*Description:* Roughly leaf-shaped blades with points off center (fig. 63, *w*). Total 2.

*Materials:* Fine-grained basalt, flint.

*Dimensions:* Length, 3.2, 3.1 cm.; width, 2.0, 1.9 cm.; thickness, 0.7, 0.6 cm.

## TYPE P

*Description:* Lateral notched, expanding stem, ear-like divided tang, triangular blades with concave bases (fig. 63, *x*). Total 2.

*Materials:* Fine-grained basalt, obsidian.

*Dimensions:* Length, 3.6, 2.8 cm.; width, 2.4, 1.8 cm.; thickness, 0.6, 0.5 cm.



## TYPE Q

*Description:* Contracting stem bases with lateral barbs, one specimen with down-raking barbs (fig. 64, *e*). Total 6.

*Materials:* Fine-grained basalt, jasper, obsidian, copperish chalcedony.

*Dimensions:* Length, 5.5 cm., remainder fragmentary; width, 3.3, 2.0, 2.1, 1.8, 2.7, 1.9 cm.; thickness, 0.6, 0.7, 0.5, 0.5, 0.5, 0.7 cm.

## TYPE R

*Description:* Broad triangular blade with shallow notched base (fig. 64, *a'*). Total 1.

*Materials:* Jasper.

*Dimensions:* Length, 4.7 cm.; width, 3.5 cm.; thickness, 0.6 cm.

## TYPE S

*Description:* Small triangular, many lateral notched and with serrate edges (fig. 64, *k-x*). Total 33.

*Materials:* Obsidian, flint.

*Dimensions:* Length, 1.1–2.5 cm., average, 2.0 cm.; width, 0.8–1.8 cm., average, 1.1 cm.; thickness, 0.1–0.5 cm., average, 0.3 cm.

## TYPE T

*Description:* Small round stem, round shoulder, shallow lateral notched (fig. 64, *d*). Total 1.

*Materials:* Obsidian.

*Dimensions:* Length, 2.4 cm.; width, 1.5 cm.; thickness, 0.4 cm.

## TYPE U

*Description:* Chip points; thin leaf-shaped flakes modified mostly on edges or on one surface; two specimens with lateral notches and serrate edges (fig. 64, *f-j*). Total 13.

*Materials:* Obsidian, fine-grained basalt.

*Dimensions:* Length, 1.8–4.4 cm., average, 2.6 cm.; width, 1.1–2.6 cm., average, 1.5 cm.; thickness, 0.3–0.6 cm., average, 0.4 cm.

## TYPE V

*Description:* Miscellaneous specimens:

(1) Small, straight stem, rounded shoulder (fig. 64, *y*).

(2) Small, broad divided tang, indented base (fig. 64, *c'*).

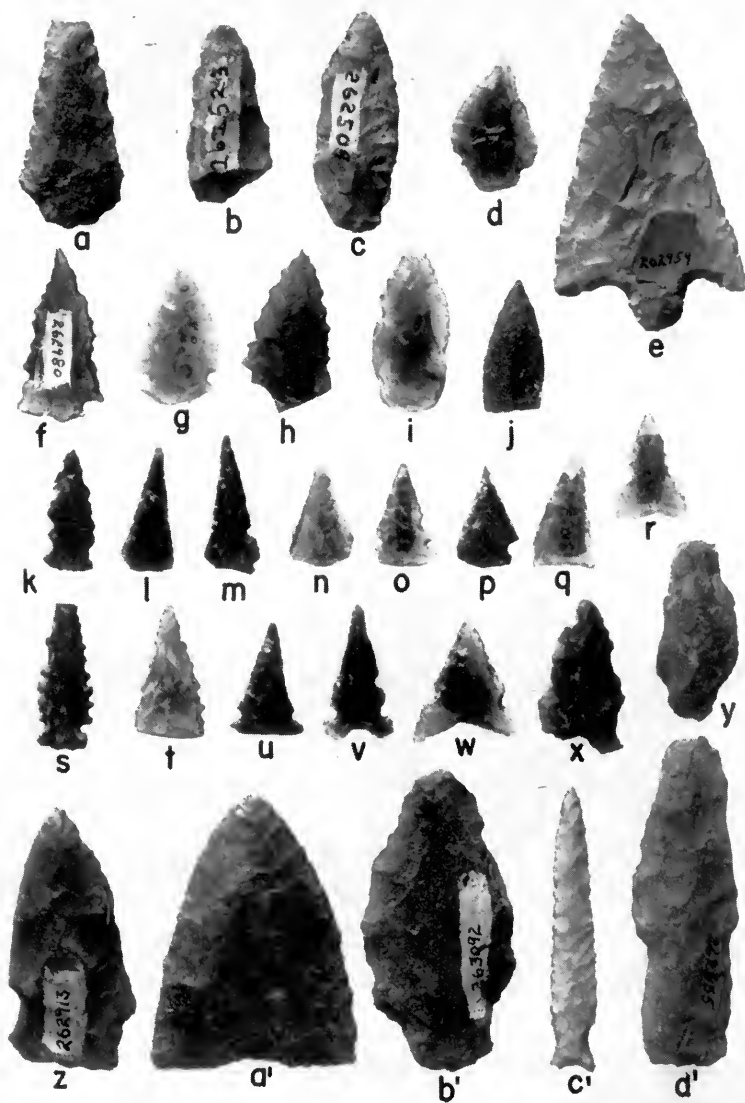


FIG. 64. Projectile points, types M-4 and Q-V. Length of  $d'$ , 5.7 cm.

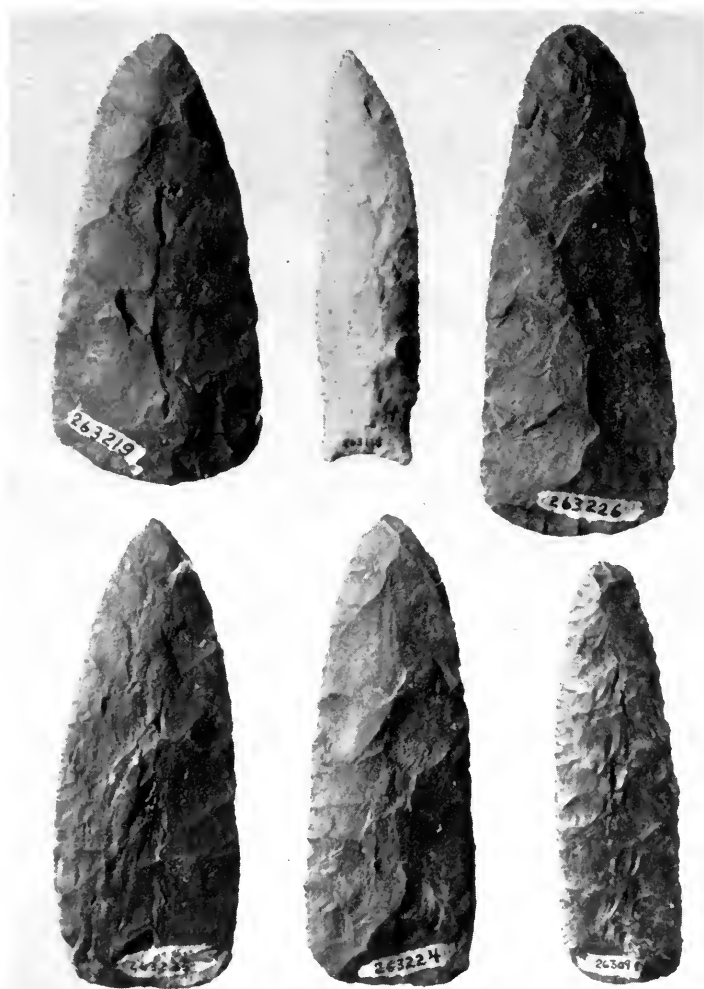


FIG. 65. Projectile points (types M-2 and V-5) or blades from O Block Cave. Length of lower right specimen, 10.3 cm.

(3) Corner notched, broad stem, thinned base (fig. 64, z).

(4) Large, straight stem, rounded shoulder (fig. 64, b').

(5) Edges of blade parallel, point off center, base indented and thinned, shoulder more pronounced on one edge (fig. 65, top center).

(6) Slender, long straight stem, rounded shoulder (fig. 64, d').

*Materials:* Fine-grained basalt, obsidian, jasper, novaculitic chalcedony.

*Dimensions:* Length, 3.1, 2.7, 4.7, 10.0, 5.2, 5.7 cm.; width, 1.4, 1.5, 2.1, 2.5, 2.6, 1.8 cm.; thickness, 0.6, 0.4, 0.5, 0.7, 0.9, 0.7 cm.

#### TYPE W

*Description:* Too fragmentary to classify; 46 tips, 17 bases, 13 blade fragments. Total 76.

*Materials:* Fine-grained basalt, obsidian, chert, chalcedony, flint.

*Dimensions:* Length, all fragments; widths, 0.7–3.0 cm., average, 1.8 cm.; thickness, 0.3–1.1 cm., average, 0.5 cm.

### FLAKE KNIVES

(Figure 66)

#### TYPE A

*Description:* Random flake type; oblong thin flakes with some chipping along one or more edges, possibly from use; no regularity of outline (fig. 66, right). Total 204.

*Materials:* Obsidian, fine-grained basalt, chalcedony, jasper, chert, flint.

*Dimensions:* Length, 1.2–5.3 cm., average, 2.7 cm.; width, 0.9–3.8 cm., average, 1.8 cm.; thickness, 0.2–0.9 cm., average, 0.5 cm.

#### TYPE B

*Description:* Biface type; relatively thin flakes with one or more edges and surfaces worked by secondary chipping, frequently elongated in outline (fig. 66, left). Total 23.

*Materials:* Obsidian, fine-grained basalt, jasper, chalcedony.

*Dimensions:* Length, 1.7–6.5 cm., average, 2.9 cm.; width, 1.2–3.4 cm., average, 1.8 cm.; thickness, 0.4–0.9 cm., average, 0.7 cm.

### SCRAPERS

(Figures 67–69)

#### Side Scrapers

##### TYPE A

*Description:* Thick flakes with some poorly directed secondary chipping (possibly from use) along one edge, plano-convex in cross section; convex surface shaped by percussion chipping; no regularity of outline (fig. 67, center row). Total 32.

*Materials:* Fine-grained basalt, rhyolite, chert.



FIG. 66. Knives: left to right, biface and random flake types. Length of bottom right specimen, 6.5 cm.

*Dimensions:* Length, 2.5–7.7 cm., average, 4.5 cm.; width, 1.8–5.8 cm., average, 3.4 cm.; thickness, 0.7–2.4 cm., average, 1.3 cm.

#### TYPE B

*Description:* Large, rough, thick, angular flakes, generally plano-convex in cross section with steep retouch along one edge (fig. 67, left row). Total 4.

*Materials:* Fine-grained basalt, rhyolite.

*Dimensions:* Length, 9.6, 9.4, 8.5, 6.8 cm.; width, 6.0, 5.3, 8.0, 7.3 cm.; thickness, 2.7, 3.5, 3.4, 2.7 cm.

#### TYPE C

*Description:* Small, rough, thick, angular flakes, generally plano convex in cross section with steep retouch ( $30^{\circ}$  to  $90^{\circ}$  along one edge) (fig. 67, right row). Total 29.

*Materials:* Fine-grained basalt, rhyolite, chert.

*Dimensions:* Length, 3.2–7.8 cm., average, 5.2 cm.; width, 2.0–6.1 cm., average, 3.7 cm.; thickness, 0.9–2.4 cm., average, 1.5 cm.

#### TYPE D

*Description:* Small, relatively thin flakes with flat retouch along one edge (fig. 68, a, f, i). Total 23.

*Materials:* Fine-grained basalt, chert, rhyolite.

*Dimensions:* Length, 3.2–9.1 cm., average, 4.8 cm.; width, 2.5–6.4 cm., average, 3.9 cm.; thickness, 0.7–1.3 cm., average, 1.0 cm.

#### TYPE E

*Description:* Thick nodules, generally circular in outline, plano-convex in cross section, with sides steeply chipped into deep notches that form a large-toothed serrate edge (fig. 68, c, e, h, k). Total 4.

*Materials:* Fine-grained basalt.

*Dimensions:* Length, 5.8, 5.2, 5.2, 5.3 cm.; width, 3.9, 5.1, 5.2, 4.6 cm.; thickness, 1.8, 2.1, 1.9, 2.3 cm.

#### TYPE F

*Description:* Small, thick, oblong, keel-shaped in cross section with secondary chipping along one or more edges (fig. 68, b, d, g, j). Total 4.

*Materials:* Obsidian, fine-grained basalt, rhyolite.

*Dimensions:* Length, 4.0, 3.2, 3.5, 4.2 cm.; width, 2.5, 1.6, 2.7, 2.4 cm.; thickness, 1.3, 1.3, 1.4, 1.2 cm.

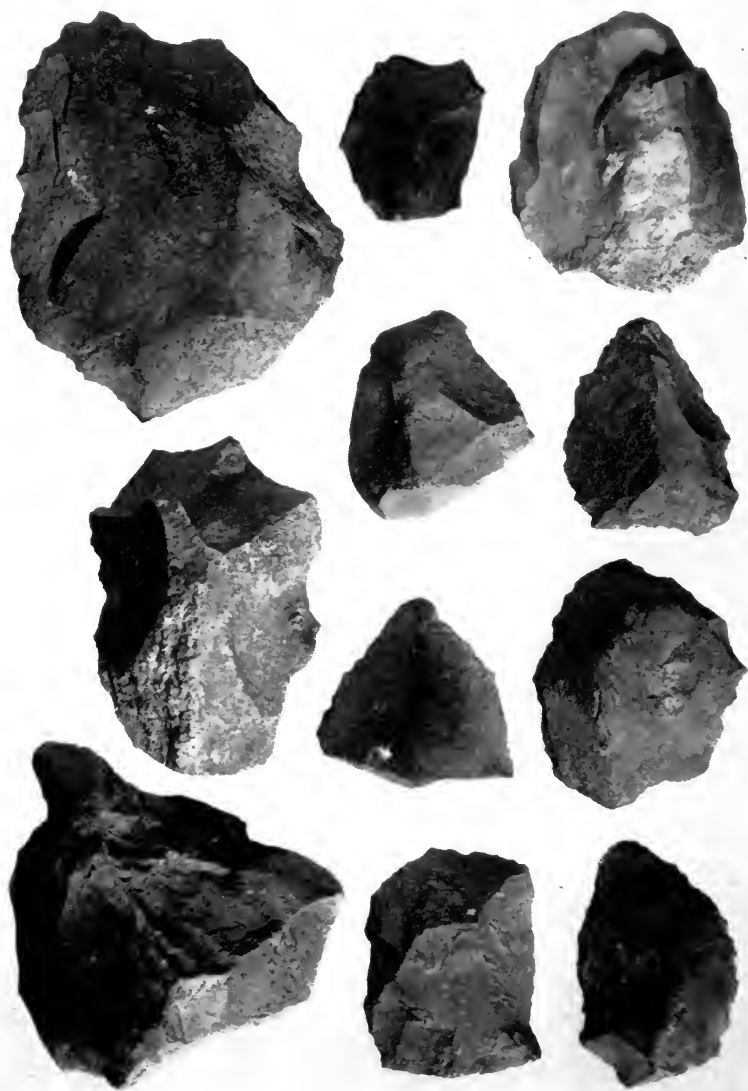


FIG. 67. Scrapers: left, large, rough, thick; center, random flake; and right, small, rough, thick types. Length of bottom right specimen, 5.9 cm.

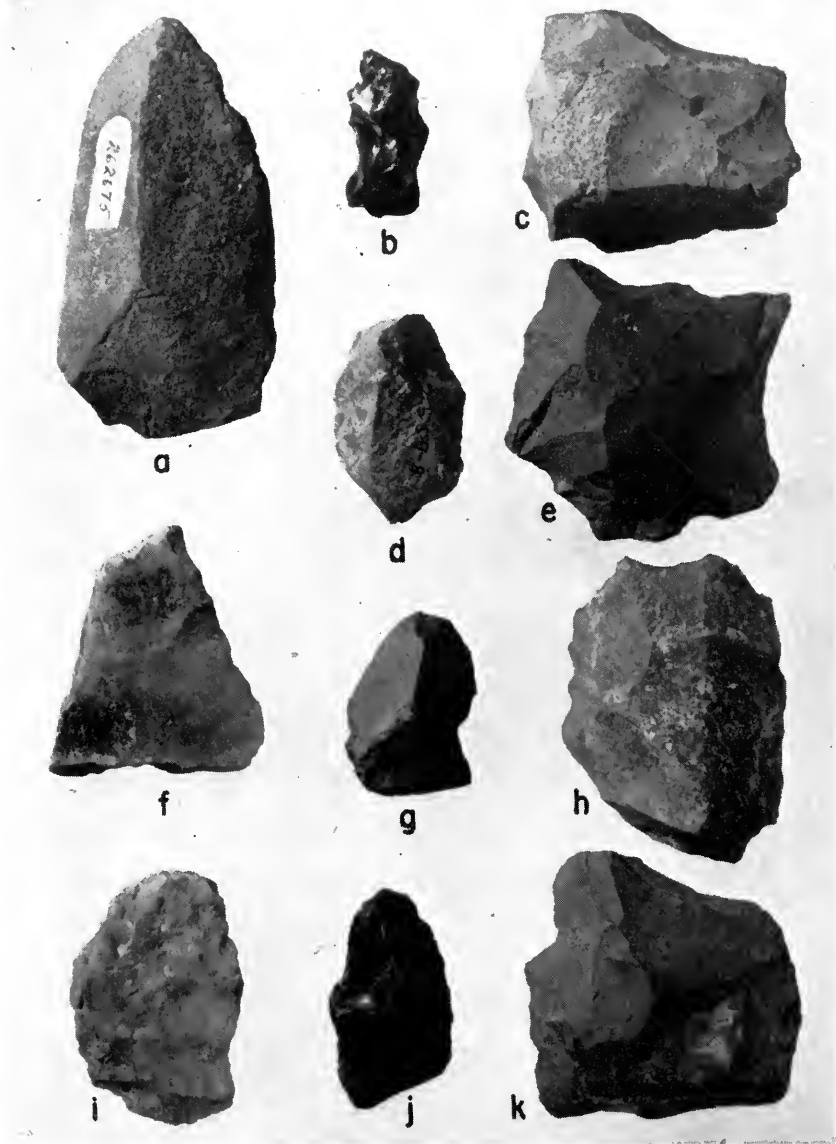


FIG. 68. Scrapers: thin flake (*a, f, i*), small keel-shaped (*b, d, g, j*), and serrate (*c, e, h, k*) types. Length of *k*, 5.2 cm.



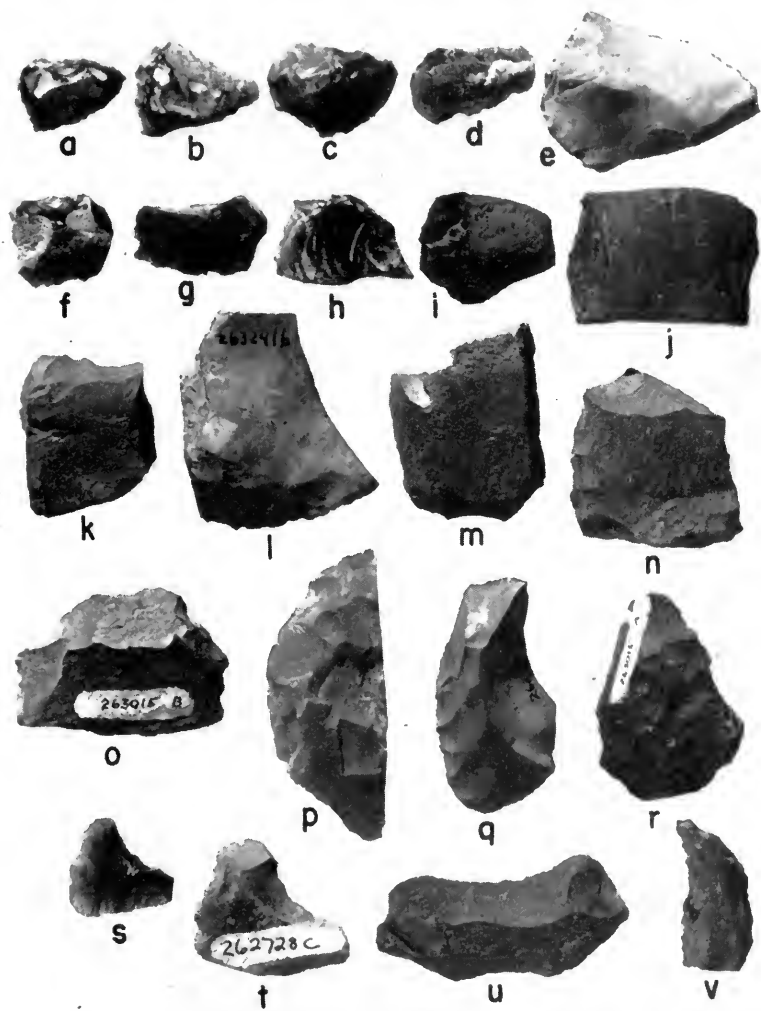


FIG. 69. Scrapers: end scrapers (a-n), biface scrapers (o-r), and hollow-edged scrapers (s-v). Length of v, 3.3 cm.

## TYPE G

*Description:* Thick convex flakes with chipping on both surfaces and one or more edges (fig. 69, *o-r*). Total 17.

*Materials:* Fine-grained basalt, chert, chalcedony, obsidian.

*Dimensions:* Length, 2.8–7.0 cm., average, 4.9 cm.; width, 2.1–5.8 cm., average, 3.2 cm.; thickness, 0.8–3.2 cm., average, 1.3 cm.

**Hollow-Edged Scrapers**

*Description:* Small thick flakes with indentations chipped into the edges (fig. 69, *s-v*). Total 5.

*Materials:* Fine-grained basalt, obsidian.

*Dimensions:* Length, 3.5, 3.3, 3.3, 2.3, 5.5 cm.; width, 2.7, 1.6, 3.3, 2.2, 2.3 cm.; thickness, 1.6, 0.5, 0.9, 0.6, 0.6 cm.

**End Scrapers**

## TYPE A

*Description:* Thick flakes, oval in outline, plano-convex in cross section; secondary chipping on convex surface and at broad end of plane surface; narrow end of plane surface unaltered (fig. 69, *a-e*). Total 10.

*Materials:* Obsidian, chert.

*Dimensions:* Length, 2.4–4.8 cm., average, 2.8 cm.; width, 1.5–3.5 cm., average, 2.0 cm.; thickness, 0.6–1.2 cm., average, 0.9 cm.

## TYPE B

*Description:* Flakes with square ends, plano-convex in cross section, oblong in outline; secondary chipping on convex surface and at broad end of flat surface (fig. 69, *f-n*). Total 11.

*Materials:* Fine-grained basalt, obsidian, chert.

*Dimensions:* Length, 2.3–4.8 cm., average, 3.7 cm.; width, 1.8–4.0 cm., average, 2.8 cm.; thickness, 0.7–1.2 cm., average, 1.0 cm.

**DISCOIDAL**

*Description:* Small round disk with secondary chipping on both surfaces and around the edges. Total 1.

*Materials:* Obsidian.

*Dimensions:* Diameter, 1.1 cm.; thickness, 0.2 cm.

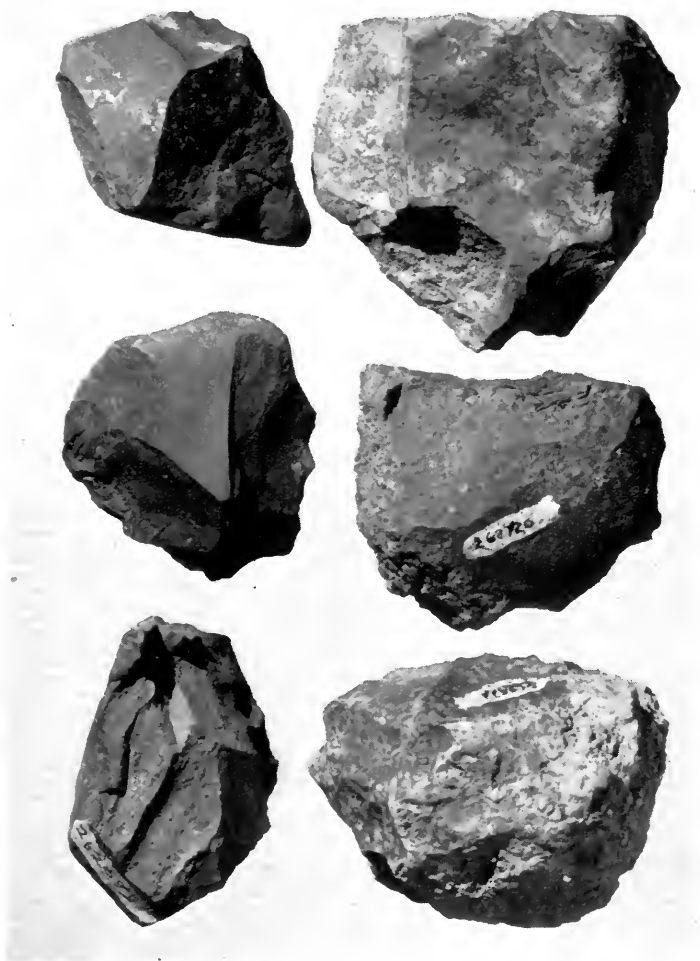


FIG. 70. Choppers. Length of bottom right specimen, 9.0 cm.

### CHOPPERS

(Figure 70)

#### TYPE A

*Description:* Plano-convex choppers or scraper planes; large, thick, angular implements; no regularity of outline; percussion-flaked part way around margin to produce cutting edge; part of original surface of pebble left intact. Total 8.

*Materials:* Basalt, rhyolite, chalcedony.

*Dimensions:* Length, 7.7–12.2 cm., average, 9.1 cm.; width, 6.0–9.0 cm., average, 6.9 cm.; thickness, 2.7–6.7 cm., average, 4.4 cm.

#### TYPE B

*Description:* Thick, angular implements; percussion-flaked on two surfaces to form a sharp cutting edge; trimmed to edge part way around; part of original surface of pebble left intact. Total 2.

*Materials:* Fine-grained basalt.

*Dimensions:* Length, 7.0, 7.6 cm.; width, 6.8, 7.3 cm.; thickness, 3.1, 4.1 cm.

### DRILLS

(Figure 71)

#### TYPE A-1

*Description:* Sharpened slender flake tapering gradually to a point; wedge-shaped in cross section (fig. 71, *a*). Total 1.

*Materials:* Chalcedony.

*Dimensions:* Length, 4.5 cm.; width, 1.3 cm.; thickness, 1.1 cm.

#### TYPE A-2

*Description:* Sharpened flake with point tapering from a relatively wide base (fig. 71, *b*). Total 1.

*Materials:* Chalcedony.

*Dimensions:* Length, 2.9 cm.; width, 1.9 cm.; thickness, 0.4 cm.

#### TYPE B

*Description:* Plain shafted type; long, slender flake, lenticular in cross section; secondary chipping on both surfaces and edges; tapers to a point (fig. 71, *c*, *d*). Total 2.

*Materials:* Chert, obsidian.

*Dimensions:* Length, 4.1, 3.4 cm.; width, 1.2, 1.0 cm.; thickness, 0.5, 0.5 cm.

#### TYPE C-1

*Description:* Small, abruptly widening flange with a long slender tapering point (fig. 71, *f*). Total 1.

*Materials:* Chalcedony.

*Dimensions:* Length, 4.1 cm.; width, 1.5 cm.; thickness, 0.5 cm.

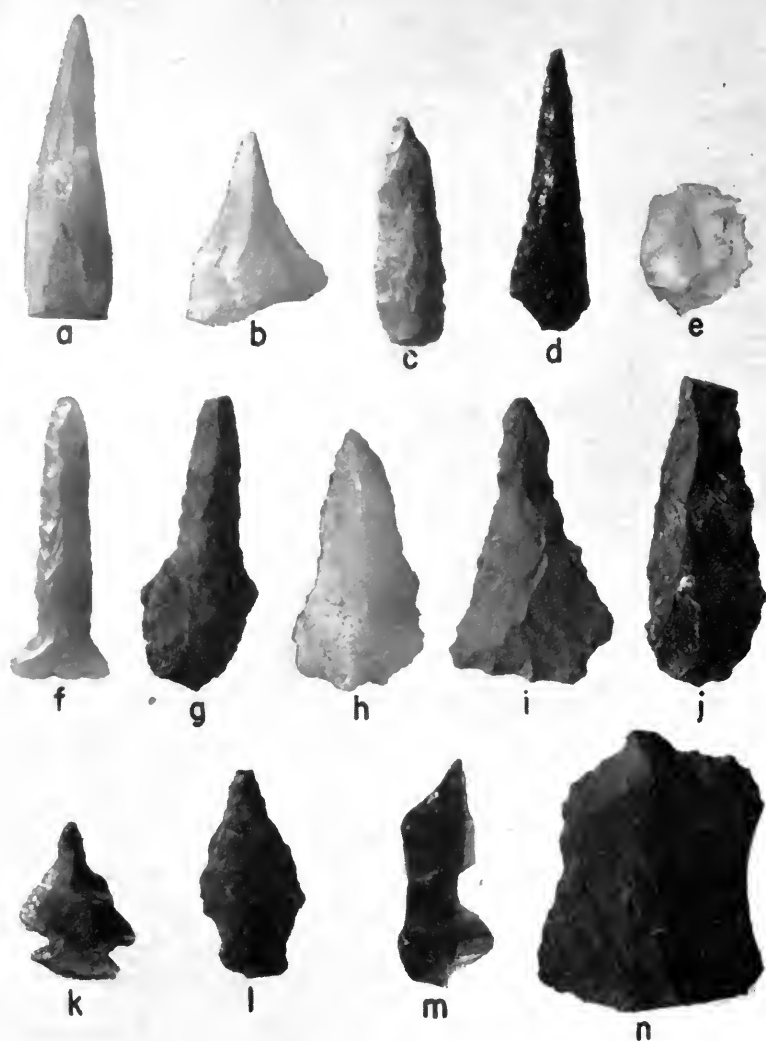


FIG. 71. Drills (*a-d, f-l*), graters (*m, n*), and saw (*e*). Length of *n*, 4.1 cm.

## TYPE C-2

*Description:* Slender points tapering from a relatively large broad base (fig. 71, *g, h, i, j*). Total 4.

*Materials:* Fine-grained basalt, chalcedony.

*Dimensions:* Length, 3.8, 4.1, 4.4, 4.6 cm.; width, 1.9, 2.3, 1.7, 1.8 cm.; thickness, 0.8, 0.8, 0.7, 0.9 cm.

## TYPE D

*Description:* Reworked projectile points (fig. 71, *k, l*). Total 2.

*Materials:* Obsidian, fine-grained basalt.

*Dimensions:* Length, 3.1, 2.3 cm.; width, 1.5, 1.7 cm.; thickness, 0.5, 0.4 cm.

## SAW

*Description:* Thin flake, plano-convex in cross section; one edge deeply indented; serrate, teeth regularly spaced (fig. 71, *e*). Total 1.

*Materials:* Chalcedony.

*Dimensions:* Length, 2.0 cm.; width, 1.8 cm.; thickness, 0.7 cm.

## GRAVERS

*Description:* Thin flakes with short points chipped from one face only (fig. 71, *m, n*). Total 2.

*Materials:* Obsidian, fine-grained basalt.

*Dimensions:* Length, 4.1, 3.2 cm.; width, 3.3, 1.3 cm.; thickness, 0.8, 0.3 cm.

## DISCUSSION

The chipped stone artifacts present a gradient from the finest type of work, wherein the major surfaces and edges were subjected to a carefully directed secondary chipping, as in projectile points, blades, drills, and biface scrapers, down to utilized flake knives and scrapers which can scarcely be distinguished from the ordinary by-products of flint manufacture. Specimens such as projectile points and other artifacts with secondary chipping on all major surfaces and edges are in a bare majority (52 per cent) of the chipped stone implements in this collection. The remaining 48 per cent exhibit lesser degrees of modification rarely exceeding a little retouch on one edge or end.

According to the evidence of the small, but significant number of hafted specimens found at Tularosa Cave (Martin, Rinaldo, and others, 1952,

p. 107) and elsewhere in the Upper Gila (Cosgrove, 1947, pp. 62-65), the majority of the notched specimens listed under projectile points and blades were probably used as dart points, or arrow points. On the other hand, there are a few exceptions (those listed under "V-5" and "K," for example) which have points off center and were more likely used as some form of cutting tool.

Evidence as to the use of the projectile points and blades without notches is lacking for the Mogollon and is not plentiful for the Anasazi, who apparently used them for knives (Morris, 1919, p. 32). Once again the use of the artifacts called drills is based on very little evidence other than historic analogy (Martin, 1934). Also, the distinction between drills and elongated, slender projectile points with straight edges such as that illustrated in figure 64, *c'*, is a subjective one. The basic distinction according to Kidder's classification is whether the edges are more or less parallel (Kidder, 1932, p. 24). In some instances this seems a difficult distinction to make (fig. 71, *d*).

Scraper and knife categories also tend to grade into one another. In general, however, the specimens termed scrapers here are larger, thicker, more convex, and have a steeper retouch on the edge, or end. The radically differing shape of end scrapers and hollow edged scrapers would logically lead us to believe that they had different uses. However, aside from historic analogy, there is definite evidence of use only for side scrapers (Martin, Rinaldo, and others, 1952, p. 107), the plant tissue remaining on their edges.

The specimens termed graters have the characteristic short points of implements of this type. On the other hand, engraving on antler, bone, or stone is lacking among the Mogollon, and it seems probable that these particular specimens had another use; they may have been perforators.

A cache of five large basalt blades was found in Square C-1, level 8, a Pre-Pottery Phase section of O Block Cave. They were found under a large rock and although they were not laid in a heap they occurred so close together that they may have been cached at the same time. In size and shape (fig. 65) they are reminiscent of the mosaic encrusted blade from Poncho House, Arizona (Guernsey, 1931, p. 103, pls. 1, 24). They are nicely chipped and not hafted, but whether they represent utilitarian knives or "ceremonial" blades remains a matter for conjecture.

*Distribution:* In the process of classifying the projectile points from the 1952 excavations a test was made of the projectile point typology formulated from the previous excavations in caves and open sites of the area. This was done by assigning each of the excavation sections of O Block Cave (levels in particular squares or rooms) to a Phase on the basis of the types of projectile points found therein. This Phase assignment was then

checked against a similar analysis based on pottery types; for example, two of the three projectile points from Square B-1, level 2, O Block Cave, were of types (B-4 and F-2; the third was a fragment) which had predominantly a late distribution in Tularosa and Cordova caves. The Three Circle Phase was indicated, and so this section was assigned to that Phase. This assignment was then checked against the pottery types (Three Circle Neck Corrugated, Three Circle Red-on-White, etc.; see p. 63) from that section and found to agree.

In a few such sections from the top levels the late types were found to be in the majority, but the situation was seldom as clear-cut as in the Pre-Pottery levels, where there was apparently less mixing. In the case of the intermediate levels, this mixing, the result partly of the arbitrary system of excavation by blocks and partly of natural churning by rodents and human occupants (see Haury, 1950, p. 206; Cressman, 1951, p. 307), was even more noticeable. For this reason Pine Lawn Phase projectile point types did not occur exclusively in any section of O Block Cave. In fact, early, intermediate, and late type projectile points were juxtaposed in all the middle sections, and the relative frequency of specimens of the different types was the decisive factor in the Phase assignments of the middle levels.

In eighteen sections from this cave it was impossible to make any Phase assignment either because there were no projectile points or because the projectile points found were too fragmentary to classify. However, the assignment made in thirty-seven sections of the remaining forty-four was corroborated either by the pottery analysis or by stratigraphic position in Pre-Pottery levels. In seven sections the assignment was not corroborated, but there was only one diagnostic projectile point in each of four of these.

We believe that this analysis shows that the various types of projectile points used are of some value as horizon markers. On the other hand, we do not claim that this is the only useful classification of these specimens. A little more than half (16) out of the total number of types common to the several cave sequences were found to be consistent in their distribution. For example, the small, thin, diagonal notched type (B-4) was found predominantly in the late sites and in the upper levels of the mixed sites; and the corner notched, thinned, concave base projectile points (A-1) were predominantly from the lower levels of the cave sequences (Martin, Rinaldo, and others, 1952, pp. 113-115, fig. 70). The following types were found to occur predominantly in the Pre-Pottery levels: A-1, D, E-2, G, H, I, O, U. Others, such as types E-1 and L, occur predominantly in the Pine Lawn and Georgetown phases; and still others, such as B-4, F-1, F-2, P, S, and T, were found most frequently in the late sites and levels assigned to the Reserve and Tularosa phases.



The other types were found to be poor horizon markers because they were too rare in their occurrence or too inconsistent in their distribution.

A notched blade (V-5) which has been shaped by good parallel flaking is reminiscent of the Type 2 Sandia points (Hibben, 1941, p. 25, pl. 12, *c*). Although it came from much too high a level (Square C-3, level 4, Pine Lawn Phase) to be ascribed to the early culture, it is also an anomaly in the later context.

The majority of the serrate side scrapers and oval end scrapers came from the earlier levels of the caves, as they did in Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, pp. 115-116). The various other types of side scrapers were about evenly distributed from early to late.

Although drills occurred in all levels of the caves, there was a tendency for more of them to occur in the earlier levels. Drills were not numerous.

Flake knives were the most numerous type of chipped stone artifact. They occurred in all levels of the excavations, but with some tendency to be most numerous in the earlier levels. There was no difference in the average dimensions of the flake knives from the early and the late levels in spite of the tendency for more of the late projectile points to be smaller.

The paucity of choppers is perhaps correlated with the late occupation of over half the sites and levels excavated. The occurrence of two grooved axes in Hinkle Park Cliff-Dwelling and others at Turkey Foot Ridge (Martin and Rinaldo, 1950a, p. 334) and at the Reserve Phase sites in the Pine Lawn Valley (Martin and Rinaldo, 1950b, p. 480) indicates that choppers were used contemporaneously with hafted axes.

## STONE BEADS

(Figure 72, *h, i*)

### TYPE A

*Description:* Fragment of rectangular bead; secondary hole partially drilled through at right angles to original perforation; possibly part of compound bead. Total 1.

*Materials:* Turquoise.

*Dimensions:* Length, 0.8 cm.; width, 0.6 cm.; thickness, 0.5 cm.

### TYPE B

*Description:* Smooth red stone cylindrical object; beginning of hole drilled in one end. Total 1.

*Materials:* Jasper.

*Dimensions:* Length, 2.2 cm.; diameter, 0.7 cm.

**STONE PENDANTS**(Figure 72, *g, j, k, l*)**TYPE A**

*Description:* Ovoid in outline; thin, tabular, smooth, perforated near small end; one specimen with malachite coating on one surface; the other with notches incised along the edges. Total 2.

*Materials:* Clay, malachite, bone.

*Dimensions:* Length, 2.2, 2.6 cm.; width, 1.8, 1.6 cm.; thickness, 0.4, 0.3 cm.

**TYPE B**

*Description:* Rectangular with rounded ends in outline; thin, tabular, smooth; perforated near one end. Total 1.

*Materials:* Gypsum.

*Dimensions:* Length, 2.1 cm.; width, 1.5 cm.; thickness, 0.2 cm.

**TYPE C**

*Description:* Small, thick piece of calcite, rectangular in outline, plano-convex in cross section; three quarters grooved around middle. Total 1.

*Materials:* Calcite.

*Dimensions:* Length, 2.1 cm.; width, 1.2 cm.; thickness, 0.8 cm.

**SHELL BRACELETS**(Figure 72, *d, f*)**TYPE A**

*Description:* Thin-cut curved sections of bivalve shell, rectangular in cross section, almost as wide as high. Total 1.

*Materials:* *Glycymeris* shell.

*Dimensions:* Diameter, 5.4 cm.; height, 0.5 cm.; width, 0.4 cm.

**TYPE B**

*Description:* Thin flat section of bivalve shell rim, notches carved in edges at intervals. Total 1.

*Materials:* *Glycymeris* shell.

*Dimensions:* Length (fragment), 3.8 cm.; width, 0.7 cm.; thickness, 0.4 cm.

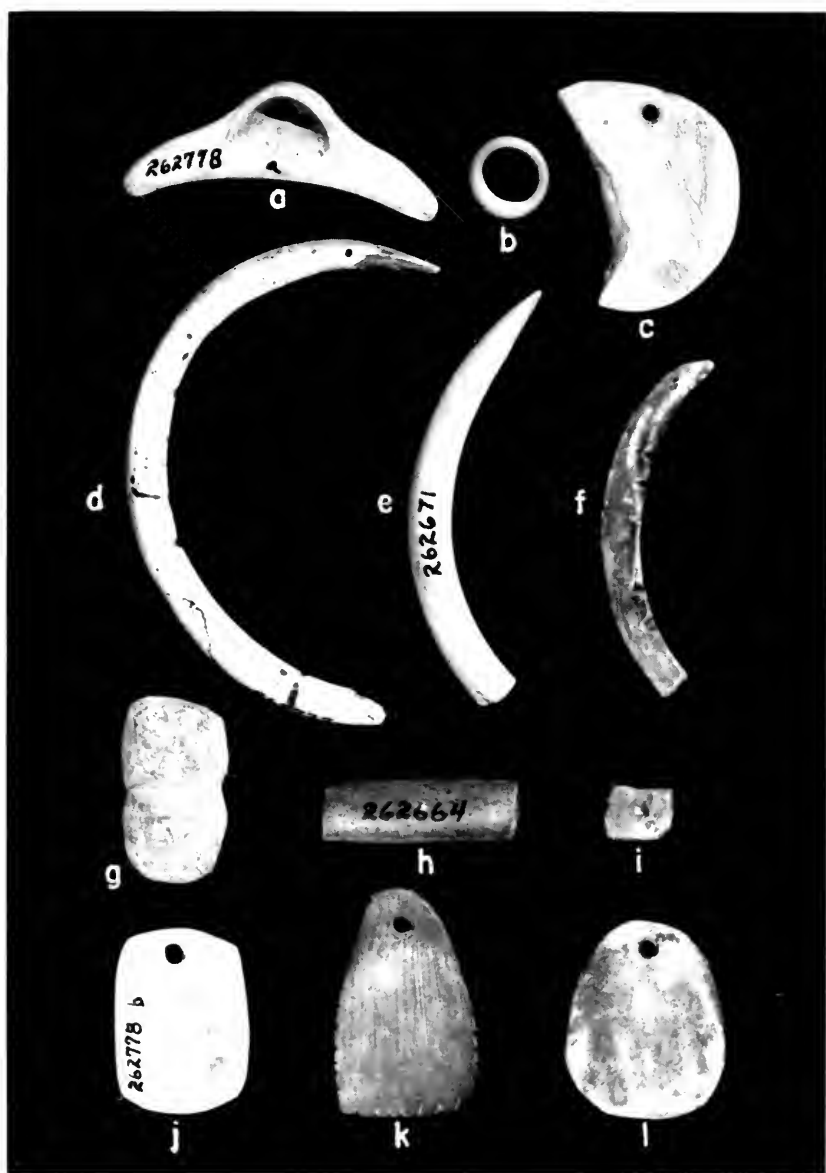


FIG. 72. Pendants, bracelets, needle, and beads. Length of *l*, 2.2 cm.

**SHELL PENDANTS**

(Figure 72, a, c)

**TYPE A**

*Description:* Thin section of shell, probably originally a disk with smooth edges; small hole drilled near one edge; three small notches incised in concave surface opposite this hole. Total 1.

*Dimensions:* Diameter, 2.6 cm.; thickness, 0.2 cm.

**TYPE B**

*Description:* Thin rectangular section of bivalve shell made at umbo; umbo pierced for suspension. Total 1.

*Materials:* *Glycymeris* shell.

*Dimensions:* Length, 3.5 cm.; width, 1.1 cm.; thickness, 0.4 cm.

**SHELL NEEDLE**

(Figure 72, e)

*Description:* Curved tusk-like rim section of bivalve shell, sharp polished point at one end, other end broken, eye missing. Total 1.

*Materials:* *Glycymeris* shell.

*Dimensions:* Length, 4.6 cm.; width, 0.5 cm.; thickness, 0.3 cm.

**SHELL BEAD**

(Figure 72, b)

*Description:* Short tubular bead. Total 1.

*Dimensions:* Diameter, 0.9 cm.; thickness, 0.4 cm.

**DISCUSSION**

The beads, pendants, and other ornaments were probably worked to shape by cutting and polishing them with flake knives and abrading stones. The small holes in the thicker pendants were often drilled from both sides, meeting in the center; the thinner specimens were drilled only from one side. The result is that the holes in most pendants are of an hourglass shape, with the diameter smallest at the center and increasing towards either surface. This could have been done with the stone drills, inasmuch as their points fit the holes in the pendants.

*Glycymeris* shell was a favorite material for bracelets and occasionally was used for pendants. The centers of these shells were cut out and the remaining rims ground and polished smooth. The specimens in the 1952

collection do not show the marks of the cutting tool. These shell ornaments were probably imported by trade from the Gulf of California; at least the resulting center blanks are to be found on shell heaps in northern Sonora (Woodward, 1936, p. 117). We also have some blanks in the Chicago Natural History Museum collections from the same area.

The uses of the beads and pendants are largely conjectural and based on historic analogy, although specimens were found in Tularosa Cave with strings long enough to indicate that they were worn on a string around the neck, rather than as ear-rings (Martin, Rinaldo, and others, 1952, p. 184, fig. 61). The evidence for bracelets as such is much better, for numerous specimens have been found with burials, for example, at the SU site (Martin and Rinaldo, 1940, p. 68) and at the Swarts Ruin (Cosgrove, 1932, p. 66).

*Distribution:* The evidence is as yet inconclusive regarding the use of the shapes of tabular pendants as diagnostic attributes for a horizon marker or in geographical distribution studies. Oval and rectangular shapes are found throughout the Southwest in all periods. Other shapes may eventually turn out to be diagnostic. On the other hand the distribution of shell bracelets is more to the south (Martin, Rinaldo, and others, 1952, p. 117; Tower, 1945, p. 29).

The use of shell for needles is the only known strictly utilitarian use to which the Mogollon Indians put this material. Shell needles have been reported from Snaketown, the Santa Cruz and Sacaton phases (Gladwin and others, 1937, pp. 138-139), the Babocomari Village (Di Peso, 1951, p. 194), and Los Muertos (Haury, 1945a, p. 147). These are all late sites or phases coeval with or later than the estimated occupation of Hinkle Park Cliff-Dwelling.

The notched shell fragment, described above (p. 142), appears to be essentially similar to an object which the Cosgroves reported from the Swarts Ruin and which they termed a "talisman" (Cosgrove, 1932, p. 66, pl. 74, f). The object we have illustrated may be imagined to resemble a lizard or a salamander. Pendants made from the umbo of the *Glycymeris* shell are not too uncommon wherever shell ornaments are found. They may have been made from broken shell bracelets. We have reported this type of object from Cordova Cave (Martin, Rinaldo, and others, 1952, p. 184), and Roberts (1931, p. 160, pl. 42) illustrates others from Kiatuthlanna.

The small red cylindrical object termed a "bead" has some similarity to objects termed "medicine cylinders" by Morris (1919, p. 27, fig. 14) and "nose plugs" by Roberts (1940, p. 129, pl. 48).

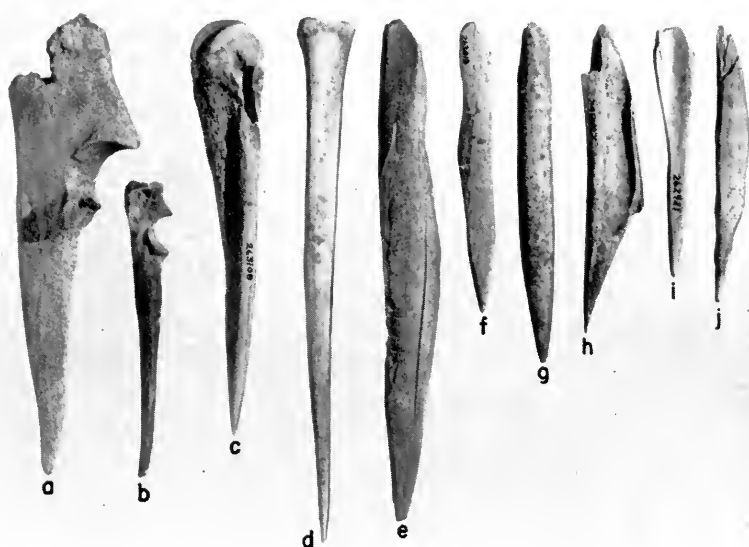


FIG. 73. Bone awls. Length of *j*, 7.8 cm.

## BONE AWLS

(Figure 73)

### TYPE A

*Description:* Ulna type, head of bone intact, shaft worked to a point (fig. 73, *a*, *b*). Total 4.

*Materials:* Deer (*Odocoileus*) ulnas. Fox (*Urocyon*) ulna.

*Dimensions:* Length, 12.9, 9.7, 8.5, 16.7 cm.

### TYPE B

*Description:* Head of bone unworked except by original splitting; other end ground and polished to a sharp point (fig. 73, *c*, *d*). Total 3.

*Materials:* Deer (*Odocoileus*) metatarsal, antelope (*Antilocapra*) metatarsal.

*Dimensions:* Length, 11.9, 10.2 (fragment), 15.0 cm.

### TYPE C

*Description:* Head of bone removed, proximal end worked smooth and rounded off; worked to point at distal end (fig. 73, *e*, *f*). Total 5.

*Dimensions:* Length, 14.3, 14.2, 7.4, 8.4, 9.7 cm.

**TYPE D**

*Description:* Long bone shaft splinters, ground and polished to a sharp point at one end (fig. 73, *g-j*). Total 11.

*Dimensions:* Length, 6.6–9.8 cm., average, 7.9 cm.; width, 0.7–1.7 cm., average, 1.2 cm.; thickness, 0.5–0.9 cm., average, 0.6 cm.

**TYPE E**

*Description:* Points, or tips of bone awls; all fragments. Total 10.

*Dimensions:* Length, 3.2–7.4 cm.; width, 0.6–1.4 cm.; thickness, 0.4–0.7 cm.

**BONE FLAKERS**

(Figure 74, *b, g, i, k*)

*Description:* Small oblong tools, generally rounded rectangular in cross section with beveled blunted ends; surfaces scored diagonally near ends. Total 4.

*Dimensions:* Length, 4.7, 4.6, 5.5, 5.6 cm.; width, 0.9, 1.0, 1.0, 1.4 cm.; thickness, 0.8, 0.8, 0.9, 0.5 cm.

**ANTLER FLAKERS**

(Figure 75)

*Description:* Antler tines with beveled and scored tips. Total 6.

*Materials:* Deer (*Odocoileus*) antler.

*Dimensions:* Length, 8.7, 15.2, 14.0, 22.3 cm., remainder fragments.

**NOTCHED RIB**

(Figure 74, *l*)

*Description:* Small fragment of rib with edges beveled off from one surface in broad, shallow notches. Total 1.

*Dimensions:* Length, 6.0 cm.; width, 1.6 cm.; thickness, 0.4 cm.

**DICE**

(Figure 74, *c, d*)

*Description:* Oblong section of bone worked smooth on one end and three sides; fourth surface concave, rough, one end broken. Total 2.

*Dimensions:* Length, 2.8, 2.7 cm.; width, 1.1, 1.3 cm.; thickness, 0.9, 0.7 cm.

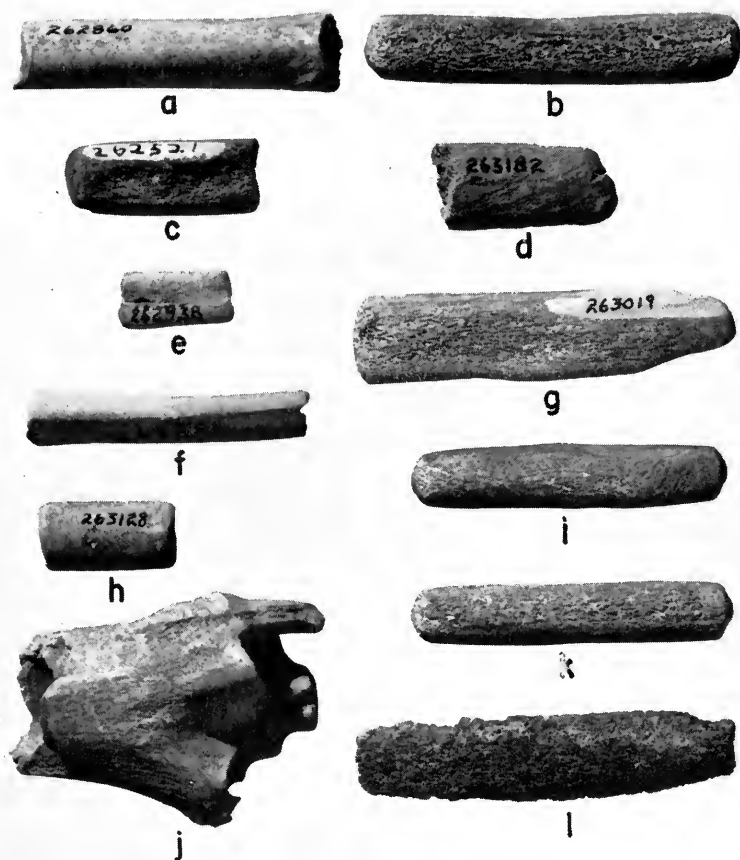


FIG. 74. Bone tubes (a, e, f, h), dice (c, d), flakers (b, g, i, k), dart bunt (j), notched rib (l). Length of j, 4.4 cm.

### BONE DART BUNT

(Figure 74, j)

*Description:* Head of bone, cut off at right angles to shaft, remainder of shaft hollowed out to receive dart foreshaft. Total 1.

*Materials:* Deer (*Odocoileus*) tibia.

*Dimensions:* Length, 4.4 cm.; width, 3.5 cm.; thickness, 2.0 cm.



### BONE TUBES

(Figure 74, *a, e, f, h*)

*Description:* Short hollow sections of long bone shafts cut and polished smooth at the ends. Total 4.

*Dimensions:* Length, 4.7, 2.0, 4.2, 1.7 cm.; diameter, 1.3, 1.1, 0.7, 0.9 cm.

### DISCUSSION

Most of the bone awls and other bone artifacts were made from long bones which had been split. It has been assumed heretofore that these bones were split for the sole purpose of making these tools. On the other hand, there is some evidence that these awls, in many instances, are simply the by-product of splitting the larger bones for their marrow. A side light on this is the very large number of bone splinters that were found. Shaft splinters exceed fragments that could be definitely identified in almost every section of O Block Cave that was excavated; also most of the fragments of the larger animals that could be identified had been split. This seems to indicate that the Mogollon Indians split almost all the long bones of the larger animals they killed, possibly for the marrow. The bones of the small animals (rats, squirrels, and the like) were not split and were more frequently found whole; but these would not contain enough marrow to make splitting worth while. Another side light on the possibility that most of the bone awls are the by-product of splitting bone for marrow is the large number of splinter type awls. Splinter type awls and awl fragments exceed all other types of awls; awls with the head of the bone intact are few in number and constitute only a very small fraction of the total. This may be a condition peculiar to the occupation of the caves, inasmuch as awls made from bone splinters are more scarce from the open sites, although those with the head of the bone intact are still few in number.

The bone awls found in Square A-3, level 4, and Square B-2, level 5, O Block Cave, probably belonged to two sets, inasmuch as the component awls in each of these sets came from a small area in each section.

Only two of the awls in the 1952 collections have side notches. Three of the awls have fine, slender, shouldered points which differ sufficiently from the average points to indicate a different use.

### WORKED SHERDS

(Figure 76)

#### TYPE A

*Description:* Pottery disks with edges ground smooth. Total 2.

*Materials:* Alma Plain, Reserve Black-on-White(?).

*Dimensions:* Diameter, 2.6, 9.0 cm.; thickness, 0.6, 0.6 cm.



FIG. 75. Antler flakers. Length of right specimen, 22.3 cm.

#### TYPE B

*Description:* Pottery disks with edges ground smooth, perforated through center; "spindle whorls." Total 2.

*Materials:* Mimbres Black-on-White.

*Dimensions:* Diameter, 3.4, 6.1 cm.

#### TYPE C

*Description:* Wing-like figure, lozenge shape with projections at axis. Total 1.



FIG. 76. Worked sherds, human figurine, miniature ladle fragments. Length of lower right specimen, 7.0 cm.

*Materials:* San Francisco Red.

*Dimensions:* Length, 3.9 cm.; width, 1.5 cm.; thickness, 0.6 cm.

#### TYPE D

*Description:* Large, concave, roughly oval in outline; edges ground smooth; possibly scoops. Total 7.

*Materials:* Reserve Smudged, Alma Plain, Reserve Black-on-White.

*Dimensions:* Length, 7.3, 8.3 cm., remainder fragments (5.5–7.0 cm.); width, 5.0, 4.4, 5.7, 4.8, 3.4, 4.6 cm.; thickness, 0.6, 0.8, 0.8, 0.7, 0.5, 0.6, 0.8 cm.

**TYPE E**

*Description:* Sherds with some edges ground smooth, other edges rough. Total 11.

*Materials:* Reserve Smudged, Mimbres Bold Face Black-on-White, San Francisco Red, Alma Plain.

*Dimensions:* Lengths, all fragments (2.4–5.2 cm.); widths, all fragments (1.5–4.4 cm.); thickness, 0.5–0.7 cm., average, 0.6 cm.

**FIGURINE**

(Figure 76)

*Description:* Clay human figure with ovoid body, “coffee bean” eye (one eye broken off), prominent clay ridge nose; arms, legs, neck, other features not represented. Total 1.

*Materials:* Fired clay, grayish pink color.

*Dimensions:* Length, 4.6 cm.; width, 1.7 cm.; thickness, 1.1 cm.

**ANIMAL EFFIGIES**

(Figure 77)

*Description:* Crudely modeled, quadruped figures, peg-like legs, ears pinched up, one with tail curled over back, one pebble smoothed, species unidentifiable, portions of legs, tails, ears broken off; one with hole through body. Total 9.

*Materials:* Brown to rosy gray fired and unfired clay.

*Dimensions:* Length, 3.2–6.0 cm., average, 4.0 cm.; width, 1.3–2.7 cm., average, 2.2 cm.; thickness, 1.3–2.1 cm., average, 1.7 cm.

**POT COVERS**

(Figure 78)

*Description:* Large thick disk of unfired or lightly fired clay; corn cob impressions in lower surface; upper surface convex; pot(?) rim impression along perimeter; upper surface of one specimen white. Total 2.

*Materials:* Sandy clay.

*Dimensions:* Diameter, 14.5, 13.0 cm.; thickness, 2.7, 4.5 cm.

**MINIATURE LADLES**

(Figure 76)

*Description:* Half of bowl of miniature ladle including base of handle. Total 2.



FIG. 77. Animal effigies. Length of lower right specimen, 3.6 cm.

*Materials:* Brown and red fired clay.

*Dimensions:* Length (both fragments), 4.2 and 3.8 cm.

## DISCUSSION

There was no additional evidence forthcoming from the 1952 collections as to the use of the various shapes of worked sherds. They have been classified as scoops, spindle whorls, and counters in accordance with customary practice. All types in the 1952 collection had a late distribution, none being earlier than the Three Circle Phase. Most of the worked sherds came from the Hinkle Park Cliff-Dwelling. It is not surprising that more did not come from O Block and Y Canyon caves in view of the fact that so few were recovered from Tularosa and Cordova caves.

One sherd of unusual wing-like shape was recovered from Hinkle Park Cliff-Dwelling (fig. 76). This object is similar to figures of carved shell found at the Swarts Ruin and at the NAN Ranch Ruin reported by the Cosgroves (Cosgrove, 1932, pl. 74, *k*, and pl. 76, *c*). Another similar object made of red slate is figured by Kidder and Guernsey (1919, p. 127, fig. 50), from the Marsh Pass region.

The human figurine bears a general resemblance to objects reported by Haury from Los Muertos (1945a, fig. 69, *b*) and more superficially to a figurine from Los Hornos (op. cit., fig. 118, p. 181). Both have "coffee bean" eyes and the prominent clay ridge nose. The figurine in the 1952

collections is the first to be reported from the later phases of the Pine Lawn Valley sequence. However, the specimen from Turkey Foot Ridge, Pit House L (San Francisco-through-Three Circle), also has "coffee bean" eyes (Martin and Rinaldo, 1950a, p. 352, fig. 134).



FIG. 78. Pot cover from Room E, Hinkle Park Cliff-Dwelling. Diameter, 13.0 cm.

Although certain apparent injuries to these figurines from the Reserve area suggest black magic, it seems doubtful whether any such significance should be attached thereto. A consistent pattern is lacking and the injuries are not as obviously intentional as those to the figurine which Morris illustrates from the Prayer Rock district, northeastern Arizona (Morris, 1951, p. 33, fig. 24, *b*). The figurine from Tularosa Cave had a peg in the top of its head, that from Turkey Foot Ridge a crack in the middle of the head running down into the chest region, and that from O Block Cave a small hole in the chest.

	SQ.	1	2	3	4	5	6	7	8
ANTELOPE OR DEER	A-2	1	12	20	24	8	11	29	
	B-1	16	13		8	21	11	7	
	C-2		30	32	41	24	38	5	
	D	1	6	2	5				
PRONGHORN ANTELOPE (ANTILOCAPRA)	D			2					
BEAR (URSUS)	B-1						1		
	D		1		1				
BEAVER (CASTOR CANADENSIS)	A-2						1		
	D				1				
BISON (BISON)	A-2	2							
	B-1		2						
COYOTE (CANIS LATRANS)	C-2	3							
	A-2							1	
DEER (ODOCOILEUS)	A-2	6	2		1	5		3	
	B-1	12	4	13		1			2
FAWN	C-2	16	1			6	1	6	
	D		3	42	12				
DOG (CANIS FAMILIARIS)	A-2			2					
	C-2	2						2	
PUPPY (CANIS JUV.)	A-2								
	C-2			3	1				
DOVE (ZENAIURA)	C-2	1							
DUCK (ANAS)	A-2		1						
	D								
EAGLE (AQUILA)	A-2				1		1		
	B-1					1			
FOX (VULPES)	C-2		1						
	D				1				
GRAY FOX (UROCYN)	A-2		1		2				
	D			1					
FROG (RANA)	C-2	1		2		1			
	D								
GOPHER (GEOMYS)	C-2	3	2	11		4	1	2	
	D				1				
POCKET GOPHER (THOMOMYS)	C-2			1		1			
	D								
JAY (CORVID)	C-2						1		
MUSKRAT (ONDATRA)	B-1								
	C-2		2	2			1		
QUAIL (COLINUS)	A-2		1						
	B-1		1						
COTTONTAIL RABBIT (SYLVILAGUS)	C-2	1	3	1			2	6	
	D								
JACK RABBIT (LEPUS ALLENI)	B-1	1		9	2	9	7	10	
	C-2	2		5	2				
RABBIT	A-2		3	1			1	3	
	B-1			1					1
RAT (RATTUS)	C-2		1	3		3	2	2	
	A-2			5			1	2	
WOOD RAT (NEOTOMA)	B-1		2	2					
	C-2		2	6					
UNIDENTIFIED RODENT	A-2	1	3	2					
	D								
GROUND SQUIRREL (OTOSPERMOPHILUS)	B-1						1		
	C-2								
ROCK SQUIRREL (CITELLUS)	A-2			1					
	B-1								
STRIPED SKUNK (MEPHITIS)	C-2	1		4		1			
	D			1					
TOAD (BUFO)	A-2				1				
	D								
TURKEY (MELEAGRIS GALLOPAVO)	C-2	1	1	10		3	4	2	
	D								
TURTLE	C-2	2							
WOLF (CANIS NUBILUS)	A-2							2	
	B-1								
UNIDENTIFIED BIRD	C-2				2		1	3	
	D								
UNIDENTIFIED FISH	A-2				1				
	C-2					1	1	1	
UNIDENTIFIED MAMMAL	A-2								
	B-1	3	15	6	8	8	2	22	
UNIDENTIFIED SHELL	C-2	2	5	4	3		4	4	
	D	8	25	32	12	8	23	19	
	A-2		6	9	6				
	B-1		2						

Fig. 79. Occurrence of unworked animal bones from Squares A-2, B-1, C-2, O Block Cave, and Trash Area D, Hinkle Park Cliff-Dwelling.

Such details could probably be passed over were it not for a similar pattern (whatever its significance might be) in the clay animal effigies. The nine animal effigies from Hinkle Park Cliff-Dwelling add significantly to the dozen specimens from the Reserve area and the fifteen figures from Point of Pines (Wendorf, 1950, pp. 85-86). A remarkable characteristic of these is that almost every specimen is broken to some extent—legs, tails, heads, or ears are frequently missing. Another characteristic is a hole pushed through while the clay is still damp, beginning just under the neck and coming out just below the tail. This hole had been noted on one specimen from Tularosa Cave (Martin, Rinaldo, and others, 1952, fig. 67, *a*), one specimen from Three Pines Pueblo (Martin and Rinaldo, 1950b, p. 474), and eight specimens from Arizona W:10:51 (Wendorf, 1950, p. 86); it also characterizes the group of clay effigies from Starkweather Ruin (Nesbitt, 1938, p. 100). One specimen from Hinkle Park Cliff-Dwelling has a large hole passing from side to side through the middle of the body. The identification of the species seems doubtful. They have been identified as various kinds of animals—mountain sheep, deer, dogs, mountain lions, bears, and porcupines—but the features are almost always too crudely modeled or fragmentary to make identification certain. They possibly bear a tenuous relationship to the effigy handles found on Tularosa Black-on-White pitchers (Martin and Willis, 1940, pl. 81, figs. 6, 7).

Miniature ladles or their broken parts have been reported from the SU site (Martin, 1943, p. 232), Turkey Foot Ridge (Martin and Rinaldo, 1950a, p. 352), and Tularosa Cave (Martin, Rinaldo, and others, 1952, p. 196). In this area they do not occur as full-sized vessels in the Mogollon pottery types, and they seem to have had a purpose other than use as toys. Possibly they were used as spoons or for administering medicine to the sick. Although fifteen were recovered from the Pine Lawn Phase pit-houses at the SU site, no more than two have been recovered from each of the later sites.

## PIGMENTS

(Not Illustrated)

### TYPE A

*Description:* Red lumps of pigment (hematite); 9 specimens smooth on two or more surfaces, 2 irregular, unworked, smooth surfaces generally faceted. Total 11.

*Dimensions:* Length, 1.8-6.5 cm., average, 3.6 cm.; width, 1.4-5.4 cm., average, 2.8 cm.; thickness, 0.6-3.1 cm., average, 1.4 cm.



## TYPE B

*Description:* White lumps of pigment (limestone), unworked. Total 2.

*Dimensions:* Length, 4.0, 2.5 cm.; width, 2.3, 1.4 cm.; thickness, 0.6, 1.1 cm.

## TYPE C

*Description:* Rough lumps of blue-green pigment or raw "turquoise"; actually malachite and azurite. Total 30.

*Dimensions:* Length, 0.9–3.4 cm., average, 1.7 cm.; width, 0.6–2.9 cm., average, 1.2 cm.; thickness, 0.4–2.8 cm., average, 0.9 cm.

## CRYSTALS

(Not Illustrated)

*Description:* Sharp hexagonal quartz crystals, possibly drills. Total 6.

*Dimensions:* Length, 5.6, 2.6, 2.9, 3.4, 2.6, 4.0 cm.; width, 3.3, 1.3, 0.8, 0.1, 0.7, 2.0 cm.; thickness, 2.5, 1.2, 0.5, 0.8, 0.6, 1.9 cm.

## DISCUSSION

A significant feature of the pigments is the number of lumps of hematite with faceted surfaces. In view of the quantity of paint grinding stones with paint on their surfaces it is suggested that the pigment was ground against the stone directly rather than between a hand stone and the paint grinding stone. Manos or rubbing stones with pigment on their grinding surfaces have rarely been recovered in this area.

Although considerable malachite pigment was recovered, none was found on any paint grinding stone from the 1952 collections. However, it was found on a paint grinding stone from Tularosa Cave (Martin, Rinaldo, and others, 1952, p. 138). These malachite lumps do not have the faceted surfaces of the hematite lumps, possibly because this malachite is a harder substance, less easily ground down.

## SUMMARY

Although a sufficient number of artifacts were secured from the early levels in O Block and Y Canyon caves to corroborate the discoveries of the previous seasons concerning the types of artifacts used in Pre-Pottery and Plain Ware horizons, the primary contribution of these collections is the number of aspects which they add to our knowledge of the Reserve and Tularosa phases. The character of the collections as a whole is colored by a number of artifact types which do not have their counterparts in the earlier

Cochise and Mogollon tradition, such as axes, arrow shaft tools, beveled manos, and the slender, triangular projectile points. These types, when taken together with specimens such as the human figurine and the wing-like worked sherd, appear to foreshadow increasing culture contacts and the approach of a culture climax.

## V. Cordage, Sandals, and Textiles

By ELAINE BLUHM

### CORDAGE

*Description:* The cordage specimens that were found consist of:

Yarns: Single elements produced by twisting two or more fibers.

Strands: Two or more yarns twisted together.

Multiple strand cordage: Two or more strands twisted together.

During manufacture, direction of twist shifts as elements are combined; for example, S-twist yarns are combined in Z-strands, which are, in turn, combined in S-twist multi-strand cords. S- or Z-twist is determined by comparing the slant of the twist of the cord with the slant of the middle bar of the letters S and Z (fig. 83).

Most cordage natural color, two bast fiber fragments dyed red.

One-, 2-, and 3-yarn and 2- and 3-strand specimens vary from 0.5 to 5.5 mm. in diameter. Yarns both S- and Z-twist, with S-twist predominate in both hard and bast fibers. Single surface fiber yarn (cotton) and yarn in cotton textile Z-twist.

*Material:* The following types of fibers are used in the construction of the cordage:

Hard fibers: Greatly thickened, elongated cells found in the leaves and stems of many monocotyledonous plants; commercial examples of such fibers are sisal, manila hemp, yucca.

Bast fibers: Elongated strengthening cells found in the phloem of plants. Flax, hemp, jute, ramie, and Indian hemp or apocynum are examples.

Surface fibers: Single-celled fibers borne on the surface of plant parts; for example, cotton fibers attached to seeds.

### Discussion

We recovered 101 pieces of cordage from the four caves, most of them from the Three Circle and Reserve levels of O Block Cave (fig. 80). Two-yarn Z-twist cord (S-twist yarn) is the most common type, as it seemed to be in Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 205-212,

SITES AND PHASES	ARTIFACTS												HARD FIBER CORD				BAST FIBER CORD				COTTON CORD				FUR AND FEATHER CORD (S-TWIST)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	YARN				TWIST				2-YARN				3-YARN				2-STRAND				3-STRAND				YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND		YARN		TWIST		2-YARN		2-STRAND	

Fig. 80. Occurrence of cordage types by phases.

ARTIFACTS	KNOTS						FIBER COILS				CARRYING-LOOP CHAIN
	SQUARE	GRANNY	OVERHAND	SINGLE HALF HITCH	SINGLE BOW	TOTAL	TWIG	YUCCA	WOODY SPLINT	TOTAL	
SITES AND PHASES											
Y CANYON CAVE											
PINE LAWN THROUGH RESERVE	6	1				7					
COSPER CLIFF-DWELLING											
TULAROSA	5	2				7					1
HINKLE PARK CLIFF-DWELLING											
TRANSITIONAL RESERVE - TULAROSA	40	2	1	2		45		2		2	
O BLOCK CAVE											
RESERVE	21	6	1			28	1	6		7	
THREE CIRCLE THROUGH TULAROSA	1				1	2			1	1	
THREE CIRCLE	22	2	9	2	2	37	1		1	2	
PINE LAWN	3	1	2			6					
PRE - POTTERY	3					3					
TOTAL	50	9	12	2	3	76	2	6	2	10	
TOTAL ALL CAVES	101	11	16	4	3	135	2	8	2	12	1

FIG. 81. Occurrence of knots and cordage artifacts by phases.

ARTIFACTS  SITES AND PHASES	SANDALS					PLAIN WEAVE CLOTH	NET	COILED BASKETRY	TWILLED MATTING	PLAITING			
	2-WARP WICKERWORK	4-WARP WICKERWORK	PLAITED ROUND TOES	PLAITED FRAGMENTS	TOTAL					BAND -WIDE	BAND NARROW	3-ELEMENT BRAID	4-ELEMENT BRAID
Y CANYON CAVE													
PINE LAWN THROUGH RESERVE	1	1		1	3								
COSPER CLIFF - DWELLING													
TULAROSA			2	6	8	1							
HINKLE PARK CLIFF - DWELLING													
TRANSITIONAL RESERVE-TULAROSA			2	5	7				3	1	1	2	
O BLOCK CAVE													
SURFACE				1	1				5				
RESERVE			3	1	4				19			1	
THREE CIRCLE THROUGH TULAROSA									2				
THREE CIRCLE	1		2	1	4		1		4				
PINE LAWN THROUGH THREE CIRCLE								1					
TOTAL	1		5	3	9		1	1	30				1
TOTAL ALL CAVES	2	1	9	15	27	1	1	1	33	1	1	2	1

Fig. 82. Occurrence of sandals and textiles by phases.

215–218) and other sites in the Hohokam (Haury, 1950, pp. 391–394) and Anasazi areas (Bartlett, 1934, p. 45; Haury, 1945b, p. 48; Kidder and Guernsey, 1919, p. 113).

In the Late Phase of Cordova Cave and the San Francisco and San Francisco-through-Tularosa levels of Tularosa Cave, S-twist hard and bast fiber yarn predominates over Z-twist, as it does in O Block Cave.

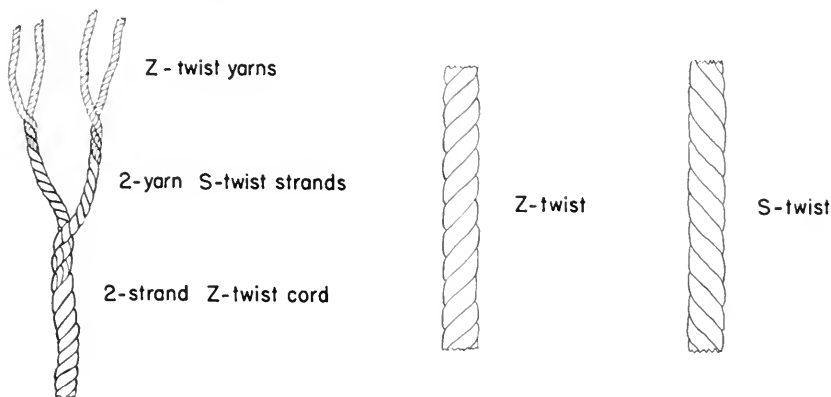


FIG. 83. Drawings of cordage types.

Samples from the Pre-Pottery, Pine Lawn, and Georgetown levels of O Block Cave were too small to provide an adequate check on the early predominance of Z-twist bast fiber yarn and later shift to S-twist bast fiber yarn in Tularosa Cave. Surface fiber yarns (cotton) are Z-twist in O Block Cave and the textile fragment from Cosper Cliff-Dwelling, as they are in the Tularosa Cave cordage and textiles (Martin, Rinaldo, and others, 1952, fig. 75, p. 299).

## FUR AND FEATHER CORD

### Fur Cord

*Description:* Of the types identified in Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, p. 218) the following were found:

Type A: Cords, or occasionally yarns, wrapped with strips of fur, producing an S-twist fur cord.

Type B: Two yarns, or less frequently cords, each wrapped with skin and then twisted together to produce an S-twisted fur cord.

Type F: A cord wrapped with two strips of fur, forming an S-twist fur cord.

*Material:* Narrow strips of fur and Z-twist bast fiber yarn or 2-yarn S-twist bast fiber cord.

### Feather Cord

*Description:* Of the types identified in Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, p. 218), the following was found:

Type A-Q: Contour feather quills wrapped around a piece of cord to form S-twisted feather cord. Quills not split, but vanes broken down after feathers had been wrapped around cord.

*Material:* Feather quills and 2-yarn Z-twist hard or bast fiber cord. In one case the 2-yarn bast fiber cord was dyed red.

### Discussion

The distribution of the 20 fur and feather cord specimens (fig. 80) found in O Block Cave, Y Canyon Cave, and Hinkle Park Cliff-Dwelling is such that no conclusion can be drawn about the relative popularity on the basis of these sites. In this sample the quantities of fur and feather cord are equal. More fur cord specimens were of Type A, and A-Q was the only feather cord type. Both types were predominate in Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, fig. 74, pp. 211-212).

In Tularosa Cave, fur cord tends to be more important in the early phases and feather cord more important later. This is also true in the Anasazi area, where fur cord is more important in Basketmaker II and III while feather cord is predominate in Pueblo II and III (Bartlett, 1934, p. 46; Kidder and Guernsey, 1919, p. 174; Morris, 1919, p. 48). Several types of fur cord were found in the Hohokam site of Ventana Cave, but feather cord is rare (Haury, 1950, pp. 394-396).

### KNOTS

*Description:* The following knots, tied in cords or more often in strips of yucca fiber, were found:

Square or reef knot (Graumont, 1945, p. 28, fig. 88).

Granny knot (Graumont, 1945, p. 28, fig. 87).

Overhand or thumb knot (Graumont, 1945, p. 27, fig. 84).

Single half hitch (Graumont, 1945, p. 3, fig. 1).

Single bow (Haury, 1950, p. 397, fig. 94, *e*).

### Discussion

Of 135 knots recovered (fig. 81), square knots were predominate in O Block Cave, Y Canyon Cave, Hinkle Park Cliff-Dwelling, and Cos-



per Cliff-Dwelling, as they were in Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, pp. 212-213, 219, fig. 76). As before, the overhand is second in popularity, but a greater proportion of granny knots was found in O Block Cave than in the sites reported before. This knot has become more important, also, because of its use in the large net from that cave (see p. 171).

The square knot appears to be the most important type in the Anasazi sites (Bartlett, 1934, p. 45; Haury, 1934, p. 87) and was also found in Ventana Cave (Haury, 1950, pp. 397-398).

### FIBER COILS

*Description:* Narrow strips of fiber or slender twigs wound into coils. Ends sometimes tied to keep coil from unwinding.

One coil of woody splint wound to tight oval, spiraling out from center, like a watch spring. Additional fiber ties free end of splint to preceding round of coil.

*Material:* Strips of yucca, woody splints, slender unpeeled twigs, 1-4 mm. wide.

*Dimensions:* Diameter, 1.3-5.6 cm.

### Discussion

The 12 coils found in the Three Circle, Reserve, and Three Circle-through-Tularosa levels of O Block Cave and Hinkle Park Cliff-Dwelling resemble those from Tularosa Cave, where they occurred throughout the occupation of the site (Martin, Rinaldo, and others, 1952, pp. 221-223, fig. 76). Coils of string were also found in Tularosa Cave, although they do not occur here.

### CARRYING-LOOP CHAIN

*Description:* Narrow strip of fiber tied with overhand knot in center; ends tied with square knot, producing 2-loop chain.

*Dimensions:* Loop diameter, 6 cm.

### Discussion

Chains of similar construction, but usually with more loops, were found in the Pre-Pottery, Pine Lawn, and Georgetown levels of Tularosa Cave (Martin, Rinaldo, and others, fig. 76, pp. 214, 216). The occurrence of one specimen from Cosper Cliff-Dwelling extends the known temporal range of the artifact to the Tularosa Phase.

Similar chains were found in Pueblo III in the Anasazi area (Fewkes, 1909, p. 47, fig. 27, and 1911, p. 77; Haury, 1945b, p. 50, pl. 21; Morris, 1911, p. 180, pls. 52, 54, 55), where the loops occasionally had corn cobs or herbs tied in them. Loop chains were also part of the tied-twined corn husk lining of a cist in Dupont Cave (Nusbaum, Kidder, and Guernsey, 1922, pl. 54). According to Fewkes (1911, p. 77) the Hopi have a similar 6-loop chain for holding corn cobs in ceremonies.

## SANDALS

### Two-Warp Wickerwork Sandals, Plain

(Figures 84, left; 85, left)

*Description:* Warps, knotted at heel in square knot, are brought down to toe and knotted again when sole is completed. Weaving begins at heel, weft passing back and forth over and under warp. Weft is wound around knotted warps at heel before sole is started. Ends of weft elements, added during course of weaving, are left on under side where they fray out and provide cushioning for sole. Sandals are oval and symmetrical; lefts not distinguishable from rights. Ends of warp fibers are knotted at toe and brought up on top of sandal to form toe ties. Heel ties are missing on these specimens (Martin, Rinaldo, and others, 1952, pp. 259-262).

*Material:* Warps, wefts, and ties usually of yucca (*Yucca baccata* Torr.) mashed somewhat before weaving. In Y Canyon specimen the weft elements are bunches of grass.

*Dimensions:* Length, 16.8 cm., incomplete; width, 8.1, 9.5 cm.

### Four-Warp Wickerwork Sandals, Plain

(Figures 84, center; 85, center)

*Description:* Weft elements woven in plain over-one-under-one weave across four warps. Warps anchored at heel by wrapping around wefts. A complete specimen from Tularosa Cave indicates that the sandal is woven from heel to toe and the surplus warps are folded back on top of the toe.

Fragment indicates that heel tie passes under outer warp on either side of foot (Martin, Rinaldo, and others, 1952, pp. 263-266).

*Material:* Warps, wefts, and ties of whole or strips of yucca leaves.

*Dimensions:* Length, fragment, width, 9.0 cm.

### Plaited Sandals with Round Toes, Made of Wide Elements

(Figures 84, right; 85, right)

*Description:* Three or four leaves, bent at toe, form 6 or 8 elements, plaited in an over-two-under-one or over-one-under-one pattern from toe



FIG. 84. Sandals: left to right, two-warp wickerwork, four-warp wickerwork, and plaited. Length of right, 20.4 cm.

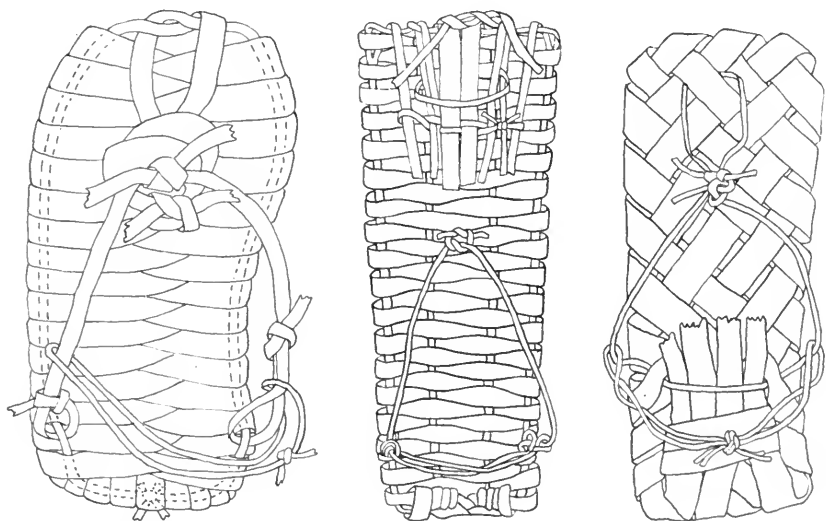


FIG. 85. Drawings of typical sandals: left to right, two-warp wickerwork, four-warp wickerwork, and plaited.

to heel beyond desired sandal length. Surplus folds over heel, providing cushion. Folded ends occasionally bound in place with narrow strip of yucca. Sandals somewhat rounded at toe, lefts sometimes distinguishable from rights when inner corner tends to be less rounded than outer.

Toe tie, a narrow strip of yucca inserted under one or two upper elements about 2.5 cm. back from toe and tied on top of second and third toes.

Heel tie of yucca crosses sole, passing under an element on either side, about 2.5 cm. from back; comes up over instep and ties to toe tie. A thin strip of leaf connects heel ties across back of foot (Martin, Rinaldo, and others, 1952, 267-272).

*Material:* Whole yucca leaves (*Yucca baccata* Torr.), usually not treated before plaiting, but sometimes beaten or crushed; vary in width from 0.7 to 2.0 cm.

*Dimensions:* Length, 19.2-23.5 cm., average, 21.0 cm.; width, 5.7-10.5 cm., average, 8.9 cm.

### **Plaited Sandal Fragments, Made of Wide Elements**

*Description:* Too fragmentary to be included in above category.

### **Discussion**

Altogether, 27 sandals were found in the four caves; two were of two-warp wickerwork, one was of four-warp wickerwork, and 24 were plaited of wide elements. Three sandals come from Y Canyon, eight from Cosper Cliff-Dwelling, seven from Hinkle Park Cliff-Dwelling, and nine from O Block Cave (fig. 82).

The two-warp wickerwork sandals are identical in construction with those from Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, pp. 259-262), although the one from Y Canyon Cave introduced a new material, as it was made of grass. This sandal type occurred in all levels of Tularosa Cave from Pre-Pottery through the San Francisco-through-Tularosa mixed levels, but it was more numerous in the earlier levels. Specimens from Y Canyon and O Block caves do not contradict this evidence.

Mogollon two-warp wickerwork sandals resemble the Hohokam two-warp wickerwork sandals from Ventana Cave in appearance (Haury, 1950, pp. 432-434) but differ from them in construction. Warps of the Mogollon type are made of two leaves knotted at both heel and toe; in the Hohokam type both warps are formed when one leaf is bent at the toe and tied at the heel. The specimens from Ventana Cave may have been worn

as early as San Pedro times (Haury, 1950, p. 340), and they are the predominant sandal type at that site.

A few two-warp wickerwork sandals have been found in Pueblo III Anasazi sites (Kidder and Guernsey, 1919, pp. 101–103). Warps in these sandals are made of two leaves, knotted at both heel and toe, as in the Mogollon type, but they are more rigid in appearance, and the wefts are short elements, beginning in the center, passing under one warp and back over it, and under the other, where they are cut and the ends frayed out. The frayed sole is, therefore, much wider than the distance between the two warps. In the Mogollon two-warp wickerwork sandal, the width of the sole is close to the distance between the warps, and weft elements are woven continuously back and forth across the warps.

The four-warp wickerwork sandal from the Pine Lawn-through-Reserve level of Y Canyon Cave is typologically like those from Tularosa Cave, and the occurrence of it here agrees with the evidence from the other sites (Martin, Rinaldo, and others, 1952, pp. 263–266, fig. 83).

Four-warp wickerwork sandals have been found in the Anasazi area in Basketmaker II and III sites (Baldwin, 1938, pp. 465–485; Guernsey, 1931, p. 77, pl. 90; Kidder and Guernsey, 1919, p. 158, pl. 67) and Pueblo III sites (Haury, 1945b, p. 42, pl. 17; Judd, 1931, pp. 63–64, pl. 41). While there is a general similarity between these sandals and the Mogollon specimens, usually the warps of the Anasazi type are fringed out at the toes, rather than folded back over the foot.

Two- and four-warp wickerwork sandals from Texas are similar in weaving technique to those of the Southwest but they usually have fishtail heels (Cosgrove, 1947, pp. 82–87; Howard, 1930, pl. 34; Jackson, 1937, p. 154; Smith, 1933, pp. 57–66). The manner in which one leaf is bent to form two warps makes them more like those from Ventana Cave than any others in the Southwest.

A total of 24 plaited sandals and fragments came from the four sites. One came from the Pine Lawn-through-Reserve level of Y Canyon Cave, eight from the Three Circle and Reserve levels and surface of O Block Cave, seven from Hinkle Park Cliff-Dwelling, which is Transitional Reserve-Tularosa; and eight from Cosper Cliff-Dwelling, a Tularosa Phase site. This was the only type present in the Reserve Phase levels of O Block Cave and in the Hinkle Park and Cosper Cliff-Dwellings. This distribution further substantiates the evidence from Tularosa Cave, where plaited sandals were the predominate type in the San Francisco-through-Tularosa mixed levels and the Reserve-through-Tularosa levels (Martin, Rinaldo and others, 1952, fig. 83).

With few exceptions, the plaited sandals from Mogollon sites (Cosgrove, 1947, pp. 89-93; Harrington, 1928, p. 9; Martin, Rinaldo, and others, 1952, pp. 266-276) are made of wide elements. In this respect they differ from those reported from sites in the Anasazi area. Plaited sandals made of narrow elements are important in Pueblo III sites in northeastern Arizona (Fewkes, 1909, p. 47, and 1911, pp. 72-73, pl. 31; Haury, 1945b, p. 42, pl. 17; Judd, 1931, pp. 63-64; Kidder and Guernsey, 1919, pp. 101-103; Morris, 1911, pp. 179-180, and 1919, pp. 49-50; Pepper, 1920, pp. 93-94), but are not the only type present at that time. Some of these Anasazi sandals have jog toes, a variation not reported from Mogollon sites. A letter from Earl H. Morris indicates that plaited sandals have been found as early as Basketmaker III, and that the earlier specimens are made of wider elements.

Plaited sandals, made of wide elements, which closely resemble the Mogollon type have been found in two southern Pueblo IV sites of Camp Verde (Morris, 1929, pp. 85-86) and Canyon Creek (Haury, 1934, pp. 64-66).

### PLAIN WEAVE CLOTH

*Description:* Wefts woven in plain, loose over-one-under-one weave across warps; 9 warps and 6 wefts per centimeter, warps slightly more tightly twisted than wefts. Fragment natural color, no selvage.

*Material:* Single-ply Z-twist cotton yarn.

### Discussion

Only one prehistoric textile fragment was found during the 1952 season; it came from Cospers Cliff-Dwelling. This fragment, made of cotton, falls within the group of cotton textiles described from Tularosa Cave (Martin, Rinaldo, and others, 1952, p. 299). Re-examination of several of those fragments has led me to the conclusion that warps are generally somewhat more tightly twisted than wefts and that Mogollon textiles tend to have a greater number of warps than wefts per centimeter. This is substantiated by cotton fragments from the caves of the Upper Gila area (Cosgrove, 1947, p. 69).

Plain weave cotton cloth is known throughout the Southwest. Specimens have been reported from Ventana Cave in the Hohokam area (Haury, 1950, pp. 450-451), and they are known in the Anasazi area from Pueblo I (Guernsey, 1931, p. 97), Pueblo II (Bartlett, 1934, pp. 46-47), and Pueblo III sites (Fewkes, 1909, p. 45, and 1911, p. 76; Judd, 1931, p. 63; Kidder and Guernsey, 1919, p. 115; Morris, 1911, p. 179, and 1919, p. 48; Tschopik in Kluckhohn and Reiter, 1939, p. 96).



FIG. 86. Left: large rabbit-net, tied with granny knots, from Three Circle Phase level of O Block Cave. Right: drawing of granny knot. Width of bundle, 20 cm.

## NETTING

(Figure 86)

*Description:* Large 9 cm. mesh formed by cords tied with granny knots.

*Material:* Three-strand Z-twist hard fiber cord; diameter, 3 mm.

*Dimensions* (of bundle, net too fragile to measure): Length, 50 cm.; width, 20 cm.

## Discussion

It is unfortunate that the net found in a Three Circle level of O Block Cave was in such fragile condition that it could not be unfolded, and, there-

fore, its length and width could not be measured. However, judging from the size of the bundle, the original net must have been several meters long. The large mesh suggests that the specimen must have been used in hunting.

Although no net of this size was found in either Tularosa or Cordova Cave (Martin, Rinaldo, and others, 1952, p. 302), Cosgrove reports fragments with large meshes (Cosgrove, 1947, pp. 72-73).

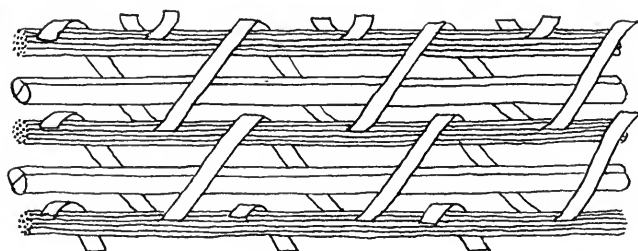


FIG. 87. Two-rod-and-bundle, bunched foundation basket fragment from O Block Cave and drawing showing construction. Width of fragment, 10.6 cm.

The specimen perhaps resembled fragments found in a Basketmaker III site (Guernsey, 1931, p. 79) and the large rabbit-net 240 feet long from White Dog Cave (Guernsey and Kidder, 1921, pp. 77-79, pl. 31). However, the use of the granny knot in this net marks it as unusual in the Southwest.



## BASKETRY

### Two-Rod-and-Bundle, Bunched Foundation

(Figure 87)

*Description:* Sewing splints encircle two-rod-and-bundle, bunched foundation of coil and part of bundle of coil below. Stitch slant is /. Stitches non-interlocking, occasionally split. Two coils and 5 stitches per centimeter. Stitches almost completely cover foundation. Fragments too fragile to determine splicing techniques.

*Material:* Rods are slender, woody shoots; sewing elements flexible wood splints 1 to 2 mm. wide.

### Discussion

Only one basket fragment was found in a Pine Lawn-through-Three Circle level of O Block Cave. This fragment resembles those reported from Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, pp. 306–308) except that this fragment is somewhat better constructed and has more stitches per centimeter.

Two-rod-and-bundle, bunched foundation coiled basketry occurs in all areas and all periods in the Southwest. In Tularosa Cave it was the predominate type in all levels from Pre-Pottery to San Francisco-through-Tularosa (Martin, Rinaldo, and others, 1952, fig. 85). Morris and Burgh (1941, p. 12) have demonstrated its persistence throughout the Basket-maker and Pueblo periods. In Ventana Cave this was not the predominate type, but it may have been known as early as the San Pedro period (Haury, 1950, pp. 403–407).

## TWILLED MATTING

(Figures 88, 89)

*Description:* Elements woven in over-three-under-three diagonal pattern. Plaiting firm, little space between elements. Pattern usually in one diagonal direction, but four fragments have 90 degree shift in direction (fig. 89) by varying weave, elements continuing from one section into another. Technique does not resemble mended area, but rather variation in design.

At selvage, on three fragments, elements are turned parallel to edge of mat, twisted once, and worked back into mat at 90 degree angle to direction from which they emerged. Twisting elements along edge produces ridge or rolled edge effect on under side of mat.

*Material:* *Dasyllirion*; strips 3 to 8 mm. wide.

*Dimensions:* Width, 94 cm. (one fragment with two edges, O Block Cave).

### Discussion

The 33 fragments of twilled matting came from only two sites: three from Hinkle Park Cliff-Dwelling, and the remainder from Three Circle, Three Circle-through-Tularosa, and Reserve Phase levels and the surface of O Block Cave (fig. 82). All of these fragments were woven in an over-



FIG. 88. Fragment of large twilled mat from O Block Cave. Length, 94 cm.

three-under-three pattern, although specimens woven in an over-two-under-two pattern were found in Tularosa Cave (Martin, Rinaldo, and others, 1952, p. 322). The more recently collected specimens have also added information about selvage and patterning not available in the Tularosa Cave specimens. In four fragments the weaving pattern shifted direction to vary the design, and three fragments had selvage along the edges. Cosgrove (1947, fig. 39) illustrates a selvage section of a cradle with a change in pattern executed in the same fashion. The distribution of the specimens in the Three Circle and later phases of cave occupation tends to substantiate the evidence from Tularosa Cave that this type is more important in the later part of the Mogollon sequence; in Tularosa Cave most of the specimens came from the San Francisco-through-Tularosa mixed levels (Martin, Rinaldo, and others, 1952, fig. 86).

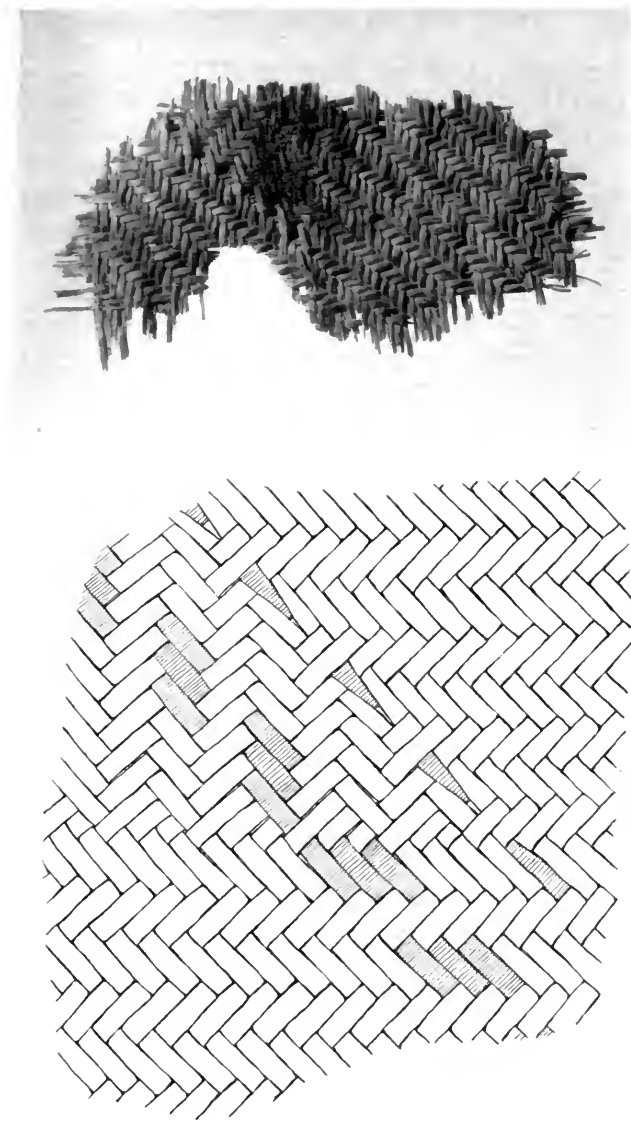


Fig. 89. Small fragment of twilled mat with design produced by shift in direction of pattern and detailed drawing of section showing method of weaving to create shift in pattern. Length of specimen, 32.3 cm.

Most of the twilled mat fragments reported from the Anasazi area have been found in Pueblo III (Haury, 1945b, p. 84; Judd, 1926, pp. 97-98; Kidder and Guernsey, 1919, pp. 111-112; Morris, 1911, p. 179, and 1919, pp. 53-54; and Tschopik in Kluckhohn and Reiter, 1939, p. 94) and Pueblo IV sites (Haury, 1934, pp. 81-83, pl. LIV, *b, d*; Kidder, 1932, p. 300), but some have been reported from Basketmaker II caves (Kidder and Guernsey, 1919, pp. 170-171). In this area both over-two-under-two and over-three-under-three weaves are known. In several specimens the direction of the pattern of the body of the mat differs from that of the border. This shift in direction is from a vertical twill to a diagonal, and represents a 45 degree angle change in pattern direction (Haury, 1945b, pl. 20, p. 48; Morris, 1911, p. 179, and 1919, pp. 53-54; Nordenskiöld, 1893, pl. XLVIII, no. 4), while Mogollon specimens shift 90 degrees from one diagonal pattern to another. The matting from the Canyon Creek site has such a 90 degree shift in pattern direction, and one fragment has a design of concentric squares produced in that fashion (Haury, 1934, pp. 81-83, pl. LIV, *b, d*).

Some small fragments of matting plaited in an over-two-under-two weave came from levels of Ventana Cave dated at pre-1400 (Haury, 1950, p. 402). That this technique was known in the Hokokam area is also indicated by impressions of over-two-under-two matting from the Sacaton Phase at Snaketown (Gladwin and others, 1937, p. 159).

## PLAITING

### Plaited Band, Wide

(Figure 90, right)

*Description:* Eight elements woven in an over-one-under-one diagonal weave form a loose band; space between elements.

*Material:* Yucca strips, 5 to 7 mm. wide.

*Dimensions:* Length, incomplete; width, 3.8 cm.

### Plaited Band, Narrow

(Figure 90, left)

*Description:* Twelve elements plaited in an over-four-under-two-over-three pattern to form a narrow band. Weave is tight; little space between elements.

*Material:* Strips of fiber 1 mm. wide.

*Dimensions:* Length, incomplete; width, 1.3 cm.

### Flat Braid

*Description:* Three or four elements plaited in an over-one-under-one flat braid. Cord in one braid dyed red.

*Material:* Strips of yucca (4-element braid) or 2-yarn Z-twist bast fiber cord (3-element braid).

*Dimensions:* Width, 1.2 cm. (4-element braid), 0.2, 0.5 cm. (3-element braids).



FIG. 90. Fragments of wide and narrow plaited bands. Width of left specimen, 1.3 cm.

### Discussion

The two braided bands were found in Hinkle Park Cliff-Dwelling. The wider one may represent part of a burden strap, but the smaller is too fragile to have served such a purpose.

Cosgrove reports several narrow braided bands from the Upper Gila area (Cosgrove, 1947, p. 74), some of cord and some of yucca, but all narrower than the wider of the two described above.

Braided yucca burden straps have also been reported from Pueblo III and Basketmaker II sites in northeastern Arizona (Kidder and Guernsey, 1919, pp. 114, 172).

A small percentage of cordage specimens in Tularosa Cave were narrow 3- and 4-element braids of cord or yucca fiber (Martin, Rinaldo, and others, 1952, p. 219, fig. 76). Such braids also occur in Anasazi (Kidder and Guernsey, 1919, p. 114; Haury, 1934, p. 83, and 1945b, p. 49) and Hohokam (Haury, 1950, pp. 393-394) sites.

## SUMMARY AND CONCLUSIONS

(Figures 80-82)

We recovered from the two caves and two cliff-dwellings a total of 121 pieces of cordage, including hard, bast, and surface fiber cords and fur and feather cord; 135 knots tied with both cord and strips of yucca; and 81 artifacts of cord or fiber, including textiles, basketry, matting, and sandals. Most of these specimens came from Three Circle, Reserve, Transitional Reserve-Tularosa, and Tularosa Phase levels in the sites, and therefore add to our knowledge of the period least adequately represented in Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952).

Most of the cordage is 2-yarn Z-twisted (S-twisted yarns), hard or bast fiber, as is most of the cordage described from other sites in the Southwest. Very little fur and feather cordage was recovered. Another Southwest-wide trait represented here is the predominance of the square knot over other types.

The majority of sandals were plaited of wide fiber. Because this was the only type found in Hinkle Park Cliff-Dwelling and Cosper Cliff-Dwelling—the Transitional Reserve-Tularosa and Tularosa Phase sites—there is further evidence that this is the typical indigenous sandal type in the later phases of the known Mogollon sequence. This conclusion was suggested by the increase in popularity of plaited sandals of wide elements in the San Francisco-through-Tularosa levels of Tularosa Cave. None of the plaited sandals of narrow elements, native to the Anasazi area, were recovered this season.

The net, tied with granny knots, has the largest mesh of any specimen yet recovered by the Chicago Natural History Museum expeditions, although fragments of equally large meshes were found by Cosgrove. While this specimen cannot be unfolded, it appears to have been similar to the rabbit net reported from White Dog Cave in northeastern Arizona. The use of the granny knot, however, marks it as unusual.

The single piece of cotton cloth and the one example of two-rod-and-bundle, bunched foundation basketry are representative of the post-San Francisco phases of the Mogollon sequence, but they were also common at that time in other parts of the Southwest.

More twilled matting was found during 1952 than had been encountered before. All the specimens came from Three Circle Phase or later levels of the sites. Twilled matting appears to be more popular, therefore, in the later part of the Mogollon occupation of the Reserve area than before. It is also more popular in Pueblo III times in the Anasazi area, although a few specimens come from earlier sites or levels in both regions.

Cordage, sandals, and textiles found in O Block Cave, Y Canyon Cave, and Hinkle Park and Cosper Cliff-Dwellings do not contradict the conclusions based on specimens from Tularosa and Cordova caves, but merely extend our knowledge of the later phases of the Mogollon sequence.

ARTIFACTS	SITES AND PHASES		ARTIFACTS	
COSPER CLIFF-DWELLING	TULAROSA	1	ATLAL FRAGMENTS	1
			ATLAL DART FORESHAFT - SLOTTED	1
HINKLE PARK CLIFF-DWELLING	TULAROSA	1	ATLAL DART FORESHAFT - PROXIMAL END	1
			BOW FRAGMENT - FUNCTIONAL	1
TRANSITIONAL RESERVE-TULAROSA	RESERVE	1	BOW CEREMONIAL	1
			BOW FRAGMENTS - CEREMONIAL	1
O BLOCK CAVE	SURFACE	1	BOW FRAGMENTS - MINIATURE	1
			ARROW MAINSHAFTS	1
THREE CIRCLE THROUGH TULAROSA	THREE CIRCLE	1	ARROW FORESHAFTS	1
			DIGGING STICKS - POINTED	1
PINE LAWN	PRE - POTTERY	1	DIGGING STICKS - FLAT BLADE	1
			DIGGING STICKS - FRAGMENTS	1
TOTAL	TOTAL ALL CAVES	1	BARK AND WOOD HOES	1
			FIRE DRILL HEARTHS - CYLINDRICAL	1
TOTAL	TOTAL ALL CAVES	1	FIRE DRILL HEARTHS - PLANO-CONVEX	1
			FIRE DRILL HEARTHS - TRIANGULAR	1
TOTAL	TOTAL ALL CAVES	1	SPATULAS	1
			SPLIT-STICK TONGS	1
TOTAL	TOTAL ALL CAVES	1	TOGGLES	1
			CHARRED SHOULDERED POINTED STICKS	1
TOTAL	TOTAL ALL CAVES	1	BURNED STICKS	1
			WOODEN AWL	1
TOTAL	TOTAL ALL CAVES	1	WOODEN CYLINDERS	1
			PAINTED STICKS - SOLID COLOR	1
TOTAL	TOTAL ALL CAVES	1	PAINTED STICKS - BANDED	1
			PAINTED STICKS - HALF AND HALF	1
TOTAL	TOTAL ALL CAVES	1	PAINTED STICKS - UNIDENTIFIED	1
			PAINTED STICKS - UNPEELED	1
TOTAL	TOTAL ALL CAVES	1	REED CIGARETTES - UNPIERCED SEPTUM	1
			REED CIGARETTES - PIERCED SEPTUM	1
TOTAL	TOTAL ALL CAVES	1	WOODEN DIE	1
			KNOB-ENDED PAHO	1
TOTAL	TOTAL ALL CAVES	1	STAINED CROOKED STICKS	1
			RING PAHO	1
TOTAL	TOTAL ALL CAVES	1	CORN COB MOUNTED ON STICK	1
			NOTCHED STICK	1
TOTAL	TOTAL ALL CAVES	1	BURNED STRAIGHT STICKS	1
			CIGAR SHAPED OBJECTS	1
TOTAL	TOTAL ALL CAVES	1	DRILLED WOOD	1
			TAPERED STICK	1
TOTAL	TOTAL ALL CAVES	1	SPLIT TAPERED BOARDS	1
			PAINTED CANE TUBES	1
TOTAL	TOTAL ALL CAVES	1	PAINTED GOURD FRAGMENT	1
			UNIDENTIFIED WORKED WOOD AND CANE	1
TOTAL	TOTAL ALL CAVES	1	TOTAL WOODEN ARTIFACTS	1

Fig. 91. Occurrence of wooden artifacts by phases.



## VI. Wooden Artifacts

By JAMES ALLISON BROWN

### ATLATLS AND ATLATL EQUIPMENT

#### Atlatl Fragment

(Figure 92, *a*)

*Description:* Distal end fragment, smoothed piece of wood, plano-convex cross section, with channel and spur on flat side (female type).

*Dimensions:* Length, 3.1 cm.; width, 2.4 cm.; thickness, 2.8 cm.; spur length, 0.4 cm.; spur width, 0.5 cm.; channel width, ca. 1.2 cm.; channel depth, 0.3 cm.; distance from spur to distal end, 3.9 cm.

#### Atlatl Dart Foreshafts

(Figure 92, *c*)

#### SLOTTED FORESHAFTS

*Description:* Short section of straight, peeled, and smoothed stick, with spiral striations on tapered proximal end. Distal end is slotted and there are traces of sinew binding. Round cross section, no decoration.

*Dimensions:* Length, 9.3 cm.; diameter, 0.9 cm.; slot depth, 0.7 cm.; slot width, 0.35 cm.

#### PROXIMAL END FRAGMENT?

*Description:* Broken, smooth, round stick, one end tapered, other end splintered.

*Dimensions:* Length, 13.1 cm.; diameter, 1.0 cm.

#### Discussion

The atlatl fragment from a Pine Lawn level in O Block Cave falls within the general type of Southwestern atlatls, with a shallow channel and a short spur which fits into a socket in the proximal end of the dart mainshaft. This specimen is too fragmentary to be placed in any of the subtypes defined by Grange for the area (Martin, Rinaldo, and others, 1952, p. 337), but possibly it represents type 4: "Rectangular distal end outline. Plano-convex distal end-spur cross section. Long channel." A similar speci-



FIG. 92. Atlatl fragment, *a*; wooden cylinder, *b*; atlatl dart foreshaft, slotted, *c*; charred, shouldered, pointed stick, *d*; notched stick, *e*; spatula, *f*; toggle, *g*; burred stick, *h*; cigar-shaped object, *i*. Length of *b*, 6.9 cm.

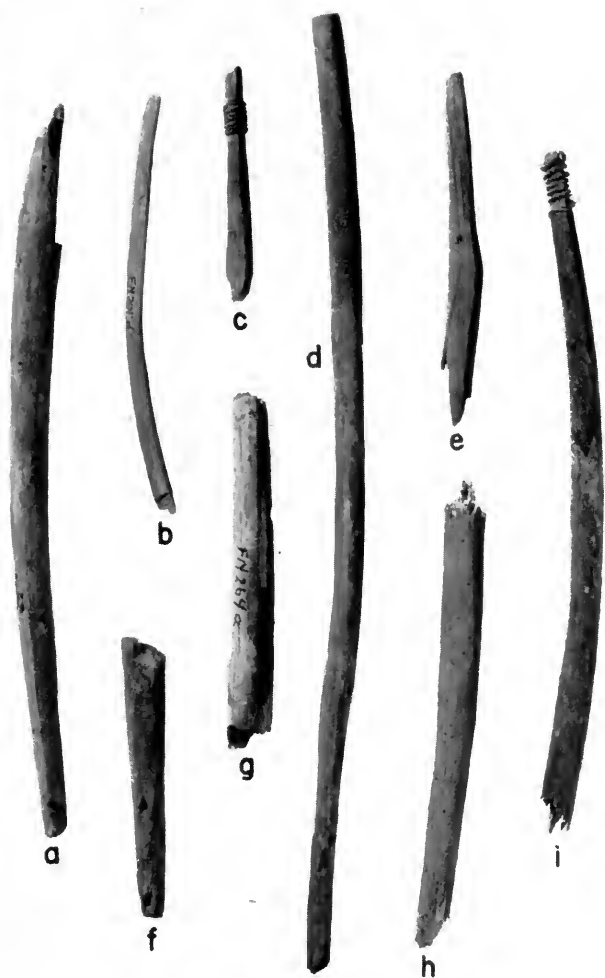


FIG. 93. Functional bows, *a*, *c*, *e-i*; ceremonial bow, flat cross section, *b*; ceremonial bow, round cross section, *d*; painted red, *c*, *d*, *h*; painted black, *i*. Length of *g*, 14.8 cm.

men was found in Tularosa Cave among other atlatl fragments with blunt-pointed distal end outline fragments (op. cit., pp. 336-339, 373-376).

Southwestern atlatl darts consist of mainshafts and foreshafts. The mainshafts, usually of cane, have concave sockets at the proximal end into which

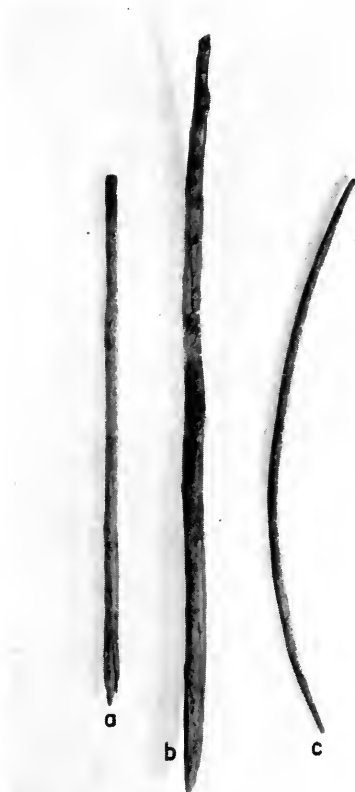


FIG. 94. Digging stick, pointed, *a*; digging stick, flat blade, *b*; ceremonial bow, *c*. Length of *b*, 107.0 cm.

the spurs fit; the tapered wooden foreshafts fit into the distal ends, which are hollow. Only foreshafts were identified in O Block Cave.

Atlatl equipment occurs in the Pine Lawn and Three Circle levels of O Block Cave, but mostly before the San Francisco Phase, A.D. 700.

In Tularosa and Cordova caves, the atlatl is the predominate weapon before A.D. 700—the end of the Georgetown Phase. In the Anasazi area, this weapon is found in Basketmaker II and III sites (Guernsey, 1931, pp.

71-72; Guernsey and Kidder, 1921, pp. 80-81; Kidder and Guernsey, 1919, p. 178; Mason, 1928, pp. 302-310; Pepper, 1902b, pp. 111, 113, 118).

## BOWS AND ARROWS

### Bow Fragments, Functional

(Figure 93, *a, c, e-i*)

*Description:* Smoothed, broken, stout sticks of hard wood, curved, tapered towards ends; plano-convex, rounded plano-convex, rounded triangular, or elliptical in cross section; flatter side is convex side of bow. End fragments usually notched; one also had cord wrapped around bow at notch.

Decoration present on many; solid red, solid black, solid white(?), black bands, black on one side, red with darker red on back, or red on one side.

*Dimensions:* Length, 5.1-31.5 cm.; width (at ends), 0.5-2.2 cm.; thickness (at ends), 0.6-1.9 cm. (all fragments).

### Ceremonial Bow

(Figure 94, *c*)

*Description:* Curved, smoothed stick, tapered toward ends, round in cross section.

No decoration.

*Dimensions:* Length, 82.0 cm.; diameter, 0.7-1.6 cm.

### Bow Fragments, Ceremonial

(Figure 93, *b, d*)

*Description:* Curved, smoothed, broken sticks, tapering toward ends, usually round in cross section although two are flat (see fig. 93, *b*). One flat specimen has notch at end.

Decoration present on many; solid red, solid black, or black bands.

*Dimensions:* Length, 4.3-40.0 cm.; diameter, 1.0-1.8 cm.

### Bow Fragments, Miniature

*Description:* Curved, smoothed, broken sticks, some with tapered ends. Fragments are smaller than those described above, and therefore are considered miniature.

Decoration solid red.

*Dimensions:* Length, 12.0-32.8 cm.; diameter, 0.3-0.8 cm.

### Arrow Mainshafts

(Figure 95, *a, d, g-l*)

*Description:* Straight, square cut, unsmoothed reeds, hollowed at distal end for foreshaft tang, and notched at the proximal end, where wooden



FIG. 95. Arrow mainshafts, *a, d, g-l*; arrow fragments, parts of mainshafts with foreshafts inserted, *b, c, e, f*. Painted with black, green, and red bands, *g*; painted with green and red bands, *j*; painted with black bands, *k*; decorated with black wavy lines parallel to mainshaft, *i*. Length of *d*, 12.7 cm.

plug of appropriate size is inserted to prevent splitting. Nocks are either V-shaped or U-shaped. Usually there is sinew binding back of nock and farther up shaft to attach feathers and at distal end where foreshaft is joined. Either three or four feathers attached back of notch at varying distances, sometimes incorporating binding just back of notch which served to keep wooden plug in place; plug seldom force-fitted (Cosgrove,

1947, pp. 21-22). Feathers trimmed in width and length, parallel to the shaft.

Decoration usually paint at proximal end: red bands, red and black bands, red, green, and black bands, or black wavy lines parallel to shaft. Paint sometimes under feathers or under sinew.

*Dimensions:* Diameter, 0.3-1.1 cm.; distance of feathers from proximal end of shaft, 0.3-2.6 cm.; distance between feather bindings, 0.6-7.7 cm.; over-all feather length, 8.5-11.9 cm.

### **Arrow Foreshafts**

(Figure 96)

*Description:* Straight, slender, peeled sticks with tapered or blunt (broken?) or in one case perhaps slotted distal end. Proximal tang tapered or shouldered, often with traces of pitch used to fasten tang in mainshaft and indications of sinew binding on shoulders.

Decoration usually paint: solid red most common, red with black end, only black end. One foreshaft is carved with square cross section and barbs along the four corners (fig. 96, *f*).

*Dimensions* (complete specimens): Length, 17.6, 16.6, 32.0, 34.5, 23.2, 24.2, 22.4 cm.; diameter, 0.7, 0.8, 0.7, 0.7, 0.6, 0.6, 0.8 cm.

### **Arrow Fragments**

(Figure 95, *b, c, e, f*)

*Description:* Broken fragments of cane mainshafts with broken fragments of wooden foreshafts inserted in them.

### **Discussion**

Bows dating from Pine Lawn through Reserve-Tularosa were found in O Block Cave and Hinkle Park Cliff-Dwelling. In Grange's analysis of bows (Martin, Rinaldo, and others, pp. 339-340, 347-350) the differentiation between functional, ceremonial, and miniature bows was based on length: functional bows were more than 87 cm. long, ceremonial bows 35 to 87 cm. long, miniature bows less than 35 cm. long. For his purposes such definitions proved workable; however, in the present caves, with only one exception, only fragments were available. From these fragments it seems that bows not round in cross section, made of hard wood, stout, and sometimes notched for bowstrings, may be termed functional bows. This class is differentiated from another group which is round in cross section (with the possible exception of the flat fragments noted above), of soft

wood, and rather delicate. In this latter group, ceremonial and miniature bows are divided on the basis of size of diameter. In all classes painted decoration is found. Employing the criteria used here, Grange's specimens would still fit into the same categories.

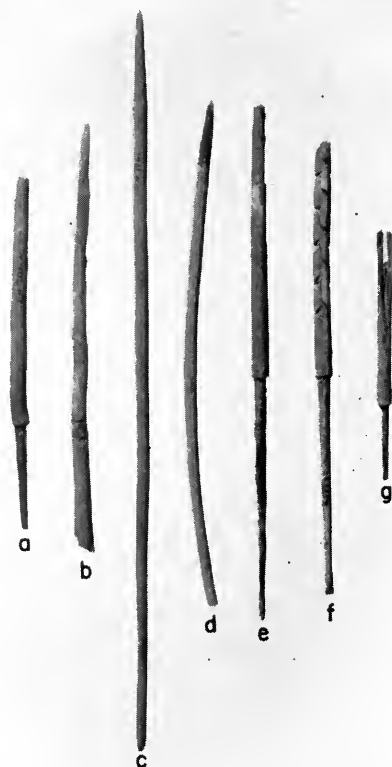


FIG. 96. Shouldered arrow foreshafts, *a*, *b*, *e*-*g*; tapered arrow foreshafts, *c*, *d*; painted red, *e*, *c*; painted red and black, *d*; carved, *f*. Length of *g*, 11.7 cm.

A few bows have been reported from other sites. From the Upper Gila area Cosgrove (1947, pp. 61, 130-131) describes functional bows that are round, plano-convex, or plano-convex with round grip, all ranging from 36 to 56 inches in length. Other Mogollon specimens were found by Fulton (1941, pp. 19-20) and Hough (1907, p. 24, and 1914, pp. 99-100). Miniature bows were found in bundles with ceremonial arrows, which indicates their ceremonial nature, by Grange (Martin, Rinaldo, and others, 1952, p. 414, fig. 152) and Cosgrove (1947, pp. 130-131).



In the Anasazi area, functional, ceremonial, and miniature bows have been found in Pueblo I, III, and IV sites (Guernsey, 1931, pp. 99, 107; Haury, 1934, pp. 106, 108; Kidder, 1932, p. 294). Haury (1934, p. 106) suggests that miniature bows may have been used for fire-making or drilling.

Compound arrows are found in Pine Lawn through Transitional Reserve-Tularosa levels of O Block Cave and Hinkle Park Cliff-Dwelling. Similar arrows from the Mogollon area were reported by Grange (Martin, Rinaldo, and others, 1952, pp. 340-343, 384-389) and Cosgrove (1947, pp. 62-65) although more complicated variations in painted decoration were found in the Upper Gila area than in the Reserve area. In O Block Cave and Hinkle Park Cliff-Dwelling, U-shaped nocks predominate over V-shaped nocks from Pine Lawn to Transitional Reserve-Tularosa.

In the Anasazi area, a few arrows have been found in a Basketmaker II site in Canyon del Muerto (Morris, 1939, p. 19) and Obelisk Cave, a Modified Basketmaker site (Morris, 1936, p. 36). More, however, occur in Pueblo II, III, and IV sites (Bartlett, 1934, pp. 37-38; Haury, 1934, pp. 106-107; Morris, 1919, pp. 59-60; Judd, 1931, p. 58; Kidder and Guernsey, 1919, pp. 122-123; Guernsey, 1931, p. 107; Kidder, 1932, pp. 290-291; Morris, 1911, p. 178). Simple band decoration was found in that area.

In Ventana Cave, arrow fragments may be as early as the San Pedro Phase (Haury, 1950, pp. 418-420), and others may be assigned to Desert Hohokam. Classic Phase arrows have also been recovered (Haury, 1945a, pp. 200-201).

On the basis of the evidence of the suggested introduction of the bow and arrow in the Hohokam area about the time of the shift from San Pedro to Hohokam (A.D. 1) (Haury, 1950, p. 420) and the early Pine Lawn and Pre-Pottery fragments from Tularosa Cave, Grange (Martin, Rinaldo, and others, 1952, p. 341) suggested that the bow and arrow might have had a southern origin. The Pine Lawn Phase bow and arrow fragments reported here from O Block Cave support that hypothesis.

## DIGGING STICKS

(Figure 94, *a*, *b*)

### Digging Sticks, Flat Blade

*Description:* Long, stout stick, peeled, polished, and fire-hardened. Proximal end smooth and rounded. Distal end (blade) flattened and pointed by carving. Blade worn from use.

*Dimensions:* Length, 107.0 cm.; diameter, 3.0 cm.

### **Digging Sticks, Pointed**

*Description:* Long, stout stick, peeled, polished, and fire-hardened. Proximal end rounded and charred. Distal end shaped toward point but broken.

*Dimensions:* Length, 75.8 cm.; diameter, 2.2 cm.

### **Digging Stick(?), Fragment**

*Description:* Fragment of stout stick, peeled, polished, and fire-hardened(?). Rounded plano-convex in cross section. One end worked to partial point, other end broken.

*Dimensions:* Length, 4.1 cm.; width, 2.0 cm.; thickness, 1.3 cm.

### **Discussion**

Both flat blade and pointed digging sticks were found in Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 389-392), where they occur from Pre-Pottery through the San Francisco-through-Tularosa levels. Cosgrove also found both types in the Upper Gila area (Cosgrove, 1947, pp. 148-149).

In the Anasazi area, both types of digging sticks are known. In Basket-maker II sites (Guernsey and Kidder, 1921, pp. 89-90; Nusbaum, Kidder, and Guernsey, 1922, pp. 113-115), both types are found, but the flat blades are more common in Pueblo II (Bartlett, 1934, pp. 36-37), Pueblo III (Fewkes, 1909, p. 44, and 1911, p. 73; Haury, 1945b, p. 50; Judd, 1926, pl. 82, and 1931, p. 56, pl. 34; Kidder and Guernsey, 1919, pp. 119-120; Morris, 1911, pp. 177-178), and Pueblo IV (Haury, 1934, p. 104). One sword-shaped blade was found at Pecos (Kidder, 1932, p. 290).

It seems that in the Hohokam the sword-shaped blade type is found in the Classic Period (Fewkes, 1912, p. 146), and the pointed type occurs in the Papago Period of Ventana Cave (Haury, 1950, p. 415).

Mogollon digging sticks usually have plain handles, although Cosgrove reports one with a crook handle (Cosgrove, 1947, pp. 148-149). Knob and crook handles apparently are more common among Anasazi specimens (Bartlett, 1934, pp. 36-37; Fewkes, 1909, p. 44; Haury, 1945b, p. 50; Kidder and Guernsey, 1919, pp. 119-120; Nusbaum, Kidder and Guernsey, 1922, pp. 113-115).

### **BARK AND WOOD TROWELS**

(Figure 97, *b*)

*Description:* Roughly rectangular sections of wood and bark, concavo-convex in cross section, with one worn, slanting end.

*Material:* Pine bark (*Pinus ponderosa*).

*Dimensions:* Length, 13.6, 21.3, 17.8, 15.3, 5.6 cm.; width, 7.3, 13.1, 7.9, 5.0, 4.2 cm.; thickness, 1.8, 1.3, 1.1, 1.0, 1.3 cm.

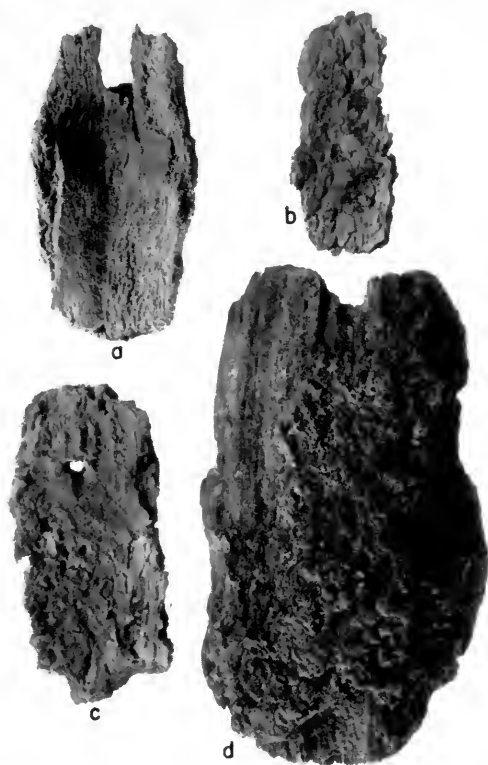


FIG. 97. Notched bark hoe, *a*; bark trowel, *b*; bark hoe with hole for hafting, *c*; notched wooden hoe with bark attached, *d*. Length of *b*, 17.8 cm.

## BARK AND WOOD HOES

(Figure 97, *a*, *c*, *d*)

*Description:* Roughly rectangular sections of wood, pine bark, or wood with bark attached, concavo-convex in cross section. One end notched or with hole near end, opposite end worn. The largest specimen, of wood with outer bark attached, has yellow ochre on the reverse side.

*Materials:* Pine bark (*Pinus ponderosa*?).

*Dimensions:* Length, 11.6, 36.8, 22.7, 23.0 cm.; width, 8.5, 20.0, 11.9, 10.8 cm.; thickness, 2.2, 4.4, 2.6, 2.1 cm.; diameter of hole (of fourth specimen), 0.9 cm.

## DISCUSSION

The occurrence of bark and wood trowels in a Three Circle level of O Block Cave and in the Hinkle Park Cliff-Dwelling extends the known temporal distribution of this tool in the Mogollon area. In Tularosa Cave, they were reported from the Pre-Pottery through the San Francisco levels (Martin, Rinaldo, and others, 1952, pp. 344, 392-394).

In the Anasazi area bark trowels are considered a typical Basketmaker trait (Guernsey, 1931, pp. 108, 183-184; Guernsey and Kidder, 1921, pp. 90-91; Haury, 1945b, p. 51; Kidder and Guernsey, 1919, p. 187; Nusbaum, Kidder, and Guernsey, 1922, pp. 115-117).

Hoes or trowels with notches or holes, presumably for hafting, are not reported from other sites.

## FIRE DRILL HEARTHES

### Cylindrical Fire Drill Hearths

(Figure 98, *b*, *e*)

*Description:* Cut, peeled sticks, round in cross section. Two have rectangular notches cut half way through stick; bottoms of notches are charred. Charred hemispherical socket has been worn in stick off-center, so there is a slot in the side of the socket.

*Dimensions:* Length, 2.9, 19.8, 5.0 cm.; diameter, 1.0, 1.5, 1.3 cm.; depth of depressions, 0.4, 0.8, 0.7 cm.

### Plano-Convex Fire Drill Hearths

(Figure 98, *c*)

*Description:* Cut, peeled stick, one face smoothed to produce plano-convex cross section. On plane face, one charred hemispherical socket has been worn off-center, so there is a slot in the side of the socket.

*Dimensions:* Length, 13.6 cm.; width, 1.9 cm.; thickness, 1.6 cm.

### Triangular Fire Drill Hearth(?)

*Description:* Split board, wedge-shaped in cross section, with charred socket worn on side of plane face. Board broken across sockets at ends.

*Dimensions:* Length, 7.4 cm.; width, 1.6 cm.; thickness, 0.6 cm.

**FIRE DRILLS**(Figure 98, *d, e*)

*Description:* Smoothed, peeled cylindrical sticks, with one end rounded and charred. One drill was also used as hearth (see above).

*Dimensions:* Length, 30.1, 19.8 cm.; diameter, 1.4, 1.5 cm.

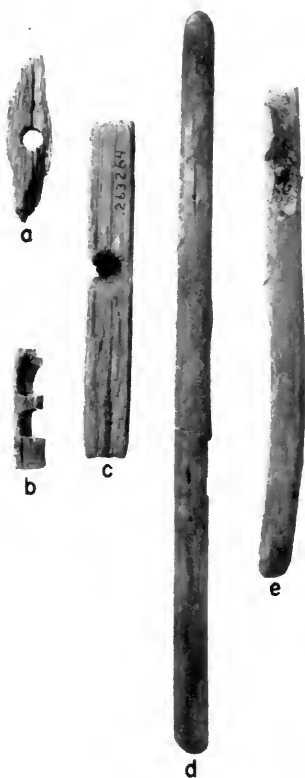


FIG. 98. Drilled piece of wood, *a*; cylindrical fire drill hearth, *b*; plano-convex fire drill hearth, *c*; fire drill, *d*; fire drill also used as hearth, *e*. Length of *c*, 13.6 cm.

**DISCUSSION**

In Tularosa Cave there is a shift from plano-convex to cylindrical fire drill hearths in the San Francisco Phase, but this is not borne out by Cordova or O Block caves (Martin, Rinaldo, and others, 1952, pp. 345–346, 394–397). Both types are also found in the Upper Gila caves (Cosgrove, 1947, pp. 146–148) and in Winchester Cave (Fulton, 1941, p. 33).

Both plano-convex and cylindrical hearths have been reported from Anasazi sites (Haury, 1934, p. 104; Kidder and Guernsey, 1919, pp. 120-121), but Haury says that "Anasazi hearths appear to have been in round sticks as a rule" (Haury, 1950, p. 420). Hohokam hearths appear to be plano-convex in cross section (op. cit., pp. 414-415).

Simple fire drills also came from the same sites.

### **SPATULAS**

(Figure 92, *f*)

*Description:* Smoothed split sticks bi-convex in cross section, with smoothed edges and rounded ends. One had tapering end which may be a handle.

*Dimensions:* Length, 15.4, 17.2, 17.1, 22.3 cm.; width, 2.2, 2.2, 1.5, 3.8 cm.; thickness, 0.9, 0.8, 0.6, 1.1 cm.

### **Discussion**

The spatulas from the Pine Lawn and Reserve levels of O Block Cave and Hinkle Park Cliff-Dwelling resemble those reported from the Georgetown level of Tularosa Cave and the Late levels of Cordova Cave (Martin, Rinaldo, and others, 1952, pp. 408, 410). Cosgrove (1947, p. 146) suggested that those found in the Hueco area might have been used in weaving.

One similar specimen came from Ventana Cave (Haury, 1950, p. 416).

### **SPLIT-STICK TONGS**

(Figure 99, *i*)

*Description:* Split, peeled stick bent into U-shape with ends parallel; painted with black bands.

*Dimensions:* Length, 21.6 cm.; width, 3.0 cm.; thickness, 1.4 cm.

### **Discussion**

These tongs are so named because of their resemblance to modern sugar tongs; their function is not known. They appear to be a late trait in the Reserve area, as they occur in the Reserve Phase of O Block Cave, the San Francisco Phase in Tularosa Cave, and the Late level of Cordova Cave (Martin, Rinaldo, and others, 1952, p. 411). Fire tongs made of two sticks bound together at one end with charred tips on the open ends have been reported from Ventana Cave (Haury, 1950, p. 415, pl. 34, *c*).

**TOGGLES(?)**(Figure 92, *g*)

*Description:* Sticks with cut or broken ends, usually unpeeled, with cord twisted around once and tied to center.

*Dimensions:* Length, 20.8, 9.2 cm.; diameter, 0.6, 1.4 cm.

**Discussion**

The two toggles from the Reserve Phase in O Block Cave are similar to those found in Pine Lawn, Georgetown, and San Francisco levels of Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 406-408), and suggest their presence throughout the Mogollon sequence.

**BURRED STICKS (FEATHER CARDERS?)**(Figure 92, *h*)

*Description:* Short sections of sticks, bark removed in one specimen, frayed at one end, cut fairly square at the other end.

*Dimensions:* Length, 6.5, 10.2, 7.3, 13.8 cm.; diameter, 2.0, 1.5, 2.6, 1.6 cm.

**Discussion**

Similar specimens have been found in Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 346-347, 406, fig. 149), in the Upper Gila area (Cosgrove, 1947, fig. 137, *j*), and in Winchester Cave (Fulton, 1941, p. 34) in the Mogollon area. The use of these specimens as feather carders is suggested by the fact that some from Tularosa Cave and one from Hinkle Park Cliff-Dwelling have bits of down caught in the burr.

Similar specimens have been reported from Ventana Cave in the Hohokam area (Haury, 1950, pp. 417-418, pl. 35).

**CHARRED, SHOULDERED, POINTED STICKS**(Figure 92, *d*)

*Description:* Short, pithy stick whose surfaces are carved and smoothed; point tapers from shoulder to rounded, charred end.

*Dimensions:* Length, 12.4, 11.9 cm.; width, 2.3, 1.6 cm.; thickness, 1.1, 1.3 cm.

**Discussion**

The purpose of these charred, shouldered, pointed sticks which have been found in Hinkle Park Cliff-Dwelling and also in Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 445-446) is not known. However, on

the basis of present knowledge they occur from Georgetown through Transitional Reserve-Tularosa phases.

### WOODEN AWL

(Figure 99, *g*)

*Description:* Peeled, split, smoothed stick, worked to slender point at one end, other end rounded.

*Dimensions:* Length, 10.1 cm.; width, 0.7 cm.; thickness, 0.4 cm.

### Discussion

Wooden awls occur sporadically in the Mogollon area. One is reported here from Cosper Cliff-Dwelling and another was found in a Pine Lawn level of Tularosa Cave (Martin, Rinaldo, and others, 1952, p. 401). A few were located in the Hueco and Upper Gila areas (Cosgrove, 1947, p. 146).

In the other areas of the Southwest, the occurrence of wooden awls also has been noted. They were found in Basketmaker (Guernsey and Kidder, 1921, p. 92) and Pueblo III (Kidder and Guernsey, 1919, p. 120) sites in the Anasazi area. One is noted from a Papago level of Ventana Cave (Haury, 1950, p. 416).

### YUCCA LEAF SPINE NEEDLE

(Figure 99, *f*)

*Description:* Sharp, tapering spine of yucca leaf with fibers twisted to form cord protruding from larger end.

*Dimensions:* Length, 7.5 cm.; width, 0.7 cm.; thickness, 0.4 cm.

### Discussion

The one needle from the Reserve Phase in O Block Cave is like those from the Plain Ware and Late levels of Cordova Cave (Martin, Rinaldo, and others, 1952, p. 408).

Similar specimens came from a Pueblo IV site (Haury, 1934, pl. LV, *b*) and Ventana Cave (Haury, 1950, p. 426).

### WOODEN CYLINDERS

(Figure 92, *b*)

*Description:* Short lengths of straight sticks, peeled and smoothed, with ends cut square and then slightly rounded.

*Dimensions:* Length, 6.9, 12.6 cm.; diameter, 0.9, 2.0 cm.



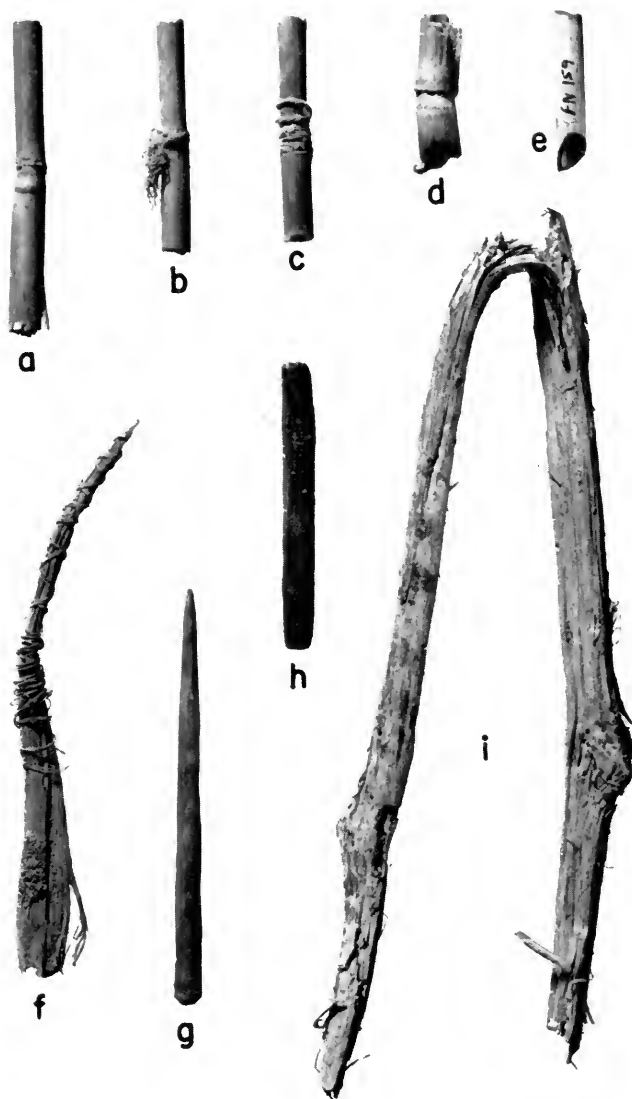


FIG. 99. Reed cigarettes, septum not pierced, *a, b*; reed cigarettes, septum pierced, *c, d*; cane tube painted red, *e*; yucca leaf spine needle, *f*; wooden awl, *g*; wooden die, *h*; split-stick tongs, *i*. Length of *h*, 7.0 cm.

### Discussion

Wooden cylinders from O Block Cave and Hinkle Park Cliff-Dwelling are a simple variant of the many styles of wooden cylinders found by others throughout the Southwest. In the Mogollon area they occurred from Pre-Pottery through San Francisco-through-Tularosa levels in Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 357, 434, fig. 131). Cosgrove also found them in the Upper Gila and Hueco areas (Cosgrove, 1947, p. 152).

They have also been described by various other authors. They occur in the Anasazi area in both Basketmaker (Kidder and Guernsey, 1919, p. 186) and Pueblo III sites (op. cit., p. 123; Fewkes, 1909, p. 44; Morris, 1919, p. 45; Nordenskiöld, 1893, pl. 49; Pepper, 1920, p. 108). Three were found in Ventana Cave, one used as a nose plug in a burial (Haury, 1950, p. 421).

The use of these specimens is unknown. They have been described as ends of carrying straps and as gaming pieces. The one from Ventana Cave has been used as a nose plug, but many are too large for that purpose.

### PAINTED STICKS

#### Painted Sticks, Peeled

(Figure 100, *a-o*)

*Description:* Straight, slender, peeled sticks, broken or cut, decorated with paint in the following ways:

Single color: Red, green, blue, or black over entire length of stick.

Banded: Sticks painted with alternating bands (0.3 to 7.0 cm. in width) in the following color combinations: red and green; red and black; red, unpainted, and green, with black rings separating colors; green, unpainted, and black; red, unpainted, and black; blue, unpainted, and green; blue and unpainted; red, black, and green; red and unpainted; green and black; black and unpainted.

Half and half: Stick divided in two parts: (1) one half banded, and one half solid color: red with black and unpainted bands, red with black and green bands, green with black and red bands, red with black and red bands, red with red and unpainted bands; (2) two halves painted different solid colors: red and green, red and black, red and unpainted with black ring separating colors, green and black, blue and white, green and unpainted with black ring dividing colors, green and blue with black ring dividing colors, black and unpainted.

*Dimensions:* Length, 2.5–43.8 cm., average 10.0 cm.; diameter, 0.3–1.3 cm., average 0.6 cm.

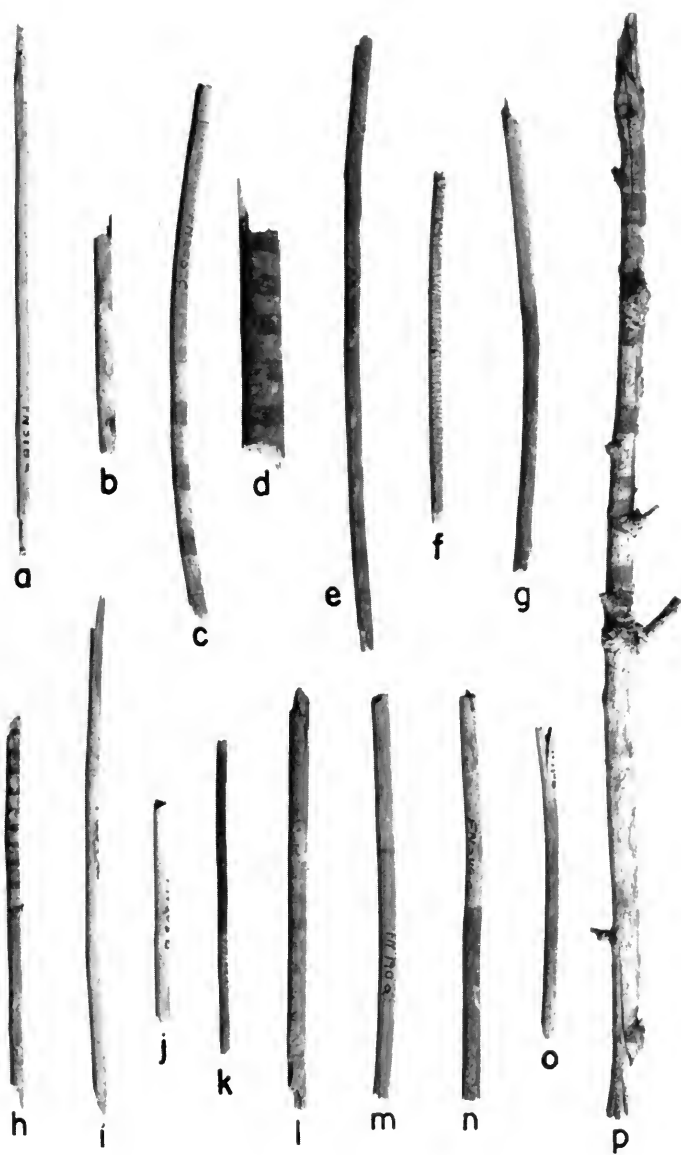


FIG. 100. Peeled painted sticks, *a-o*: solid red, *a, f*; half unpainted, half blue, *b*; half red, half black and unpainted bands, *c, h*; black and unpainted bands, *d*; half black, half black and unpainted bands, *e*; half black, half green, *g*; solid green, *i*; solid red, *j*; half black, half red, *k*; half black, half red and unpainted bands, *l*; half red, half green, black ring separating halves, *m*; half black, half unpainted, *n*; black and red bands, *o*. Unpeeled painted stick, red and white bands, *p*. Length of *f*, 11.4 cm.

### Painted Sticks, Unpeeled

(Figure 100, *p*)

*Description:* Straight, slender, unpeeled sticks, broken at both ends, decorated with paint in the following ways:

Solid color: Red.

Banded: Alternating bands of red(?) and white. The banded specimen is not smoothed; stubs of branches remain.

*Dimensions:* Length, 9.5–35.8 cm.; diameter, 0.4–0.8 cm.

### Discussion

None of the painted sticks are smoothed or cut at both ends, so it may be assumed that they are all fragments. There are a few specimens that probably had large diameters (see fig. 100, *d*); these may be bow fragments. All types of peeled sticks are found from the Pine Lawn through the Reserve Phase of O Block Cave. Unpeeled sticks are found in the Reserve Phase of O Block Cave and Hinkle Park Cliff-Dwelling. More single color sticks than any other type are found in any given Phase of O Block; all types are present in the same proportions in all phases. The same colors were employed throughout the occupation of the cave.

The color blue is not present in the meager collection of similar painted sticks from Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, pp. 354, 422–423). Grange's conclusion (op. cit., p. 354) that painted sticks were introduced into the Mogollon area during or after the San Francisco Phase must be modified in view of the sample from the Pine Lawn Phase of O Block Cave. However, the evidence from all of the three Mogollon caves indicates that painted sticks increased in importance in Reserve times.

Similar sticks have been reported in the Anasazi area from Betatakin (Judd, 1931, p. 61) and Shumapovi (Fewkes, 1904, p. 99).

### TABLITAS

(Figure 101)

*Description:* Broken, thin, flat pieces of wood, produced by splitting larger sticks or boards. Surfaces not smoothed after splitting; some edges cut and smoothed. Fragments usually roughly rectangular, but one specimen is worked to a rounded point (fig. 101, *e*). Another specimen, painted green, is plano-convex in outline with notches near the points, and has a hole near the center for a cord (fig. 101, *h*); this shape is similar to that of a worked sherd (fig. 76). Some fragments have paired small holes 5–24 mm.

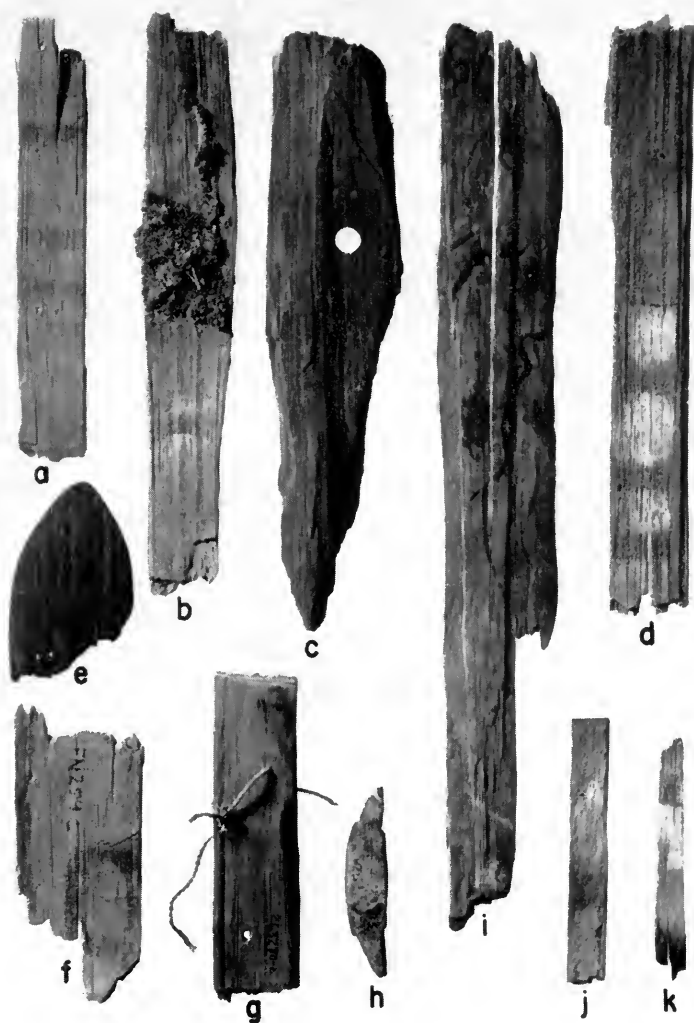


FIG. 101. Tablitas: striped black, *a*; bull's eye, red, white, and black, *b*; unpainted, large drilled hole, *c*; spotted black and white, *d*; rounded point, charred, *e*; unpainted with black markings, *f*; black design, *g*; green, shaped like worked sherd, *h*; marked with gum, *i*; black circle with green center, *j*; stepped design, red and white, black border, *k*. Length of *j*, 8.9 cm.

apart for cords (fig. 101, *g*), others have single large drilled holes 8 mm. in diameter (fig. 101, *c*).

A few are undecorated, but many have painted geometric(?) designs:  
Solid color: Black, red, or green.

Striped: Black (fig. 101, *a*).

Circular motif (bull's eye pattern): Black, red, and white; black and green; black and white (fig. 101, *b, j*).

Stepped design: Red and white with black border (fig. 101, *k*).

Spotted: Black with rounded rectangular white spots (fig. 101, *d*).

Diamond pattern(?): Green diamond, black background.

Some thin boards from Hinkle Park Cliff-Dwelling, without decoration, are marked with gum (fig. 101, *i*).

*Dimensions:* Length, 3.8–29.7 cm.; width, 1.0–7.8 cm.; thickness, 0.1–0.8 cm.

### Discussion

Tablita fragments probably represent items of ceremonial equipment. The solid red, striped, circular motifs and green diamond designs resemble some found by Cosgrove (1947, fig. 125, *e, f, i*) and Grange (Martin, Rinaldo, and others, 1952, fig. 155, *e*). Those with stepped design are not reported elsewhere.

Tablitas have been reported only in the Mogollon and Hueco areas (Cosgrove, 1947, p. 134; Martin, Rinaldo, and others, 1952, pp. 354, 421–422, and figs. 155, 156). Their occurrence in the O Block Cave, Hinkle Park Cliff-Dwelling, and Cospes Cliff-Dwelling indicates that they were known from Pine Lawn through Tularosa times; in Cordova Cave they occurred in both Plain Ware and Late levels (op. cit., fig. 132). Tablitas seem to increase in popularity around San Francisco or Three Circle times. In the Pine Lawn Phase of the O Block Cave and the Plain Ware Phase of Cordova Cave, black is the only color used for decoration; the other colors occur later.

### REED CIGARETTES

(Figure 99, *a-d*)

#### Reed Cigarettes, Septum Pierced

*Description:* Short lengths of square-cut cane, with a single node, usually near one end; if cotton-wrapped, node is in center. Septum is pierced and one end is filled with short sections of broken cane and slender stems of tobacco (*Nicotiana attenuata*?) in the long end. Some specimens charred at long end or burnt to stubs.

Decorated specimens have plain cotton yarn wound around the middle ten to twelve times, with the ends tucked under the band in place of a knot.

*Dimensions:* Length, 3.8, 4.2, 3.4, 5.3, 5.6 cm.; diameter, 0.6, 0.7, 0.7, 0.7, 0.8 cm. Burnt specimens shorter.

### Reed Cigarettes, Septum Unpierced

*Description:* Short lengths of square-cut cane, with single node, usually in the center. Septum is unpierced, and one or both ends are filled with split pieces of cane and tobacco (*Nicotiana attenuata?*). Ends of some slightly charred.

Decorated specimens have red cord of hard fiber wrapped once or twice around the middle, with ends loose.

*Dimensions:* Length, 4.0–7.6 cm., average 6.0 cm.; diameter, 0.6–0.9 cm., average 0.7 cm.

*Material:* Cane (*Phragmites communis*).

### Discussion

The distribution of reed cigarettes in Pine Lawn-through-Tularosa Phase levels in O Block Cave, Hinkle Park Cliff-Dwelling, and Cosper Cliff-Dwelling confirms the temporal range of this trait found in Tularosa and Cordova caves (Martin, Rinaldo, and others, 1952, pp. 351–354, 418–421, figs. 131–132). Cigarettes from Tularosa Cave, like those from the sites reported above, had both pierced and unpierced septa. While those with unpierced septa could not be smoked, both specimens of both types were plain and decorated, indicating that probably both were used for ceremonial purposes. More elaborate bundle decoration was found on specimens from Tularosa Cave than on specimens from the sites excavated in 1952.

Reed cigarettes occur in the Anasazi area in Pueblo II (Bartlett, 1934, pp. 38–39), Pueblo III (Haury, 1945b, p. 53; Morris, 1919, pp. 57–58), and Pueblo IV (Haury, 1934, p. 114). They also occur late in the Hohokam area (Fewkes, 1912, p. 135; Haury, 1945a, pp. 194–196, and 1950, p. 426; Hough, 1914, p. 107). Their occurrence in the Pine Lawn Phase in the Mogollon area is the earliest in the Southwest.

### REED FLUTE

(Figure 102, a)

*Description:* Section of hollow cane with round hole on side and no blocking nodes.

*Dimensions:* Length, 11.4 cm.; diameter, 0.8 cm.; distance from hole to end, 2.0 cm.

### Discussion

The one reed flute taken from O Block Cave was found in a Three Circle level. Similar flutes were reported from Pre-Pottery, Pine Lawn, and Georgetown levels of Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 357, 429-430, fig. 131). Cosgrove (1947, p. 120) also reported them from "Pueblo" period sites in the Upper Gila area. On this evidence it would seem that the trait was known throughout the Mogollon sequence.

In the Anasazi area, also, flutes have been reported from Basketmaker II (Kidder and Guernsey, 1919, p. 186), Pueblo III (Pepper, 1920, pp. 108-109), and Pueblo IV (Haury, 1934, p. 114) sites. The only specimen from Ventana Cave was found in the Papago level (Haury, 1950, p. 425).

### WOODEN DIE

(Figure 99, *h*)

*Description:* Split, unpeeled stick, concavo-convex cross section, ends square cut, slightly charred.

*Dimensions:* Length, 7.0 cm.; width, 0.8 cm.; thickness, 0.4 cm.

### Discussion

Wooden dice are usually peeled, but the one from Hinkle Park Cliff-Dwelling and some of the collection from Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 355-356, 423-428) had bark left on one side. In Tularosa Cave the specimens are found from Pre-Pottery through San Francisco; the Hinkle Park specimen adds the Transitional Reserve-Tularosa Phase to the time span.

Specimens in the Anasazi area occur as early as Basketmaker II (Kidder and Guernsey, 1919, p. 186). They are also reported from Pueblo III sites (Morris, 1919, p. 45; Pepper, 1920, pp. 36, 108).

### PAHOS

#### Knob-Ended Pahos?

(Figure 102, *c, e*)

*Description:* Shaped stick, peeled or unpeeled, with knob at one end, two painted with purple or red stain. On one specimen there is a small charred area.

*Dimensions:* Length, 5.8, 10.5, 21.5 cm.; diameter, 2.3-3.0, 1.8-1.9, 0.3-1.3 cm.



**Stained Crooked Sticks (Pahos?)**

*Description:* Pithy crooked sticks; part of bark remains, stained red-purple.

*Dimensions:* Length, 21.0, 7.0 cm.; diameter, 0.8, 0.9 cm.

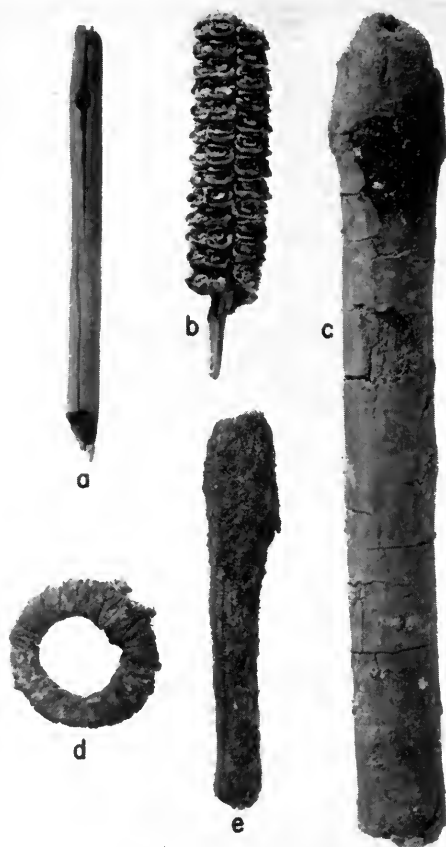


FIG. 102. Reed flute, *a*; corn cob mounted on stick, *b*; knob-ended pahos(?), *c*, *e*; ring paho, *d*. Diameter of *d*, 4.2 cm.

**Ring Paho**

(Figure 102, *d*)

*Description:* Fiber ring wrapped with additional strips of fiber. Piece of string tied around ring at one point, as if it might have been for suspension.

*Dimensions:* Diameter, 4.2 cm.; thickness, 0.7–1.2 cm.

**Corn Cob Mounted on Stick**(Figure 102, *b*)

*Description:* Corn cob impaled on slender, peeled stick.

*Dimensions:* Length, 11.1 cm.; diameter of corn cob, 2.0 cm.; diameter of stick, 0.4 cm.

**Discussion**

The knob-ended, crooked sticks (pahos?), ring pahos, and corn cobs mounted on sticks all occur in Reserve or Transitional Reserve-Tularosa Phases of the O Block Cave and Hinkle Park Cliff-Dwelling. Identification of pahos as such is tentative. Only the corn cobs mounted on sticks have been previously reported from Tularosa Cave (Martin, Rinaldo, and others, 1952, pp. 356, 428). Cosgrove also found them and in addition found a ring paho similar to the one reported above (Cosgrove, 1947, pp. 12, 36, 38, 65, 119).

Corn cobs mounted on sticks occur in the Anasazi area in Pueblo III (Fewkes, 1911, pl. 33; Haury, 1945b, p. 54; Kidder and Guernsey, 1919, p. 98; Morris, 1919, p. 60) and Pueblo IV (Haury, 1934, p. 114) sites.

The classification of the knob-ended sticks and crooked sticks as possible pahos is based on the fact that they are painted and do not resemble other painted sticks.

**MISCELLANEOUS OBJECTS****Notched Stick**(Figure 92, *e*)

*Description:* Peeled, smooth stick that has a notch opposite a bump in the wood; oval in cross section.

*Dimensions:* Length, 6.9 cm.; width, 0.9 cm.; thickness, 0.7 cm.; depth of notch, 0.6 cm.

**Burned Straight Sticks**

*Description:* Straight, peeled sticks, partially burned; ends broken and cut.

*Dimensions:* Length, 23.0, 25.0 cm.; diameter, 0.9, 0.9 cm.

**Cigar-Shaped Object**(Figure 92, *i*)

*Description:* Round, charred stick, abraded at both ends to form cigar-shaped object; elliptical longitudinal in cross section.

*Dimensions:* Length, 10.1 cm.; width, 1.8 cm. at center.

### **Drilled Wood**

(Figure 98, *a*)

*Description:* Piece of wood, smoothed on one side; hole drilled through it.

*Dimensions:* Length, 6.8 cm.; width, 1.9 cm.; thickness, 1.1 cm.; diameter of hole, 0.9 cm.

### **Tapered Stick**

*Description:* Round stick smoothly tapered to blunt point at one end.

*Dimensions:* Length, 22.2 cm.; diameter, 1.1 cm.

### **Split, Tapered Boards**

*Description:* Smoothed, split wood, wedge-shaped in cross section, tapered to slightly curved edge. End of one specimen tapered to blunt point, the other end rounded from use.

*Dimensions:* Length, 8.6, 36.8 cm.; width, 1.2, 1.7 cm.; thickness, 0.9, 0.9 cm.

### **Painted Cane Tube**

(Figure 99, *e*)

*Description:* Short length of hollow cane tube; ends cut square or diagonal, and charred. Painted red.

*Dimensions:* Length, 2.5, 4.0, 5.6 cm.; diameter, 1.0, 0.7, 0.7 cm.

### **Painted Gourd Fragment**

*Description:* Piece of gourd shell painted green on both sides.

*Dimensions:* Length, 2.5 cm.; width, 1.8 cm.; thickness, 0.1 cm.

### **Unidentified Worked Wood and Cane Fragments**

*Description:* Cane fragments, sticks, or pieces of wood, peeled or unpeeled, cut, broken, split, or smoothed, obviously worked. All too fragmentary to be included in any of the above categories.

### **Discussion**

The pieces of wood, gourd, and cane described above may represent parts of artifacts or merely discarded pieces experimentally worked. Those described individually come from the late levels and may be found in other sites. They are therefore separated for possible future comparative purposes. The unidentified wood and cane fragments come from all levels and are various shapes and sizes. They may be scraps left over from the manu-

facture of something else or fragments of other artifacts too small to identify.

### SUMMARY AND CONCLUSIONS

A total of 549 wooden artifacts and 213 pieces of worked wood was recovered from Hinkle Park Cliff-Dwelling, Cosper Cliff-Dwelling, and O Block Cave. No wooden artifacts were found in Y Canyon Cave. The majority of these specimens came from levels assigned to the Reserve, Transitional Reserve-Tularosa, and Tularosa phases and increase our knowledge of the wooden artifacts associated with the later part of the Mogollon sequence in the Reserve area. The Reserve and Tularosa levels of Tularosa Cave were often mixed with San Francisco Phase material and therefore precise temporal assignment of some artifacts could not be made.

Analysis of the wooden artifacts taken from O Block Cave shows that there is a continual increase in quantity and diversity of material from the Pre-Pottery to the Reserve Phase. In the Pre-Pottery Phase there is only one wooden artifact; in Pine Lawn there are many artifacts but few distinct types; in the Three Circle and Reserve Phases there is much diversity; only then do many of the wooden artifacts common in other sites appear. A few types occur persistently from Pine Lawn to Reserve: bows, arrows, painted sticks, tablitas, and reed cigarettes.

In general, Hinkle Park Cliff-Dwelling, which is Transitional Reserve-Tularosa, has the same wooden assemblage as the Reserve Phase in the O Block Cave. The few artifacts found in the Cosper Cliff-Dwelling fit in with the O Block Cave and Hinkle Park Cliff-Dwelling assemblages. Of those artifacts which persist throughout the O Block Cave, only one group—reed cigarettes—also appear in both Hinkle Park and Cosper Cliff-Dwellings. The larger Hinkle Park Cliff-Dwelling collection has more traits in common with the O Block Cave assemblage than with the assemblages of the other two caves.

There are several categories in the wooden artifact assemblage that are of special significance when compared to the material from Tularosa Cave:

The quantity of atlatl equipment is small but falls within a time span consistent with the Tularosa Cave distribution. The atlatl may have been used from the Pre-Pottery through the San Francisco and Three Circle, but probably not in the Reserve Phase.

Bow and arrow fragments occur in relatively large quantities in Pine Lawn through Reserve levels. The number of both bow and arrow fragments in the Pine Lawn Phase augments Grange's hypothesis that the bow

and arrow may have had earlier development in the southern part of the Southwest than in the Anasazi area, where the first occurrence is in Basketmaker II (Martin, Rinaldo, and others, 1952, p. 341). While this temporal distribution is consistent with that reported from Tularosa Cave, there is no evidence of any real shift in emphasis from atlatl to bow and arrow at the San Francisco period.

Painted sticks constitute the largest category of wooden artifacts and show a definite rise in popularity between Three Circle and Reserve, even though the total number of wooden artifacts also increased. The temporal distribution in the O Block Cave points to an earlier occurrence in Mogollon sites than was evident before. In Tularosa Cave, Grange notes San Francisco as the earliest occurrence; but in the O Block Cave they occur in substantial numbers in the Pine Lawn Phase.

The tablita, a unique Mogollon artifact, occurs also from Pine Lawn through Reserve and Tularosa, with more evidence for occurrence in the Pine Lawn Phase than was previously available from Cordova Cave. Also, it is noted that until the Three Circle Phase, black is the only color used; after Three Circle other colors were employed and the quantity of specimens increases.

Reed cigarettes occur from Pine Lawn to Tularosa and agree with Grange's evidence, although they are more popular in Pine Lawn at O Block Cave than they were at that time in Tularosa Cave.

Pahos and other ceremonial equipment occur late, whereas much of Grange's ceremonial equipment occurs early and late. Such artifacts as Juniper-berry skewers, reed stems mounted on reed stalks, and feathers mounted on sticks are lacking in the O Block Cave, Hinkle Park Cliff-Dwelling, and Cosper Cliff-Dwelling. On the other hand, a paho ring which was found is new to the Reserve area, although not to the Mogollon culture. The flute occurring in the Three Circle Phase of O Block Cave is later than those reported from Tularosa Cave.

Bark and wooden hoes have not been reported from any other site in the Southwest and occur late in Hinkle Park Cliff-Dwelling and O Block Cave. Bark trowels also seem to be late, thereby extending the known temporal range from Pre-Pottery in Tularosa Cave through Transitional Reserve-Tularosa in Hinkle Park Cliff-Dwelling.

Burred sticks occurred late in the O Block Cave, Hinkle Park Cliff-Dwelling and Cosper Cliff-Dwelling; previously, they were known only as late as San Francisco.

Concerning Grange's temporal division of pre-A.D. 700 and post-A.D. 700, very little can be said because much of the material that he dealt with

did not occur in sufficient numbers in the O Block Cave, because that cave was uninhabited during the Georgetown-through-San Francisco period, and because in some cases a shift does not occur for that cave. Grange states: "The changes occurring in the San Francisco Phase are the introduction and/or increased use of the bow and arrow; introduction of ceremonial and miniature bows and arrows; introduction of painted sticks; introduction of sticks with knotted yucca leaf bindings; absence of reed flutes; a shift from plano-convex to cylindrical fire drill hearths; increase in reed cigarettes; decline in Juniper-berry skewers; decline in wooden cylinders; decline in split sticks; decline in sticks with fiber and sinew and hair bindings; decline in bark trowels; decline in wooden dice; decline in twigs tied in loops; and decline in worked gourd." (Martin, Rinaldo, and others, 1952, p. 361.) Sticks with knotted yucca leaf bindings, Juniper-berry skewers, split sticks, sticks with fiber, sinew, and hair bindings, twigs tied in loops, and worked gourd fragments do not occur in the 1952 collection. Their absence, plus the fact that most of the O Block Cave material is from phases of Three Circle or later, offers proof of this decline before the San Francisco Phase. Only one wooden die was found in O Block Cave. Two plano-convex fire drill hearths were discovered in the Three Circle Phase of the O Block Cave, suggesting that the shift from plano-convex to cylindrical may be true only for Tularosa Cave. One reed flute came from a Three Circle level of the O Block Cave, and bark and wood trowels and hoes occurred in Hinkle Park and Cosper Cliff-Dwellings, indicating that both types of tools were known after A.D. 700 in the Mogollon area. We have no evidence from the O Block Cave for an increase in popularity of the functional bow and arrow, for they are found in about the same percentage throughout that cave. The fact that one ceremonial bow fragment was found in both Tularosa and O Block caves in the Pine Lawn levels suggests that this type of artifact may have been known at that time, although in both sites the type increases in popularity after A.D. 700. Painted sticks are so abundant in the Pine Lawn levels of the O Block Cave that they must have been introduced into the area at that time instead of in the San Francisco Phase.

We lack evidence to change Grange's conclusions in many cases; we may agree with him on the introduction of ceremonial bows, but definitely disagree on the introduction of painted sticks at A.D. 700.

In Tularosa Cave the quantity of ceremonial equipment increased from Pine Lawn to Tularosa. In O Block Cave this is likewise true. There is a greater percentage of ceremonial equipment in the Pine Lawn Phase at the O Block Cave than in the Pine Lawn Phase of Tularosa Cave, although in the Reserve Phase there is about the same percentage. In

O Block Cave there is also a smaller quantity of what we might call "domestic" equipment (digging sticks, hoes, burred sticks, etc.) and more hunting equipment (bows and arrows, atlatls, etc.) than in Tularosa Cave. Thus it is evident not only that different phases have different emphases in wooden artifact assemblages, but also that different sites have different over-all emphases.

## VII. Summary

*By* PAUL S. MARTIN

Four caves were excavated during the season of 1952: Y Canyon, Cosper, Hinkle Park, and O Block. Cosper and Hinkle Park caves contained cliff-dwellings. These are the first Mogollon cliff-dwellings that have been carefully dug and for which the details have been published. We now have an adequate sample of perishable and imperishable specimens representative of the Reserve Phase.

The estimated dates for Hinkle Park Cliff-Dwelling are about A.D. 1100-1200, and for Cosper Cliff-Dwelling about A.D. 1300.

In general, the architecture of these cave-houses resembles that found in cliff-houses of the Anasazi area. The masonry is not so good as the best at Mesa Verde, but for the most part it is good. The masonry of the Sierra Ancha cliff-dwellings (Haury, 1934) is very close in most details to that at Hinkle Park. The masonry of the two rooms in Cosper Cave is crude and rough by comparison. The method of roofing the rooms is similar to one type of roof found at Mesa Verde and at Chaco Canyon. Other details—firepits, joining of corners, doorways, smoke holes or vents—remind one of similar features in the Mesa Verde cliff-dwellings.

None of this is too surprising, since we feel that the architectural ideas of the Anasazi caught the fancy of the Mogollon Indians during this epoch.

One comment about the masonry of the surface houses of the Pine Lawn area during the Reserve Phase (A.D. 1000 plus) is in order here. The masonry of the houses at open sites in the Pine Lawn area is crude indeed and not laid in even courses. The individual stones used in the walls of these houses were unshaped stream boulders of varying sizes. The stones in the walls of Hinkle Park Cliff-Dwelling were selected, were usually flat, were often shaped and tooled, and were almost always laid in regular courses. On the basis of the artifacts, we can detect little difference in time between the two types of sites, although the cliff-dwellings are somewhat later. Of course, we know that some changes in culture and improvements in technique can often take place swiftly. Perhaps, then, it should not be surprising to find that the Mogollon masons who built the rooms in Hinkle Park Cave were better technicians than their fathers or grandfathers.



Many storage pits were found in Hinkle Park Cliff-Dwelling; such pits are typical of Mogollon houses from the Pine Lawn Phase to the Reserve Phase.

The pottery from the four caves consisted of familiar types with brown wares predominating. A list of all types is given in Chapter III. The bar graphs (fig. 25) indicate that Cosper Cliff-Dwelling was slightly younger than Hinkle Park Cliff-Dwelling. The stratigraphy was significant in Cosper, Hinkle Park, and O Block caves; the sequences and trends in popularity of pottery types corroborated those which we found in Tularosa and Cordova caves.

Stone and bone artifacts were recovered in fair quantity. Several interesting and important contributions have sprung from the detailed analysis of these specimens. One of these is the vast amount of fundamental information concerning artifacts of the Reserve and Tularosa phases. Tularosa and Cordova caves yielded no levels that could be assigned to the Reserve Phase only. Much of the material from the 1952 excavations of the four caves could be surely assigned to the Reserve Phase. Now we feel we have a goodly quantity of stone and bone tools of the Reserve Phase and can state with a fair degree of confidence what is typical of that phase; namely, axes, arrow-shaft tools, beveled manos, and slender triangular projectile points.

The other contribution from the analysis of stone tools has to do with the use of projectile points as chronological markers or phase indicators. In the study of over 700 projectile points and blades from Tularosa and Cordova caves, Rinaldo noted the vertical distribution of these specimens. He tentatively suggested that some types might be useful in assigning a relative date to given levels and strata (Martin, Rinaldo, and others, 1952, pp. 113 and 497), especially when used with other categories—pottery, textiles, sandals, and the like—that might turn out to be sensitive time indicators. In analyzing the projectile points from the 1952 digs, Dr. Rinaldo tested the formulae that he had tentatively worked out in other years. Great was his satisfaction when he found that the relative dates which he assigned to certain cave levels, purely on the basis of projectile point typology, were the same as those that had been assigned by means of pottery analysis. A characteristic late or Reserve Phase type is a small, thin, diagonal notched point; and an earlier type is a corner notched, thinned, concave-base point.

Similar trends were noted in scrapers, drills, choppers, metates, manos, sandals, cloth, matting, atlatl equipment, bows and arrows, cigarettes, Juniper-berry sticks and the like. Therefore, if the trends of *all* materials—perishable and non-perishable—are carefully worked out, one will not have to depend entirely on ceramics for dating. We have used this hypothesis in all our work of the past few years and find that it helps us in puzzling situations.

The cordage, sandals, and textiles came mostly from the late phases (Three Circle, Reserve, and Tularosa) and therefore add to the knowledge of periods that were *least* well represented in Tularosa and Cordova caves. These artifacts, too, show trends through time and are just as good for dating as stone tools are. The typical sandal of the Reserve and Tularosa phases is a plaited one of wide elements. Twilled matting appears to be more popular, too, in these late phases.

The wooden artifacts likewise came mostly from the Reserve and Tularosa phases and add greatly to our previously scanty knowledge of these times. They, too, may be used independently of pottery to assign relative dates to cave levels. A few major conclusions concerning this class of material may be mentioned here:

The data we have on atlatls and atlatl equipment are in accord with what Grange reported (Martin, Rinaldo, and others, 1952).

A number (24) of arrow fragments and two bow fragments from Pine Lawn levels of the O Block Cave tend to add further credence to Grange's hypothesis that the bow and arrow had earlier development and usage in the southern part of the Southwest. Painted sticks were abundant and their range in time has now been pushed back from the San Francisco Phase to the Pine Lawn Phase. Tablitas also occur in the Pine Lawn Phase. Black is the only color in early times; colors and quantity increase through time. Bark trowels were found in Pre-Pottery horizons. A paho ring has been found and is the first reported from the Reserve area.

The O Block Cave has a greater proportion of ceremonial artifacts than Tularosa or Cordova caves. It is possible that in early times (Pine Lawn Phase) this cave was used more for ceremonial and camping than for domestic purposes.

No burials were found in the 1952 season.

The plant remains have not yet been studied, but we may state that we found maize, beans, squash, pinyon nuts, walnuts, yucca pads, quids and wads, cactus, wild gourds, and thistles.

Thus, we see that the importance of the materials from the 1952 season lies in the fact that most of it can be pinned down to late time horizons. Our materials from Tularosa and Cordova caves were adequately representative of the earlier phases of the Mogollon culture; but since the upper levels of those caves were so badly churned and disturbed, we could not be sure which of the artifacts were typical of the Three Circle, Reserve, and Tularosa phases. In fact, materials of the Three Circle Phase were apparently lacking from those caves.

Now with these new data, we can go over the specimens from the mixed, late levels of Tularosa and Cordova caves and date them with a

fair presumption of being right, because we have good dated materials with which to work.

Without depending on pottery, we can now use trends (frequencies) in popularity of specimens—perishable and imperishable—for determining relative dates in cave levels.

# Bibliography

AMSDEN, C. A.

1935. The Pinto Basin artifacts. Southwest Museum Papers, no. 9, pp. 33-51. Los Angeles, California.

1937. The Lake Mohave artifacts. Southwest Museum Papers, no. 11. Los Angeles, California.

BALDWIN, GORDON C.

1938. Basket Maker III sandals from northeastern Arizona. American Anthropologist, vol. 40, no. 3, pp. 465-485.

BARTLETT, K.

1934. The material culture of Pueblo II in the San Francisco Mountains, Arizona. Museum of Northern Arizona, Bull. 7. Flagstaff, Arizona.

COLTON, H. S., and HARGRAVE, L. L.

1937. Handbook of northern Arizona pottery wares. Museum of Northern Arizona, Bull. 11. Flagstaff, Arizona.

COSGROVE, C. B.

1947. Caves of the Upper Gila and Hueco areas in New Mexico and Texas. Papers of Peabody Museum of American Archaeology and Ethnology, Harvard University, vol. 24, no. 2.

COSGROVE, H. S. and C. B.

1932. The Swarts Ruin. Papers of Peabody Museum of American Archaeology and Ethnology, Harvard University, vol. 15, no. 1.

CRESSMAN, L. S.

1951. Western prehistory in the light of Carbon 14 dating. Southwestern Journal of Anthropology, vol. 7, no. 3.

DI PESO, CHARLES C.

1951. The Babocomari village site on the Babocomari River, southeastern Arizona. The Amerind Foundation, no. 5. Dragoon, Arizona.

DOUGLAS, FREDERIC H.

1935. Pottery of the southwestern tribes. Denver Art Museum, Indian Leaflet Series, nos. 69-70 (vol. 2, pp. 78-79).

EMERY, IRENE

1952. Naming the direction of the twist in yarn and cordage. El Palacio, vol. 59, no. 8, pp. 251-262.

FERDON, EDWIN N., JR.

1946. An excavation of Hermit's Cave, New Mexico. School of American Research, Monog. no. 10. University of New Mexico Press, Albuquerque.

FEWKES, J. W.

1904. Two summers' work in Pueblo ruins. Bureau of American Ethnology, 22nd Ann. Rept., 1900-1901, pp. 1-197.

1909. Antiquities of the Mesa Verde National Park: Spruce Tree House. Bureau of American Ethnology, Bull. 41.
1911. Antiquities of the Mesa Verde National Park: Cliff Palace. Bureau of American Ethnology, Bull. 51.
1912. Casa Grande, Arizona. Bureau of American Ethnology, 28th Ann. Rept., 1906-1907, pp. 25-181.
- FULTON, WILLIAM S.  
1941. Winchester Cave: A ceremonial cave in the Winchester Mountains. The Amerind Foundation, no. 2. Dragoon, Arizona.
- GLADWIN, H. S.  
1945. The Chaco Branch. Excavations at White Mound and in the Red Mesa Valley. Gila Pueblo, Medallion Papers, no. 33. Globe, Arizona.
- GLADWIN, H. S., HAURY, E. W., SAYLES, E. B., and GLADWIN, N.  
1937. Excavations at Snaketown. Gila Pueblo, Medallion Papers, no. 25. Globe, Arizona.
- GLADWIN, W. and H. S.  
1931. Some southwestern pottery types, Series II. Gila Pueblo, Medallion Papers, no. 10. Globe, Arizona.  
1934. A method for the designation of cultures and their variations. Gila Pueblo, Medallion Papers, no. 15. Globe, Arizona.
- GRAUMONT, RAOUL  
1945. Handbook of knots. Cornell Maritime Press, New York.
- GUERNSEY, S. J.  
1931. Explorations in northeastern Arizona: Report on the archaeological field work of 1920-1923. Papers of Peabody Museum of American Archaeology and Ethnology, Harvard University, vol. 12, no. 1.
- GUERNSEY, S. J., and KIDDER, A. V.  
1921. Basket Maker caves of northeastern Arizona. Papers of Peabody Museum of American Archaeology and Ethnology, Harvard University, vol. 8, no. 2.
- HARGRAVE, L. L.  
1932. Guide to 40 pottery types from the Hopi country and the San Francisco Mountains, Arizona. Museum of Northern Arizona, Bull. 1. Flagstaff, Arizona.
- HARRINGTON, M. R.  
1928. Sandal Cave. The Masterkey, vol. 2, no. 2, pp. 5-10.
- HAURY, EMIL W.  
1932. Roosevelt:9:6, a Hohokam site of the Colonial period. Gila Pueblo, Medallion Papers, no. 11. Globe, Arizona.  
1934. The Canyon Creek Ruin and the cliff dwellings of the Sierra Ancha. Gila Pueblo, Medallion Papers, no. 14. Globe, Arizona.  
1936a. The Mogollon culture of southwestern New Mexico. Gila Pueblo, Medallion Papers, no. 20. Globe, Arizona.  
1936b. Some southwestern pottery types, Series IV. Gila Pueblo, Medallion Papers, no. 19. Globe, Arizona.  
1940. Excavations in the Forestdale Valley, east-central Arizona. University of Arizona Bulletin, vol. 11, no. 4 (Social Science Bulletin, no. 12).  
1945a. The excavations of Los Muertos and neighboring ruins of the Salt River Valley, southern Arizona. Papers of Peabody Museum of American Archaeology and Ethnology, Harvard University, vol. 24, no. 1.  
1945b. Painted Cave, northeastern Arizona. The Amerind Foundation, no. 3. Dragoon, Arizona.

1950. The stratigraphy and archaeology of Ventana Cave, Arizona. University of Arizona, Tucson; University of New Mexico, Albuquerque.
- HAURY, E. W., and HARGRAVE, L. L.  
1931. Recently dated pueblo ruins in Arizona. Smithsonian Miscellaneous Collections, vol. 82, no. 11.
- HAURY, E. W., and SAYLES, E. B.  
1947. An early pit house village of the Mogollon culture, Forestdale Valley, Arizona. University of Arizona Bulletin, vol. 18, no. 4 (Social Science Bulletin, no. 16).
- HAWLEY, FLORENCE M.  
1936. Field manual of prehistoric southwestern pottery types. University of New Mexico, Bulletin, Anthr. Ser., vol. 1, no. 4. Albuquerque.
- HIBBEN, FRANK C.  
1941. Evidence of early occupation in Sandia Cave, New Mexico, and other sites in the Sandia-Manzano region. Smithsonian Miscellaneous Collections, vol. 99, no. 23.
- HODGE, F. W.  
1920. Hawikuh bonework. Museum of the American Indian, Heye Foundation, Indian Notes and Monographs, vol. 3, no. 3.
- HOUGH, WALTER  
1907. Antiquities of the Upper Gila and Salt River valleys in Arizona and New Mexico. Bureau of American Ethnology, Bull. 35.  
1914. Culture of the ancient Pueblos of the Upper Gila River region, New Mexico and Arizona. United States National Museum, Bull. 87.
- HOWARD, E. B.  
1930. Archaeological research in the Guadalupe Mountains. University of Pennsylvania, Museum Journal, vol. 21, nos. 3-4, pp. 189-202.
- HURT, WESLEY R., JR., and McKNIGHT, DANIEL  
1949. Archaeology of the San Augustin Plains, a preliminary report. American Antiquity, vol. 14, no. 3, pp. 172-194.
- JACKSON, A. T.  
1937. Exploration of certain sites in Culberson County, Texas. Bulletin of the Texas Archeological and Paleontological Society, vol. 9, pp. 146-193. Abilene, Texas.
- JUDD, N. M.  
1926. Archaeological observations north of the Rio Colorado. Bureau of American Ethnology, Bull. 82.  
1931. The excavation and repair of Betatakin. United States National Museum, Proceedings, vol. 77, art. 5.
- KIDDER, A. V.  
1924. An Introduction to the study of Southwestern archaeology. Papers of the Southwestern Expedition, no. 1. Phillips Academy, Andover, Massachusetts.  
1932. The artifacts of Pecos. Papers of the Southwestern Expedition, no. 6. Phillips Academy, Andover, Massachusetts.
- KIDDER, A. V., and COSGROVE, C. B.  
1949. The Pendleton Ruin, Hidalgo County, New Mexico. Carnegie Institution of Washington, Contributions to American Anthropology and History, no. 50, pp. 107-152.

KIDDER, A. V., and GUERNSEY, S. J.

1919. Archaeological explorations in northeastern Arizona. Bureau of American Ethnology, Bull. 65.

KLUCKHOHN, CLYDE, and REITER, PAUL (*Editors*)

1939. Preliminary report on 1937 excavations, BC 50-51, Chaco Canyon, New Mexico. University of New Mexico, Bulletin, Anthr. Ser., vol. 3, no. 2. Albuquerque.

KROEBER, A. L.

1939. Cultural and natural areas of native North America. University of California Publications in American Archaeology and Ethnology, vol. 38.

LEHMER, DONALD J.

1948. The Jornada Branch of the Mogollon. University of Arizona Bulletin, vol. 19, no. 2 (Social Science Bulletin, no. 17).

MARTIN, PAUL S.

1934. The bow drill in North America. American Anthropologist, vol. 36, no. 1, pp. 94-97.

1936. Lowry Ruin in southwestern Colorado. Field Museum of Natural History, Anthropological Series, vol. 23, no. 1.

1939. Modified Basket Maker sites in the Ackmen-Lowry area, southwestern Colorado, 1938. Field Museum of Natural History, Anthropological Series, vol. 23, no. 3.

1943. The SU site. Excavations at a Mogollon village, western New Mexico, 1941. Field Museum of Natural History, Anthropological Series, vol. 32, no. 2.

MARTIN, P. S., LLOYD, C., and SPOEHR, A.

1938. Archaeological work in the Ackmen-Lowry area, southwestern Colorado, 1937. Field Museum of Natural History, Anthropological Series, vol. 23, no. 2.

MARTIN, P. S., QUIMBY, GEORGE I., and COLLIER, DONALD

1947. Indians before Columbus. University of Chicago Press.

MARTIN, P. S., and RINALDO, JOHN B.

1940. The SU site. Excavations at a Mogollon village, western New Mexico, 1939. Field Museum of Natural History, Anthropological Series, vol. 32, no. 1.

1947. The SU site. Excavations at a Mogollon village, western New Mexico, third season, 1946. Field Museum of Natural History, Anthropological Series, vol. 32, no. 3.

1950a. Turkey Foot Ridge site. A Mogollon village, Pine Lawn Valley, western New Mexico. Fieldiana: Anthropology, vol. 38, no. 2.

1950b. Sites of the Reserve Phase, Pine Lawn Valley, western New Mexico. Fieldiana: Anthropology, vol. 38, no. 3.

1951. The Southwestern Co-Tradition. Southwestern Journal of Anthropology, vol. 7, no. 3, pp. 215-229.

MARTIN, P. S., RINALDO, JOHN B., and ANTEVS, ERNST

1949. Cochise and Mogollon sites, Pine Lawn Valley, western New Mexico. Fieldiana: Anthropology, vol. 38, no. 1.

MARTIN, P. S., RINALDO, J. B., BLUHM, E., CUTLER, H., and GRANGE, R., JR.

1952. Mogollon cultural continuity and change. Fieldiana: Anthropology, vol. 40.

MARTIN, P. S., and WILLIS, E. S.

1940. Anasazi painted pottery in Field Museum of Natural History. Field Museum of Natural History, Anthropology Memoirs, vol. 5.

MASON, J. A.

1928. Some unusual spear throwers from ancient America. University of Pennsylvania, Museum Journal, vol. 19, no. 3, pp. 290-324.

MORRIS, EARL H.

1911. Preliminary account of the antiquities of the region between the Mancos and La Plata rivers in southwestern Colorado. Bureau of American Ethnology, 33rd Ann. Rept., pp. 155-207.
1919. The Aztec Ruin. American Museum of Natural History, Anthropological Papers, vol. 26, pt. 1.
1929. An aboriginal salt mine at Camp Verde, Arizona. American Museum of Natural History, Anthropological Papers, vol. 30, no. 3.
1936. Archaeological background of dates in early Arizona chronology. Tree Ring Bulletin, vol. 2, no. 4, pp. 34-36. Laboratory of Tree-Ring Research, University of Arizona. Tucson.
1939. Archaeological studies in the La Plata district, southwestern Colorado and northwestern New Mexico. Carnegie Institution of Washington, pub. 519.
1951. Basket Maker III human figurines from northeastern Arizona. American Antiquity, vol. 17, no. 1, pp. 33-40.

MORRIS, EARL H., and BURGH, ROBERT F.

1941. Anasazi basketry, Basket Maker II through Pueblo III. A study based on specimens from the San Juan River country. Carnegie Institution of Washington, pub. 533.

NESBITT, PAUL H.

1938. Starkweather Ruin. Logan Museum Publications in Anthropology, Bulletin no. 6. Beloit College, Beloit, Wisconsin.

NORDENSKIÖLD, G.

1893. The cliff dwellers of the Mesa Verde, southwestern Colorado. Stockholm, Sweden, and Chicago, U.S.A.

NUSBAUM, JESSE L., KIDDER, A. V., and GUERNSEY, S. J.

1922. A Basket-Maker cave in Kane County, Utah. Museum of the American Indian, Heye Foundation, Indian Notes and Monographs, no. 29.

PEPPER, G. H.

- 1902a. The ancient Basket Makers of southeastern Utah. American Museum of Natural History, Guide Leaflet no. 6 (Supplement to American Museum Journal, vol. 2, no. 4).
- 1902b. The throwing stick of a prehistoric people of the Southwest. Transactions of the 13th International Congress of Americanists, pp. 107-130. New York.
1920. Pueblo Bonito. American Museum of Natural History, Anthropological Papers, vol. 27.

REED, ERIK K.

1951. Types of stone axes in the southwest. Southwestern Lore, vol. 17, no. 3, pp. 45-51. Boulder, Colorado.

REITER, PAUL, and OTHERS

1938. The Jemez Pueblo of Unshagi, New Mexico, with notes on the earlier excavations at "Amoxiumqua" and Giusewa. University of New Mexico, Bulletin, Monog. Ser., vol. 1, nos. 4 and 5 (Monographs of the School of American Research, nos. 5 and 6, Santa Fe). Albuquerque.

ROBERTS, FRANK H. H., JR.

- 1929a. Shabik'eshchee village. A late Basket Maker site in the Chaco Canyon, New Mexico. Bureau of American Ethnology, Bull. 92.



- 1929b. Recent archaeological developments in the vicinity of El Paso, Texas. Smithsonian Miscellaneous Collections, vol. 81, no. 7.
1931. Ruins at Kiatuthlanna, eastern Arizona. Bureau of American Ethnology, Bull. 100.
1932. The village of the Great Kivas on the Zuni Reservation, New Mexico. Bureau of American Ethnology, Bull. 111.
1940. Archaeological remains in the Whitewater district, eastern Arizona. Part II: Artifacts and burials. Bureau of American Ethnology, Bull. 126.
- SAYLES, E. B.  
1945. The San Simon Branch. Excavations at Cave Creek and in the San Simon Valley. I: Material culture. Gila Pueblo, Medallion Papers, no. 34. Globe, Arizona.
- SAYLES, E. B., and ANTEVS, ERNST  
1941. The Cochise culture. Gila Pueblo, Medallion Papers, no. 29. Globe, Arizona.
- SMITH, VICTOR J.  
1933. Sandals of the Big Bend culture, with additional notes concerning Basket Maker evidence. Bulletin of the Texas Archeological and Paleontological Society, vol. 5, pp. 57-66. Abilene, Texas.
- SPIER, LESLIE  
1928. Havasupai ethnography. American Museum of Natural History, Anthropological Papers, vol. 29, pt. 3.
- TOWER, DONALD B.  
1945. The use of marine Mollusca and their value in reconstructing prehistoric trade routes in the American Southwest. Papers of the Excavators Club, vol. 2, no. 3. Cambridge, Massachusetts.
- TSCHOPIK, HARRY J.  
1939. Artifacts of perishable materials. Section F in Preliminary report on 1937 excavations, BC 50-51, Chaco Canyon, New Mexico (Clyde Kluckhohn and Paul Reiter, Editors). University of New Mexico, Bulletin, Anthr. Ser., vol. 3, no. 2, pp. 94-130. Albuquerque.
- TUTHILL, CARR  
1947. The Tres Alamos site on the San Pedro River, southeastern Arizona. The Amerind Foundation, no. 4. Dragoon, Arizona.
- WENDORF, FRED  
1950. A report on the excavation of a small ruin near Point of Pines, east central Arizona. University of Arizona Bulletin, vol. 21, no. 3 (Social Science Bulletin, no. 19).
- WOODBURY, RICHARD  
1939. Ground and pecked stone artifacts (other than arrow shaft tools). Section C in Preliminary report on 1937 excavations, BC 50-51, Chaco Canyon, New Mexico (Clyde Kluckhohn and Paul Reiter, Editors). University of New Mexico, Bulletin, Anthr. Ser., vol. 3, no. 2, pp. 58-79. Albuquerque.
- WOODWARD, ARTHUR  
1936. A shell bracelet manufactory. American Antiquity, vol. 2, no. 2, pp. 117-125.
- WORMINGTON, H. M.  
1949. Ancient man in North America. The Colorado Museum of Natural History, Popular Series, no. 4 (3rd ed. revised). Denver.



# Index

- Abrading stones, 110, 111, 112, 114  
 Ackmen, pit covers, 116; stone balls, 115  
 Adams, Robert M., 7  
 Alamogordo, arrow shaft straighteners, 112  
 Alder, Thomas P., 7  
 Alma Incised, 63  
 Alma Plain, 56, 63, 64  
 Alma Punched, 63  
 Alma Rough, 64  
 Anasazi, 212; arrows, 189; atlatls, 184; awls, wood, 196; bows, 189; braid, 177; burden straps, braided, 177; carrying-loop chain, 166; cloth, 170; coiled basketry, 173; cordage, 163; corn cob mounted on stick, 206; cylinders, wood, 198; dice, wood, 204; digging sticks, 190; fire drill hearths, 194; fur cord, 164; knots, 165; manos, beveled, 101; matting, twilled, 176; painted sticks, 200; reed cigarettes, 203; flutes, 204; projectile points, 139; sandals, plaited, 170, 178, wickerwork, 169; trowels, bark and wood, 192  
 Anderson, Patricia J., 8  
 Animal bones, occurrence of unworked, 155  
 Animal effigies, 152, 156  
 Antler flakers, 147  
 Apache pottery, 70  
 Arizona W:10:51, 156  
 Arrow points, 139  
 Arrows, 186-189  
 Arrow shaft straighteners, 112  
 Arrow shaft tools, 110-112, 158  
 Artifacts, bone, 91, 146-149, 213; stone, 87-142, 213; wood, 181-211  
 Atlatl darts, 181-185  
 Atlatls, 181-185, 208-209, 211, 214; occurrence of by phases, 180  
 Atwood, Edward, 8  
 Atwood, Robert, 8  
 Awls, see Bone awls, Wooden awls  
 Awl sharpeners, 110, 111, 112  
 Axes, 115, 116, 158; grooved, 141; three quarters grooved, 116  
 Azurite, 157; see also Pigments  
 Babocomari village, 107; arrow shaft straighteners, 112; needles, 145; pit covers, 116  
 Balls, stone, 112-114, 115  
 Bar graphs, pottery, 67  
 Basketmaker, sandals, 169, 170; netting, 172  
 Basketry, 173, 178-179; coiled, 172, 173; occurrence of types by phases, 162  
 Beads, 145; stone, 141  
 Bears, animal effigies, 156  
 Betatakin, painted sticks, 200; stone balls, 115  
 Blades, 89, 138, 139, 141; notched, 141  
 Blue, Arizona, 18  
 Blue River, 19-20  
 Bone awls, 146-147, 149; splinter type, 147, 149  
 Bows, ceremonial, 185, 189; miniature, 185, 188, 189  
 Bows and arrows, 185-189, 208-211; ceremonial, 210; miniature, 210; occurrence of by phases, 180  
 Bracelets, 144, 145; blanks, 145  
 Bradfield site, arrow shaft straighteners, 112  
 Braid, 177; see also Plaiting  
 Broman, Vivian, 7  
 Brown-ware bowl, 64  
 Burred sticks, 195, 209, 211  
 Camp Verde, plaited sandals, 170  
 Canyon Creek Site, twilled matting, 176  
 Canyon del Muerto, arrows, 189  
 Carey, Robert E., 8  
 Carrying-loop chain, 165-166  
 Ceremonial objects, 114  
 Cerros Red-on-White, 56  
 Chaco, 107  
 Chaco Canyon, 212  
 Charred, shouldered, pointed sticks, 195-196  
 Chetro Ketl, jar stoppers, 115  
 Chihuahua, arrow shaft straighteners, 112; ax, three quarters grooved, 116  
 Choppers, 135  
 Cibola, ax, three quarters grooved, 116  
 Cloth, cotton, 170, 178; occurrence of by phases, 162  
 Cordage, 159-164, 178-179; bast fibers, definition of, 159; feather, 164, 178; fiber, 159; fur, 163, 178; hard fibers, definition of, 159; occurrence of types by phases, 160; surface fibers, definition of, 159; yarns, definition of, 159  
 Cordage artifacts, occurrence of types by phases, 161

- Cordova Cave, 101; atlatls, 184; cordage, 163; cordage and textiles, 178; knots, 165; netting, 172; painted sticks, 200; pendants, 145; projectile points, 140, 213; reed cigarettes, 203; scrapers, 141; spatulas, 194; tablitas, 202, 209; wickerwork sandals, 168; yucca leaf spine needles, 196
- Corn cob mounted on stick, 206
- Cosper Cliff-Dwelling, 29, 107; architecture, 33-37; dates, 212; fill, 26; location, 18; methods of excavation, 24; Room A, 34; Room B, 36; surface indications, 20
- Cosper, John, 8, 18
- Cotton, 170; cordage, 159
- Counters, 153; see Sherds, worked
- Crackel, Mary, 8
- Crystals, 157
- Dalstrom, Gustaf, 8
- Dart bunt, bone, 148
- Dart points, 139
- Dice, bone, 147; wood, 204, 210
- Digging sticks, 189-190, 211; occurrence of by phases, 180
- Discoidal, 134
- Dragoon, three quarters grooved ax, 116
- Drills, 90, 136-138, 139, 141, 144, 157; plain shafted, 136; see also Crystals
- Dupont Cave, carrying-loop chain, 166
- Ear-rings, 145
- Egan, W. T., 7
- Excavation, methods of, 24; procedure, 29
- Feather carders, 195
- Fiber coils, 165
- Field, Stanley, 7
- Figurine, 152, 153; human, 158
- Fire drill hearths, 192-194, 210
- Flakers, bone, 147
- Flute, reed, 203-204, 209
- Gaines, Wayne, 7
- Gourd, painted, 207
- Gravers, 138, 139
- Gray ware, corrugated neck, tooled, 56
- Gregg, Clifford C., 7
- Grinders, pigment, 115
- Grinding stone, paint, 157
- Gulf of California, 145
- Gurley, Clair E., 8
- Hammerstones, 110, 112, 116
- Handstones, 100, 157
- Havasupai, 107
- Hematite, 106, 107, 156, 157; see also Pigments
- Hinkle Park Cliff-Dwelling, 29, 106, 108; animal effigies, 156; architecture, 37-52; arrow shaft tools, 112; axes, grooved, 141; dates, 212; fill, 26; jar stoppers, 115, 116; location, 20; methods of excavation, 24; needles, 145; pottery types, trends, 66-68; Room A, 37; Room B, 40; Room C, 42; Room D, 42; Room E, 45; Room F, 45; Room G, 46; Room H, 47; Room I, 48; Room J, 48; Room K, 48; storage pits, 213; surface indications, 22; trash area, 50; unworked animal bones, 155; worked slabs, 109
- Hoes, bark and wood, 191-192, 209; wood, 211
- Hohokam, arrows, 189; ax, three quarters grooved, 116; braid, 177; burred sticks, 195; cloth, 170; cordage, 163; digging sticks, 190; feather cord, 164; fire drill hearths, 194; fur cord, 164; matting, twilled, 176; reed cigarettes, 203; wickerwork sandals, 168
- Hopi, carrying-loop chain, 166
- Hopi sites, ax, three quarters grooved, 116
- Horizon markers, 140, 141
- Huaco area, awls, wood, 196; cylinders, wood, 198; spatulas, 194
- Incised Corrugated, 53, 56, 64
- Indented Corrugated with polished red, slipped interior, 56
- Indented Corrugated with red interior, 56
- Indented Corrugated with smudged interior, 56
- Jar stoppers, miniature, 115, 116
- Juniper berry, 100
- Juniper berry skewers, 209, 210
- Kelly, Marjorie, 7
- Kency, Charles W., 8
- Kiatuthlanna Black-on-White, 63
- Kiatuthlanna, pendants, 145
- Kiehne, Emil O., 8
- Knives, 90, 112; flake, 128, 138, 141, 144
- Knots, 164, 165; granny, 164-165, 171, 172; occurrence of types by phases, 161; overhand, 164-165; single bow, 164; single half hitch, 164; square, 164-165
- Ladle, miniature, 152, 156
- Linden Corrugated, 56
- Los Muertos, figurine, 153; needles, 145
- Mabon, David, 7
- MacDonald Corrugated, 53
- Malachite, 157; see Pigments
- Manos, 87-96, 100, 157; beveled, 96, 100, 101, 158; one hand, 100, 101; rectangular, 100; two hand, 100, 101; see also Rubbing stones
- Marrow, 149
- Marsh Pass, worked sherds, 153

- Masonry, 212  
 Matting, 178–179; occurrence of by phases, 162; twilled, 173–176, 178, 214  
 Mauls, 116  
 Mealing bins, 107  
 Medicine cylinders, 145  
 Mesa Verde, 212  
 Metate-like grinding stones, 104  
 Metates, 88, 101–104; basin type, 100, 101, 103, 107; slab type, 101, 107; trough type, 100, 103, 104, 106, 107  
 Milling stones, 104, 106, 112  
 Mimbres, three quarters grooved ax, 116  
 Mimbres Bold Face Black-on-White, 56, 63  
 Mimbres Classic Black-on-White, 56  
 Mimbres Corrugated, 53, 56  
 Mimbres Neck Corrugated, 56  
 Miniature pots, 64  
 Mogollon, bone tools, 149; culture, 214  
 Mountain lions, animal effigies, 156  
 Mountain sheep, animal effigies, 156  
  
 NAN Ranch Ruin, worked sherds, 153  
 Needles, 145; shell, 144; yucca leaf spine, 196  
 Net, rabbit, 171, 172  
 Netting, 171–172, 178  
 Nose plugs, 145  
 Notched rib, 147  
  
 Obelisk Cave, arrows, 189  
 O Block Cave, 29, 106, 107, 157, 214; animal bone, unworked, 155; ceremonial artifacts, 214; figurine, 154; fill, 26; location, 23; methods of excavation, 24; natural levels, 26; projectile points, 139; stratigraphy, 71; surface indications, 23  
 Ornaments, 90; see also Bracelets, Beads, Pendants  
  
 Pacific Coast, arrow shaft straighteners, 112  
 Pahos, 204–206, 209; knob-ended, 204, 206; ring, 205–206, 209  
 Painted sticks, 198–200, 209, 214; occurrence of by phases, 180  
 Paint grinding stones, 104, 106  
 Pecos, digging sticks, 190; pit covers, 116; stone balls, 115  
 Pendants, 145; stone, 142  
 Petit, Alain, 7  
 Phase indicators, projectile points, 213  
 Pigments, 156–157; hematite, 156; lime-stone, 157  
 Pinedale Black-on-Red, 53  
 Pine Lawn Phase, arrow fragments, 214; spoons, 156  
 Pipes, stone, 113, 114; tubular, 115  
 Pit covers, 115, 116  
 Plain and Indented Corrugated, 53, 56, 65  
 Plain Corrugated, 53, 56  
 Plain Corrugated with smudged interior, 53  
 Plaiting, 176, 177  
 Point of Pines, animal effigies, 156  
 Polishing stones, 99–100, 101  
 Poncho House, blades, 139  
 Pot covers, 152  
 Pottery, 53–86; artifacts, 90; bar-type graph, 53; occurrence, Cosper Cliff Dwelling, 55, 77, Hinkle Park Cliff Dwelling, 55, 78–79, O Block Cave, 54, 80–86, South Leggett Pueblo, 55, Three Pines Pueblo, 55, Wet Leggett Pueblo, 55, Y Canyon Cave, 74–76; painted wares, Reserve Phase, 56, Three Circle Phase, 63, Tularosa Phase, 53, Pine Lawn Phase, 64; plain wares, Reserve Phase, 56, Three Circle Phase, 63, Tularosa Phase, 56; restored, 64–65; seriation, 67; textured wares, Reserve Phase, 56, Three Circle Phase, 63, Tularosa Phase, 53; trade wares, Reserve Phase, 56, Three Circle Phase, 63, Tularosa Phase, 56; trends in, Cosper Cliff-Dwelling, 66–68, O Block Cave, 68–70, Y Canyon Cave, 70; wedge-bar graph, 70  
 Pottery types, alphabetical list of, 72–73; by phase, 53–64; see also Alma Incised; Alma Plain; Alma Punched; Alma Rough; Apache pottery; Cerros Red-on-White; Gray ware, corrugated neck, tooled; Incised Corrugated; Indented Corrugated with polished red, slipped interior; Indented Corrugated with red interior; Indented Corrugated with smudged interior; Kiatuthlanna Black-on-White; Linden Corrugated; MacDonald Corrugated; Mimbres Bold Face Black-on-White; Mimbres Classic Black-on-White; Mimbres Corrugated; Mimbres Neck Corrugated; Pinedale Black-on-Red; Plain and Indented Corrugated; Plain Corrugated; Plain Corrugated with smudged interior; Puerco Black-on-White; Punched Corrugated; Red Indented Corrugated; Red Indented Corrugated, smudged interior; Red Mesa Black-on-White; Reserve Black-on-White; Reserve Fillet Rim; Reserve Indented Corrugated; Reserve Smudged; St. Johns Polychrome; San Francisco Red; San Francisco Red with punched and smoothed corrugated exteriors; Smudged Decorated; Three Circle Neck Corrugated; Three Circle Red-on-White; Tularosa Black-on-White; Tularosa Fillet Rim; Tularosa Patterned-Plain-and-Indented Corrugated; Tularosa White-on-Red;

- Tusayan Polychrome; Wingate Black-on-Red  
 Prayer Rock district, figurine, 154  
 Projectile points, 89, 116-128, 138, 139, 140, 141, 213; chip, 125; corner notched, 116-118, 122, 140; diagonal notched, 118, 140; lateral notched, 120-122, 124; leaf-shaped, 118, 122-124; phase indicators, 213; Reserve Phase type, 213; triangular, 125, 158  
 Puerco Black-on-White, 56  
 Punched Corrugated, 56
- Rats, bones, 149  
 Red Indented Corrugated, 53, 56  
 Red Indented Corrugated, smudged interior, 56  
 Red Mesa Black-on-White, 56  
 Reed cigarettes, 202-203, 209, 210; occurrence of by phases, 180  
 Reserve Black-on-White, 56  
 Reserve Fillet Rim, 56  
 Reserve Indented Corrugated, 53, 56  
 Reserve Indented Corrugated, smudged interior, 64  
 Reserve Phase, 212, 213; projectile points, 213; sites of, 109  
 Reserve Phase sites, grooved ax, 141  
 Reserve Smudged, 56, 63, 65  
 Rock falls, 31  
 Ross, Lillian A., 8  
 Rubbing stones, 88, 96-99, 100, 101, 157; see also Manos
- Sacaton Phase, needles, 145  
 St. Johns Polychrome, 53  
 Salado, three quarters grooved ax, 116  
 San Augustine Plains, 17  
 Sandals, 166-170, 178-179; fishtail, 169; four-warp wickerwork, 166-169; occurrence of types by phases, 162; plaited of wide elements, 166-170; two-warp wickerwork, 166-169; typical, Reserve Phase, 214, Tularosa Phase, 214  
 Sandia points, 141  
 San Francisco Red, 56, 63  
 San Francisco Red with punched and smoothed corrugated exteriors, 56  
 San Francisco Red, Saliz Variety, 64  
 San Francisco River, 23  
 San Juan, 107  
 San Simon, three quarters grooved ax, 116  
 San Simon Branch, 107  
 Santa Cruz Phase, needles, 145  
 Saw, 138  
 Scoops, 151, 153; see also Worked sherds  
 Scrapers, 90, 128-134, 138, 139; biface, 138; end, 134, 139, 141; hollow-edged, 134, 139; planes, 135-136; serrate, 130; serrate side, 141; side, 128-134, 139
- Shell, beads, 144; bracelets, 142, 144; *Glycymeris*, 145; pendants, 144  
 Sherd counts, 53  
 Sherds, worked, 149  
 Shumapovi, painted sticks, 200  
 Sierra Ancha, 212  
 Sinagua, three quarters grooved ax, 116  
 Skinner, Robert, 8  
 Smudged Decorated, 56  
 Snaketown, twilled matting, 176  
 Snaketown Phase, needles, 145  
 Sonora, 145  
 South Leggett Pueblo, pottery, 67  
 Spatulas, 194  
 Spindle whorls, 150, 153; see also Worked sherds  
 Spoons, 156  
 Squirrels, bones, 149  
 Starkweather Ruin, clay effigies, 156; worked slabs, 110  
 Stone artifacts, ground and pecked, 88; see also Axes, Manos, Metates  
 Storage pits, 213  
 SU, bracelets, 145; pit covers, 116; stone balls, 114  
 Swarts Ruin, bracelets, 145; metates, 107; talisman, 145; worked sherds, 153; worked slabs, 110
- Tablitas, 200-202, 209, 214  
 Talisman, 145  
 Texas, arrow shaft straighteners, 112; wickerwork sandals, 169; see also Hueco area  
 Textiles, 164-179; occurrence of types by phases, 162  
 Thompson, George, 8  
 Three Circle Neck Corrugated, 53, 63, 65, 140  
 Three Circle Red-on-White, 63, 140  
 Three Pines Pueblo, animal effigies, 156; pottery, 67  
 Time indicators, 213  
 Toggles, 195  
 Tongs, split-stick, 194  
 Toys, 156  
 Trash areas, 107  
 Tres Alamos, arrow shaft straighteners, 112  
 Trowels, bark, 209, 210; bark and wood, 190-191, 192  
 Tubes, bone, 149  
 Tularosa Black-on-White, 53  
 Tularosa Cave, 101, 106; animal effigies, 156; artifacts, wood, 208; atlats, 184; awl, wood, 196; basketry, coiled, 173; beads and pendants, 145; bows, 187, 189; burred sticks, 195; carrying-loop chain, 165; ceremonial equipment, 210; charred, shouldered, pointed sticks, 195; cloth, 170; cordage, 159, 163; cordage and textiles, 178; corn cobs

- mounted on sticks, 206; dice, wood, 204; digging sticks, 190; fiber coils, 165; figurines, 154; fire drill hearths, 193; fur and feather cord, 163, 164; knots, 165; ladles, miniature, 156; malachite, 157; matting, twilled, 174; net, 172; painted sticks, 200, 209; plaited sandals, 169; projectile points, 138, 140, 213; reed, cigarettes, 203, 209, flute, 204, 209; scrapers, 141; spatulas, 194; stone balls, 114; toggles, 195; tongs, split-stick, 194; trowels, bark, 192, 209, wood, 192; tubular pipes, 115; wicker-work sandals, 168, 169
- Tularosa Fillet Rim, 53, 56, 65
- Tularosa Indented Corrugated, 65
- Tularosa Patterned-Plain-and-Indented Corrugated, 53, 56
- Tularosa White-on-Red, 65
- Turkey Foot Ridge, figurine, 154; grooved ax, 141; miniature ladles, 156; pit covers, 116; stone balls, 115
- Turner, Frank, 8
- Tusayan Polychrome, 56
- Upper Gila Area, arrows, 189; awls, wood, 196; bow, 188; braid, 177; cloth, 170; cylinders, wood, 198; fire drill hearths, 193; projectile points, 139; reed flutes, 204; worked slabs, 110
- Ventana Cave, awls, wood, 196; arrows, 189; basketry, coiled, 173; burred sticks, 195; cloth, 170; cylinders, wood, 198; digging sticks, 190; fur cord, 164; knots, 165; matting, twilled, 176; reed flutes, 204; spatulas, 194; tongs, 194; wickerwork sandals, 168, 169; yucca leaf spine needle, 196
- Village of the Great Kivas, jar stoppers, 115
- Wet Leggett Pueblo, pottery, 67
- White Dog Cave, net, 172, 178
- Winchester Cave, burred sticks, 195; fire drill hearths, 193
- Wingate Black-on-Red, 56
- Wooden awls, 196
- Wooden cylinders, 196-198
- Worked sherds, 149-152, 153
- Worked slabs, 108-110; door, 108
- Wyant, Robert, 8
- Y Canyon, 157
- Y Canyon Cave, 29; fill, 26; location, 17; methods of excavation, 24; natural levels, 26; surface indications, 17
- Zuni sites, three quarters grooved ax, 116



















UNIVERSITY OF ILLINOIS-URBANA



3 0112 041838654