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THE ARCHAEOLOGY OF CASTLE PARK DINOSAUR NATIONAL MONUMENT

BY
ROBERT F. BURGH
AND
CHARLES R. SCOGGIN
WITH APPENDICES BY
EDGAR ANDERSON
RICHARD E. PILLMORE
VOLNEY H. JONES

UNIVERSITY OF COLORADO PRESS
BOULDER, COLORADO, OCTOBER, 1948

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PREFACE

This report on the antiquities of Castle Park is the first result of a comprehensive study of the archaeology and natural history of Dinosaur National Monument, begun and to be continued by the University of Colorado Museum with the co-operation of the National Park Service.

The field work described here was done in 1939 and 1940 by Charles R. Scoggin, at that time Student Assistant at the Museum, and Edison P. Lohr of Loveland, Colorado. The excellence of their work in Castle Park is a tribute to their professional integrity and to their perseverance under sometimes difficult circumstances. The field records made by Scoggin testify to accurate and detailed observation.

Publication of the research in Castle Park would naturally have been a labor and a reward for Scoggin but for his tragic death in the war. He was killed in action at Anzio Beachhead, Italy, on February 2, 1944. The events of his personal ife and his work in archaeology have been related with appreciation and under-tanding by Dr. Frank H. H. Roberts, Jr. (*American Antiquity*, vol. 10, pp. 98–201, 1944).

In August, 1947, the work of preparing a report on the archaeology of Castle ark was assigned to me. The sources I have used are as follows: field notes, cata-g data, photographs and drawings made by Charles Scoggin, and his preliminary ports to the National Park Service in 1940 and 1941; reconnaissance data in ational Park Service files at Dinosaur National Monument and Rocky Moun-n National Park; and other information which I obtained during a brief visit the Monument with National Park Service officials in October, 1947. Photo-aphs of the canyon and the excavations (Plates 1 to 12) and text illustrations gned C. R. S. were made by Scoggin. The rest of the photographs were made by ichard G. Beidleman, Student Assistant, University of Colorado Museum, and e rest of the drawings were made by me. Responsibility for the interpretation Scoggin's work is entirely my own.

For services, professional aid, and encouragement it is a pleasure to make knowledgement to the following persons:

To Mr. and Mrs. Charley Mantle, of Castle Park, who gave permission to ex-vate on their property, and who helped in many ways to make life comfortable in e field, often at great inconvenience to themselves.

For professional counsel and aid in research, to Dr. Earl H. Morris, Division of storical Research, Carnegie Institution of Washington; Dr. John Clark, Cura-of Physical Geology, Carnegie Museum; Dr. Edgar Anderson, Geneticist, issouri Botanical Garden; Mr. and Mrs. G. E. Unterman, Utah Field House of tural History; Mr. F. Martin Brown, Fountain Valley School; Mr. Lowell

Swenson, Technical Assistant to the Director, and Mr. Richard E. Pillmore, Student Assistant, University of Colorado Museum; Dr. William A. Weber, Biology Department, Dr. Omer C. Stewart and Mr. Robert H. Lister, Department of Anthropology, University of Colorado; Mr. Volney H. Jones, Curator of Ethnology, Museum of Anthropology, University of Michigan.

For administrative assistance, field services, and authorization for field work in the Monument, to the following officials of the National Park Service: Mr. David H. Canfield, Superintendent, Rocky Mountain National Park; Mr. Jesse L. Nusbaum, Senior Archaeologist, Department of the Interior; Dr. Jesse D. Jennings, Archaeologist, Region Two; and Mr. Jess H. Lombard, Custodian, Dinosaur National Monument.

For preparation of the typescript, to Mrs. Catharine Amy, Miss Patricia Martin, and Mrs. Marion Stagner.

To Dr. Hugo G. Rodeck, Director, University of Colorado Museum, I am especially indebted both for facilities and for encouragement in the work of completing the project.

ROBERT F. BURGH

UNIVERSITY OF COLORADO MUSEUM
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THE ARCHAEOLOGY OF CASTLE PARK DINOSAUR NATIONAL MONUMENT

CHAPTER I

INTRODUCTION

Dinosaur National Monument is new in the literature of archaeology, but old in the annals of human experience. The traces of aboriginal life in its remote and inaccessible canyons are the subject of our present study; the more recent history of its exploration and settlement by white men, although of equal interest, must here receive only cursory treatment.

Early Exploration

The first white man to describe the Monument region was Father Escalante, a Franciscan Friar. With a small party that included Miera, the cartographer, he traveled overland from Santa Fe, New Mexico, to the Great Salt Lake. The party crossed the Green River near Jensen, Utah, and, in September, 1776, camped for three days near the present location of Monument headquarters within sight of Split Mountain (Bolton, 1928). They did not explore any of the canyons above the crossing.

William Henry Ashley, prominent in the fur trade, was the second man to record his presence in the Monument. In 1825, with a party of six trappers, he made a boat trip down the Green River through southwestern Wyoming and northeastern Utah. On this trip the party ran the dangerous waters of the Lodore Canyon, where Ashley inscribed his name and the date of his passage on the cliff. In Echo Park, at the junction of the Yampa River with the Green, Ashley saw "a number of buffaloe" (Dale, 1918, p. 146).

In 1849, William Lewis Manly joined forces with six others, bound for California to make the same perilous trip down the Green River and through the Lodore Canyon. His story, from which the following extract is taken, is a dramatic one.

Some days we did not go more than four or five miles, and that was serious work, loading and unloading our canoes and packing them over the boulders, with only small streams of water

curling around between them. We went barefoot most of the time, for we were more than half of the time in the water, which roared and dashed so loud that we could hardly hear each other speak. . . . On the high peaks above our heads we could see the Rocky Mountain sheep looking defiantly at us from their mountain fastnesses, so far away that they looked no larger than jack rabbits. (Quaife, 1927, p. 96)

For the early traders and emigrants, the Green River was a thoroughfare. Later explorers risked the rapids for other purposes—first for science and then for sport. Major J. W. Powell, the one-armed Civil War veteran who founded the Geological Survey, ran the Lodore Canyon in 1869, and again in 1871. The members of his party explored the Yampa River as well as the Green, and they were the first to report on the geology of the Monument region (Powell, 1875).

The first settler in the canyons was Pat Lynch, called the "hermit of Pat's Hole." For many years he roamed the canyons in solitude, only occasionally meeting a party of explorers or wanderers before the region was homesteaded. Among the first settlers were the Chew family who took up land in Pat's Hole in the Yampa Canyon a mile or so above its junction with the Green River.

In 1919, Charley Mantle homesteaded in Castle Park about ten miles above Pat's Hole in Yampa Canyon. Charley Mantle was the first man to take any significant notice of the prehistoric ruins in Castle Park, and he and his wife were the first persons to take an interest, beyond mere curiosity, in their meaning and preservation. In the years of their residence they have been friendly and helpful to many parties of explorers and scientists visiting the canyon.

Archaeological Exploration

Between 1921 and 1947, Dinosaur National Monument has been visited many times by persons interested in the antiquities of Yampa Canyon. All of these tours of exploration were of short duration; the published accounts are brief and almost entirely descriptive, with little attempt to determine the age or cultural affiliation of the prehistoric occupation. The following chronological record of exploration summarizes the results of archaeological reconnaissance and excavation in the Monument area.

1921 L. S. McCandless, with a party of four from Craig, Colorado, explored Castle Park. His observations were published in the *Steamboat Pilot*, February, 1921 (Jeancon, 1927).

1927 J. A. Jeancon, Archaeologist, Colorado State Historical Society, explored Lizard Canyon, south of the Yampa River. His observations, with a review of the McCandless investigations, were published in the *Colorado Magazine*, January, 1927.

In the same year, Junius Henderson published a brief reference to "per-

sistent rumors" of prehistoric ruins in northwestern Colorado (Henderson, 1927).

1933 In the early summer of 1933, the DuBois Expedition spent two days in Castle Park. Later in the same year the adventures of this expedition were chronicled in the Sunday Magazine Section of the *Washington* (D. C.) *Post*. After the DuBois Expedition, a party representing the Colorado Biological Survey explored Castle Park in August, 1933, under the leadership of F. Martin Brown. An account of their observations was published in a brief but well-illustrated descriptive article in *Southwestern Lore*, September, 1937. Mr. Brown collected tree-ring sections of living trees, which he has given to the University of Colorado Museum. His preliminary study of tree-ring chronology for the region was published in *Antiquity*, December, 1937.

1936 A party representing the Colorado Mountain Club explored the Yampa Canyon. The observations of Richard Morris and others, with a commentary by Marie Wormington, appeared in *Trail and Timberline*, January, 1937.

1939 In the early summer, Frank C. Lee and J. R. Jones of Boulder, Colorado, visited Castle Park and explored Mantle's Cave. Their specimens (Cache No. 2 in the Castle Park Collection) and data were given to Earl H. Morris, who in turn gave them to the University of Colorado Museum, of which he is an Associate. In November of the same year, Hugo G. Rodeck, Director, University of Colorado Museum, and Charles R. Scoggin made a trip to Castle Park to consider prospects for intensive archaeological work. A month later, Scoggin returned with Edison P. Lohr of Loveland, Colorado, to set up camp for a season of excavation.

1940 Scoggin and Lohr surveyed Castle Park and excavated Mantle's Cave. A permit to excavate on public land was granted by the Secretary of the Department of the Interior.

In May, 1940, Earl H. Morris, Hugo G. Rodeck, and Robert F. Burgh made a visit to Castle Park to review the work of Scoggin and Lohr.

1941 Under a temporary appointment as a Park Ranger, Scoggin incidentally continued archaeological reconnaissance in Dinosaur National Monument outside Castle Park.

1942 A survey party of the National Park Service made a reconnaissance by boat of reservoir areas proposed for construction, by the Bureau of Reclamation, on the Yampa River. The members of the party were David H. Canfield, Gordon C. Baldwin, Dan Beard, Harold Ratcliff, and Charles R. Scoggin of the National Park Service; Frank M. Setzler of the Smithsonian Institution; and Bus Hatch and Roy Despain, boatmen.

1947 David H. Canfield, Superintendent, Rocky Mountain National Park, and Hugo G. Rodeck took action to complete the work begun in the Monument by the University of Colorado Museum. In October, 1947, a brief field survey of the project was made by the following men: Jesse L. Nusbaum, Senior Archaeologist, Department of the Interior; Jesse D. Jennings, Archaeologist, Region Two; Jess H. Lombard, Custodian of the Monument; and Robert F. Burgh, of the University of Colorado Museum.

In addition to the explorations cited, the Custodian of the Monument and other National Park Service employees have engaged in reconnaissance, maintenance, and educational activities. Archaeological activities involving the National Park Service have been described in various preliminary reports to administrative agencies. A summary of the observations of the river survey in 1942 by Gordon C. Baldwin was published in the *Kiva*, March, 1947.

The Archaeology of Castle Park

This study is concerned in detail with the antiquities of Castle Park in the Yampa Canyon, and more particularly with the excavation of Mantle's Cave. Our presentation is primarily descriptive and analytical, but we have attempted to relate local antiquities to those in neighboring areas.

We find that the culture of Castle Park is virtually identical with the Fremont culture on the Green River and its tributaries in east-central Utah. The Fremont culture, in turn, shows a close affinity to the earlier phases of the Basket Maker-Pueblo culture (collectively called Anasazi), whose classical manifestation is found in the San Juan River drainage.

Anasazi culture is sufficiently well known so that an elaborate description of it is scarcely required for our immediate purpose. We need to remark, however, that recent archaeological studies in the San Juan region have revised our older conception of prehistoric events. Since Morris (1939) and Brew (1946) have presented evidence of a *continuum*, in both population and culture, lasting from about 200 to 1300 A.D., our views of cultural contact with other areas must be revised. Transmission of cultural traits from one group to another must be regarded as a continuous process over many centuries, without sudden or extensive changes involving wholesale migration or militant colonization.

The present relevance of Anasazi culture to Fremont culture, as manifested in Castle Park, is almost entirely a matter of chronology. For that reason, we have omitted the conventional schedule of cultural periods. Instead, for purposes of comparison, we have used the dates listed below for the earliest appearance in the San Juan region of cultural traits found in Dinosaur National Monument. Period designations of the Pecos Classification are given for convenience of reference to the literature.

Trait	*Century A.D.*	*Pecos Classification*
Coiled Basketry	III	Basket Maker II
Slab-lined Pits	III	Basket Maker II
Fur Cloth	III	Basket Maker II
Twined Tule Matting	III	Basket Maker II
Basket-molded, Unfired Pottery	III	Basket Maker II
Netting	III	Basket Maker II
"Medicine" Pouch	III	Basket Maker II
Sheephorn Wrench	III	Basket Maker II
Tubular Pipe	III	Basket Maker II
Corn	III	Basket Maker II
Squash	III	Basket Maker II
Spear Thrower (Atlatl)	III	Basket Maker II
Metate	IV	Basket Maker II
Feather Cloth	V	Basket Maker III
Plain Gray Fired Pottery	V	Basket Maker III
Black-on-Gray Decorated Pottery	V	Basket Maker III
Bow and Arrow	VI	Basket Maker III
Adobe Turtlebacks	VI	Basket Maker III
Rubble Masonry on Slab Footing	VI	Basket Maker III
Beans	VII	Basket Maker III
Slipped Surface on Pottery	VIII	Pueblo I
Cranial Deformation	VIII	Pueblo I

For the reconstruction of ancient events on the Green River and the Yampa, the chronology of the traits listed above is the basic datum. We now have reason to believe that the Northern Periphery, as the culture province of northern Utah and northwestern Colorado is called, may eventually stand on its own feet chronologically, but at present the timetable of the Anasazi in the San Juan is our soundest source.

Whatever the outcome of later research may be, the studies thus far accomplished in Dinosaur National Monument are only a skirmish in the general campaign for understanding early civilizations. Therefore, our present inquiry is correspondingly limited.

CHAPTER II

ENVIRONMENT

Dinosaur National Monument is a wilderness area that occupies more than 300 square miles in northwestern Colorado and northeastern Utah. Its approximate coordinates are latitude 40° 50′ north and longitude 108° 50′ west. The extremes of altitude are 4800 feet at river level on the western side and 9005 feet at the summit of Zenobia Peak in the northeast. Within the boundaries of the Monument there is a great diversity of features to attract both laymen and scientists, but our present concern is with the archaeology of Yampa Canyon, on the Colorado side of the Monument. Other features of interest, although worthy of detailed study in their own right, here serve only to provide a setting for the cultural history of the region.

Physiography

Stratigraphically, Dinosaur National Monument is a part of the Colorado plateau province, and the sedimentary rocks of which it is formed are widely distributed elsewhere in the Colorado River drainage (Unterman and Unterman, 1946). In spite of stratigraphic identity, however, the local landscape is unique. The massive rock strata have been folded, faulted, and sculptured by erosion into spectacular forms. West of the Green River, in Utah, the folded strata have been deeply eroded, and in many places the formations stand almost vertical. In the Morrison formation, of the Jurassic series, we find the largest of the fossil dinosaurs —the primary attraction of the Monument.

East of the Green River, along the Yampa River in Colorado, the sedimentary rocks lie almost horizontal. A few miles south of the Yampa, folded mountain masses rise nearly 3000 feet above the river. Beyond these, other folds have been reduced by erosion to form receding ramparts of hogbacks which blend into other topographic forms along the White River drainage. North of the Yampa, the terrain rises more or less with the inclination of the rock strata, again to mountain height.

The most spectacular canyons of the Green and the Yampa Rivers have been included within the boundary of the Monument. Lodore Canyon, a deep narrow gorge on the Green River above the junction with the Yampa, has long been famous among traders, boatmen, and pioneers. Its walls rise in places almost vertically to a height of 2000 feet. The canyon of the Yampa, above the junction, is less rugged than the Lodore, but offers greater variety and beauty (Plate 1). At intervals of two to five miles its high cliffs draw away from the river to form

open parks, one to three square miles in area. Between the junction with the Green River on the west and the eastern boundary of the Monument, within an airline distance of 25 miles, there are four parks suitable for habitation, and two or three others of smaller size. Along this route the Yampa River meanders at an elevation of about 5200 feet for 45 miles on a tortuous course between the canyon walls. In many places the cliffs are sheer; elsewhere they break away to form high terraces and steep slopes which grade upward to the level of the mountains on both sides. The cliffs are formed of the Weber sandstone, locally a loosely-cemented formation of water-laid deposits, 800 to 1450 feet thick, laid down in Pennsylvanian time. The formation dips toward the south at an angle of about six degrees.

There are four topographic features of particular relevance to the study of ancient culture along the Yampa River. These are caves, terraces at river level, high benches along the skyline of the cliffs, and the extensive plateau-like summits of the mountains.

Caves. In the Weber sandstone, caves are formed along the contact lines of thin strata of shale at all altitudes from river level to the top of the cliffs. Because of the dip of the strata, only those caves which face toward the north are dry; those with a southern exposure, otherwise more suitable for habitation, are subject to continuous seepage.

The caves range in size from small shelters beneath outcropping ledges to great arches 400 feet wide and more than 100 feet high. Since the cave floors slope steeply downward in front from the line of shale contact, they are rarely suited for occupancy except where later deposits accumulate upon the rocky incline to form a level interior. Usually rocks from the roof of the cave and from the cliff above it lodge on the slope to form an anchorage for alluvium and wind-blown dust. Afterwards, the new material is secured by vegetation along the front of the cave, and the deposits continue to accumulate until a high talus cone is formed at the mouth of the cave. Finally alluvium from the cliff overhead strikes this cone and washes back into the cave to form a level floor. The full cycle of cave formation is rarely found in this ideal form, and it is evident that a very favorable combination of circumstances is necessary to produce a shelter suitable for human occupancy.

River Terraces. On the canyon floor low terraces are formed which grade upward from river level 150 or 200 feet to the foot of the cliffs. The contours of the lower terrace rims are annually changed during the season of high water. During the spring run-off and after occasional storms, flash floods dissect the terraces near the cliffs, producing a series of broad, gently-sloping tongues of land along the river. In the narrows of the canyons, occasional small terraces, islands, and bars are frequently subjected to the caprice of fast flood water in the main channel.

In the tributary canyons of the Yampa (for example Hells Canyon and Red

Rock Canyon) the width of the canyon floors is insufficient for extensive terracing. Deposits of alluvium and wind-blown material grade sharply down from the cliffs to the dry channel of the intermittent stream. Unlike the canyon of the Yampa, which has been cut by a live stream, the side canyons have been formed by headward erosion (Mantle's Cave is one stage in that slow process) and they have the familiar character of box canyons in other parts of the Colorado plateau.

Benches. At the top of the cliffs, broad benches and an occasional isolated mesa have been developed by removal of overlying formations from the resistant surface of the Weber sandstone. These benches, 600 to 1200 feet above the river, have been dissected by intermittent streams fed from the mountains. The present surface of the benches is a series of ridges which slope gently from the mountain escarpments to the brink of the cliffs.

Mountain Summits. The mountains north and south of the Yampa River are actually extensive tablelands. Douglas Mountain on the north has a maximum elevation of 7586 feet, and the broad surface of the summit, above the 7000-foot contour line, is 25 or 30 square miles in area. Blue Mountain, to the south, has a maximum elevation of 8717 feet, and an area of perhaps 50 square miles above the 7000-foot contour line. The mountains are bordered on all sides by abrupt escarpments and steep talus slopes. Recent erosion has formed shallow valleys betwen masses of resistant rock, but there are no deep canyons or gorges.

Climate

Since we lack long-term weather observations for Dinosaur National Monument, we can discuss the climate only in general terms. The most significant data perhaps are the tree-ring patterns found in both ancient and modern wood. These show a surprising conformity with the tree-ring patterns in southwestern Colorado, southeastern Utah, and northern Arizona; living trees in the area, both at river level and on the higher benches, show this same conformity. The average annual precipitation is greater than in the arid Southwest, but the cycles of drouth appear to correspond.

Within the Monument, precipitation and temperatures vary with altitude. The summits of the mountains are mantled with snow for long periods; and, as in other parts of northwestern Colorado, the winters can be bitterly cold. On the canyon floor in Castle Park snowfall is rarely more than three or four inches during any one storm, and it lingers only a few days on the ground; zero weather is uncommon and of brief duration.

Farming, practiced now only in the parks on the canyon floor, is restricted to orchard and garden crops. The growing season normally is May 1 to October 15. On the Mantle ranch in Castle Park sweet corn, garden crops, and fruit trees are cultivated under irrigation; crop failures are rare and the yield is unusually abundant. Although rumors of ancient irrigation channels persist in the locality, their

existence remains to be verified; but it is quite probable that flood-water farming, controlled by diversion ditches, was practiced here in ancient times as it is today by the Pueblo Indians.

Fresh-water springs and an occasional "bad water" spring are found throughout the Monument at almost all altitudes. With this source, and the perennial flow of the river, the ancient people had an adequate water supply. Of course, the springs might fail during a prolonged period of drouth, but no such failure has occurred in modern times. And even in midsummer the spring in Hells Canyon on the Mantle ranch flows in sufficient volume to irrigate garden and orchard.

Natural History

From the archaeologist's point of view, the life forms in the Yampa Canyon show a striking similarity to those found along the San Juan and Colorado Rivers in southern Utah and northern Arizona. The Yampa region is more verdant and less barrenly eroded than the canyon country farther south; it may represent an environment that once prevailed more widely on the Colorado plateau. A comprehensive biological survey can be expected to provide an accurate census of flora and fauna for comparison with both modern and ancient species in other parts of the Southwest.

Sagebrush, service berry, mountain mahogany, and oak are the common shrubs; they grow most abundantly on the mountain summits where there is no timber cover. Thickets of willow are common along the Yampa River. Pinyon pine and juniper grow on talus slopes and terraces in the canyons, where they form a dense cover on the high benches above the cliffs. Their upper limit, along the mountain escarpments, is about 7200 feet. Cottonwood and box-elder grow on the canyon floor near live streams and springs; and rabbit brush, mormon tea, and cactus are characteristic of the canyon floor. Among the flowering plants are primrose, sego lily, pentstemon, columbine, and Indian paintbrush.

Among the mammals of the area are deer, cottontail, porcupine, beaver, muskrat, chipmunk, badger, mountain lion, lynx, bobcat, swift fox, coyote, and ringtail. Mink and jackrabbit are rare. Birds reported are sapsucker, camp robber, red-shafted flicker, bluebird, robin, magpie, buzzard, bluejay, goose, and heron. Sage hen and grouse sometimes are seen in the mountains. Reptiles of the canyons include lizards, horned lizard, water snake, bull snake, and (rarely) rattlesnake. In the Yampa River, catfish and a giant species of minnow, locally called whitefish, are found.

At present the region is a refuge for wild life, and we think it unlikely that the ancient inhabitants found game as plentiful as it is now. We have little information as yet on the identity of species in prehistoric times, but they were certainly not the same as at present. Buffalo, antelope, and mountain sheep, for example are no longer native.

CHAPTER III

ABORIGINAL SITES

In the Yampa Canyon aboriginal sites can be most conveniently considered according to their topographic occurrence, as follows: (1) caves, terrace sites, and cliff murals below the canyon rim; (2) surface sites on the benches above the canyon rim; and (3) surface sites on the mountain summits. In this classification no cultural identities are implied since our knowledge of the upland sites is as yet too meager for comparison. Mantle's Cave, Hells Midden and the murals are separately treated in later sections of this chapter and following chapters. For the rest of the sites, our limited information is summarized in this chapter.

Sites in Castle Park and Vicinity

Sites in Castle Park are indicated by name and number on the accompanying map, Figure 1. Sites outside of Castle Park are not numbered. These are referred to by name or geographic location; more nearly precise designation must be postponed until further work is done in the field.

CAVE SITES IN CASTLE PARK

Despite a considerable range in size, all of the caves in Castle Park have certain features in common, which can be summarized as follows:

a. Almost no evidence of residential use. Smoke stains, fire places, house floors, and midden deposits are rarely found.

b. Small structures for the storage of corn and other foodstuffs. These storage chambers occur in a variety of forms: masonry granaries, slab-lined pits, and potholes, with or without basketry liners or covers.

c. The general use of the caves and shelters as hide-aways for a variety of perishable articles: baskets, nets and snares, ceremonial objects, wooden implements, etc.

d. The absence of skeletal remains.

e. Almost complete absence of pottery.

The following inventory includes only the caves in the vicinity of Castle Park known to contain cultural remains. Barren caves and others not yet explored have been omitted. The data are summarized from field records of the Museum expedition of 1940 and National Park Service reconnaissance in 1941 and 1942.

Site 1. Mantle's Cave

Location: A large vaulted cave at head of a short box canyon, 0.4 mile downstream from mouth of Hells Canyon. (See Plate 2.)

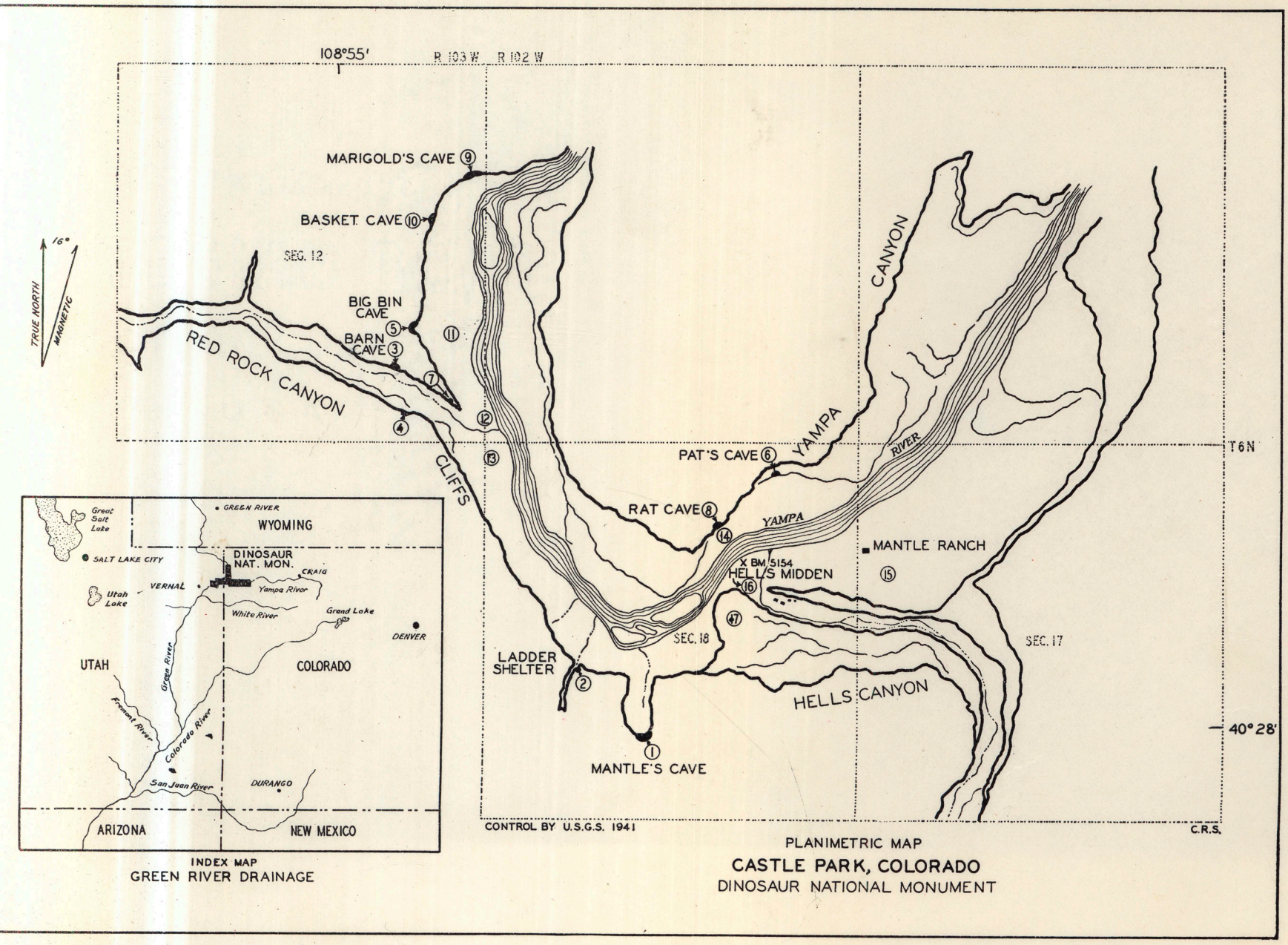


FIGURE 1. Map of archaeological sites in Castle Park, with index map of region surrounding Dinosaur National Monument

Coordinates: SE ¼ SW ¼ Sec. 18. T. 6 N. R. 102 W.
Floor: 360 feet long, 133 feet wide—level, stable, and dry.
Elevation: 155 feet above the river.
Exposure: North.
Prior Reference: Dubois, 1933. Cave I (Brown, 1937), Cliff Canyon Cave.
Archaeology: Cultural remains found before 1940 Museum expedition: masonry granaries, basketry, corn cobs, cordage, matting, objects of bone, stone, and wood. The results of the 1940 excavations are described below ("Archaeology of Mantle's Cave," p. 22).

Site 2. Ladder Shelter

Location: A small cave in the east cliff of Ladder Canyon at junction with Yampa Canyon, south of river.
Coordinates: NW ¼ SW ¼ Sec. 18. T. 6 N. R. 102 W.
Floor: 30 feet long, 25 feet wide. Extends outward to form terrace beyond shelter of cliff.
Elevation: About 200 feet above the river.
Exposure: Northwest.
Archaeology: Test trench in 1940 yielded three projectile points and a few corn kernels in shallow deposits. Murals occur on large rock in middle of cave. (See Chapter IV, "Cliff Murals.") Scattered poles on floor may be remains of historic Indian wickiups or camp debris of pioneers in the canyon.

Site 3. Barn Cave

Location: A large cave located at the base of cliff on north side of Red Rock Canyon, 0.3 mile above junction with Yampa Canyon.
Coordinates: NW ¼ SE ¼ Sec. 12. T. 6 N. R. 103 W.
Floor: 180 feet long, 20 feet wide. Surface level. Deposits compact, because of dampness. Floor fronts on a steep talus slope.
Elevation: About 60 feet above the stream channel of Red Rock Canyon.
Exposure: South.
Archaeology: Near center of cave, strata of midden material two to four feet thick can be seen. Test trench in 1940 yielded a storage pit with mud imprint of basketry superstructure, and stone artifacts, corn, basketry fragments, bone, etc. Smoke stains on cave wall, presence of midden material and southern exposure indicate more than casual occupation of the cave.

Site 4

Location: A narrow shelter at crest of steep talus slope on south side of Red Rock Canyon, 300 feet downstream from Site 3.

Coordinates: SW ¼ SE ¼ Sec. 12. T. 6 N. R. 103 W.
Floor: 65 feet long, 10 feet wide.
Elevation: About 80 feet above the stream channel of Red Rock Canyon.
Exposure: Northeast.
Archaeology: No surface trace of occupation. Test trench in 1940 uncovered four pothole storage pits and one slab-lined pit. These contained scraps of cedar bark, but no artifacts except a scrap of buckskin and a stone flake.

Site 5. Big Bin Cave

Location: A large vaulted cave in Yampa Canyon, south of river, 0.2 mile downstream from mouth of Red Rock Canyon.
Coordinates: SE ¼ SE ¼ Sec. 12. T. 6 N. R. 103 W.
Floor: 200 feet long, 10 feet wide. A long narrow strip of soil along back of cave, fronting on a steep rocky incline under the overhang of the cliff.
Elevation: About 200 feet above the river level.
Exposure: East.
Prior Reference: Caves? (Brown, 1937).
Archaeology: Contains remnants of one masonry granary. Test excavation in 1940 yielded basket fragments and stone artifacts. Fifty yards south of the main cave a waterpocket in the cliff, called the Key Hole, contains two masonry granaries. These still stand to a height of five courses. Fallen sections of mud turtlebacks which formed the top of the granaries are present in abundance, Plate 20*c*.

Site 6. Pat's Cave

Location: A tunnel-like cave at the upper end of Castle Park, across the river opposite Mantle's ranch.
Coordinates: NE ¼ Sec. 18. T. 6 N. R. 102 W.
Floor: 40 feet across front, 150 feet from front to back.
Elevation: About 150 feet above the river.
Exposure: Southeast.
Archaeology: No surface indication. Floor deposits appear to be several feet deep and merit investigation.

Site 7. Buck Shelter

Location: A small cave in north cliff at mouth of Red Rock Canyon.
Coordinates: SE ¼ SE ¼ Sec. 12. T. 6 N. R. 103 W.
Floor: 9 feet across front, 21 feet from front to back.
Elevation: 25 feet above the nearby stream channel of canyon.
Exposure: Southeast.

Prior Reference: Cave 2 (Brown, 1937).

Archaeology: Contains a few petroglyphs and recent autographs. Test excavations in 1940 revealed shallow and virtually sterile deposits.

Site 8. Rat Cave

Location: A narrow, tunnel-like cave across river from mouth of Hells Canyon.

Coordinates: NE ¼ Sec. 18. T. 6 N. R. 102 W.

Floor: 12 feet across front, 50 feet from front to rear. Pack-rat debris which filled the back of the cave has been burned out in recent years.

Elevation: About 70 feet above the river.

Exposure: Southeast.

Archaeology: Scattered flint chips at front of cave.

Site 9. Marigold's Cave

Location: A large vaulted cave at lower end of Castle Park, south of the river.

Coordinates: NE ¼ NE ¼ Sec. 12. T. 6 N. R. 103 W.

Floor: Two narrow rock ledges, 10 to 20 feet wide, along back of cave, above very steep rock slope. The upper ledge is difficult of access.

Elevation: About 300 feet above the river.

Exposure: Southeast.

Prior Reference: Caves 3 and 4 (Brown, 1937). Jeancon, 1927.

Archaeology: Ledges contain remnants of five house floors or living areas, fire places, and remnants of masonry granaries. A masonry granary on the upper ledge, three by three and one half feet in diameter is divided into four compartments by cross walls of mud and vertical sticks. (See Figure 5.) The cliff behind the floor areas shows no color contrast, as might be expected if masonry-walled rooms once existed above the living areas, and there is no masonry debris to suggest the former presence of walls. On the lower ledge, a short section of wall remains, but this is merely a line of rough uncut stones, haphazardly laid without mortar.

Site 10. Basket Cave

Location: A large vaulted cave at the lower end of Castle Park, 0.1 mile upstream from Marigold's Cave.

Coordinates: SE ¼ NE ¼ Sec. 12. T. 6 N. R. 103 W.

Floor: A bench with a maximum width of 40 feet, covered with sand and fallen rocks. The rock surface descends abruptly in front to the terrace below. The overhang of the cliff extends more than 100 feet forward from the floor.

Elevation: About 200 feet above the river.

Exposure: East.

Archaeology: Before 1940, Basket Cave had been visited only by members of the Mantle family. No surface remains of occupation were in evidence, and no digging had ever been done. In 1940, the cave floor was trenched by the Museum party.

The specimens from Basket Cave, although numerous, were mostly fragmentary. However, they are of great value as a series for comparison with artifacts from Mantle's Cave.

RIVER TERRACE SITES IN CASTLE PARK

Surface sites in Castle Park are located upon spurs of land and rocky benches near the river. All of them are badly eroded. Aboriginal occupation is indicated by stone artifacts, burnt rocks, and scraps of charcoal. Although these remains represent camp sites of considerable extent, occupational debris is found at only two sites—Hells Midden and Rat Midden. At the other sites, midden deposits have long since been washed away by floods.

No tipi rings or other house remains have been observed on the river terrace sites.

Site 11

Location: Surface site on sandy terrace below Big Bin Cave.
Coordinates: NE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 12. T. 6 N. R. 103 W.
Elevation: About 75 feet above the river.

Site 12

Location: Surface site on sandy terrace on downstream side of junction of Red Rock Canyon drainage with the Yampa River.
Coordinates: SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 12. T. 6 N. R. 103 W.
Elevation: About 50 feet above the river.

Site 13

Location: Surface site on sandy terrace upstream from junction of Red Rock Canyon drainage with the Yampa River.
Coordinates: NW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 18. T. 6 N. R. 102 W.
Elevation: About 40 feet above the river.

Site 14. Rat Midden

Location: Midden deposit north of river, below Rat Cave.
Coordinates: NE $\frac{1}{4}$ Sec. 18. T. 6 N. R. 102 W.
Elevation: 50 feet above the river.

Archaeology: The midden material extends nearly 400 feet along the ledge. It ranges in depth from a few inches to 14 feet. No testing or trenching has been attempted.

Site 15

Location: Surface site on terrace immediately north of the Mantle Ranch.
Coordinates: SW ¼ NW ¼ Sec. 17. T. 6 N. R. 102 W.
Elevation: About 75 feet above the river.

Site 16. Hells Midden

Location: Midden deposit south of river, below junction with Hells Canyon.
Coordinates: SW ¼ NE ¼ Sec. 18. T. 6 N. R. 102 W.
Elevation: About 35 feet above the river.
Archaeology: Midden deposit 200 feet long and 14 feet deep. Test trenches dug in 1940 and 1947 by Museum parties. This site is more fully discussed below ("Archaeology of Hells Midden," p. 26).

Site 17 (Hells Half Acre)

Location: Surface remains on terrace above Hells Midden.
Coordinates: SW ¼ NE ¼ Sec. 18. T. 6 N. R. 102 W.
Elevation: 60 to 100 feet above the river.
Archaeology: Scattered stone implements, burnt rocks, and flakes on terraces and ledges above Hells Midden are all that remain of what must have been an extensive camp site. Erosion and modern cultivation have removed almost all trace of the settlement which accumulated the kitchen debris now contained in the enormous midden below the ledge.

SITES ON BENCHES ABOVE THE CLIFFS

Aboriginal sites are numerous and extensive in the cedar brakes overlooking the canyon, 600 to 1000 feet above the river. The characteristic location is on spurs of land between deeply eroded gullies.

Fire hearths and burnt stones are exposed at the surface. Chipped stone implements and flakes are present in great quantity, and metates and manos for milling corn are occasionally found. In the vicinity of the hearth areas are fallen poles and timbers which probably represent wickiups or tipis of historic tribes.

SITES ON THE MOUNTAIN SUMMITS

Sites on the mountains are indicated almost exclusively by surface finds of stone artifacts. The quantity is profuse, and the litter of flakes and spalls indicates, in an impressive manner, extensive occupation of the region by the Indians.

One site on Douglas Mountain and another on Blue Mountain require particular notice. On both, the exposure of vertical stone slabs indicates the presence of slab-lined storage pits like those found in the caves. The inference that house floors are present must be tested by excavation.

Archaeology of Mantle's Cave

In Mantle's Cave, the cycle of floor deposition can be observed in ideal form. The talus cone in front, overgrown with mature juniper trees, rises twenty-three feet above the interior of the cave floor. Behind it, the surface grades abruptly downward to the line of an extensive rock fall. Between the rock fall and the back of the cave is a more or less level floor some 20,000 square feet in area. The plan of the cave floor is shown in Figure 2.

The rock fall is the most conspicuous feature of the cave floor. It forms a rampart of massive sandstone blocks, half buried in silt and sand, extending for 200 feet from east to west, parallel to the talus cone. This collapse of a part of the cave roof occurred during the time of prehistoric occupation; conditions of weathering and patination indicate that the entire mass descended at the same time.

Upon the surface of this sandstone rampart were built the masonry granaries which are the most noticeable cultural remains in the cave. Because of their elevated position, the upper courses of masonry were exposed above the surrounding debris.

These structures were first recognized by Mr. and Mrs. Mantle. Later, in 1921, the McCandless party observed them and afterwards published an account in the *Steamboat Pilot*, February, 1921. (Jeancon, 1927.) In 1933, articles of basketry, buckskin, wood, and well-preserved ears of corn were found in or near the granaries (Brown, 1937); and in May, 1939, Lee and Jones found the basket shown in Plate 17*c*. This excellent specimen, with its remarkable contents of fishhooks, snares, and netting, became the nucleus of the collection obtained by the University of Colorado Museum in 1940.

The objectives of the 1940 excavations were to recover what promised to be a valuable collection of perishable specimens and to look for chronological and cultural evidence that would relate the site to the archaeology of adjacent regions. The excavations therefore included deep tests for stratified deposits.

With one exception, no clearly defined occupational strata were found, since the cave never served as a residence. Over most of the cave floor the levels are irregular and the cultural debris is mixed because of a variety of circumstances. Aboriginal excavations for storage pits produced inversion of strata, and many artifacts were lost or stored in deep crevices and pockets among the rocks. In the centuries since the cave was occupied, wind and water have deposited sand and silt unequally over the surface. Vermin have continued their tireless traffic in

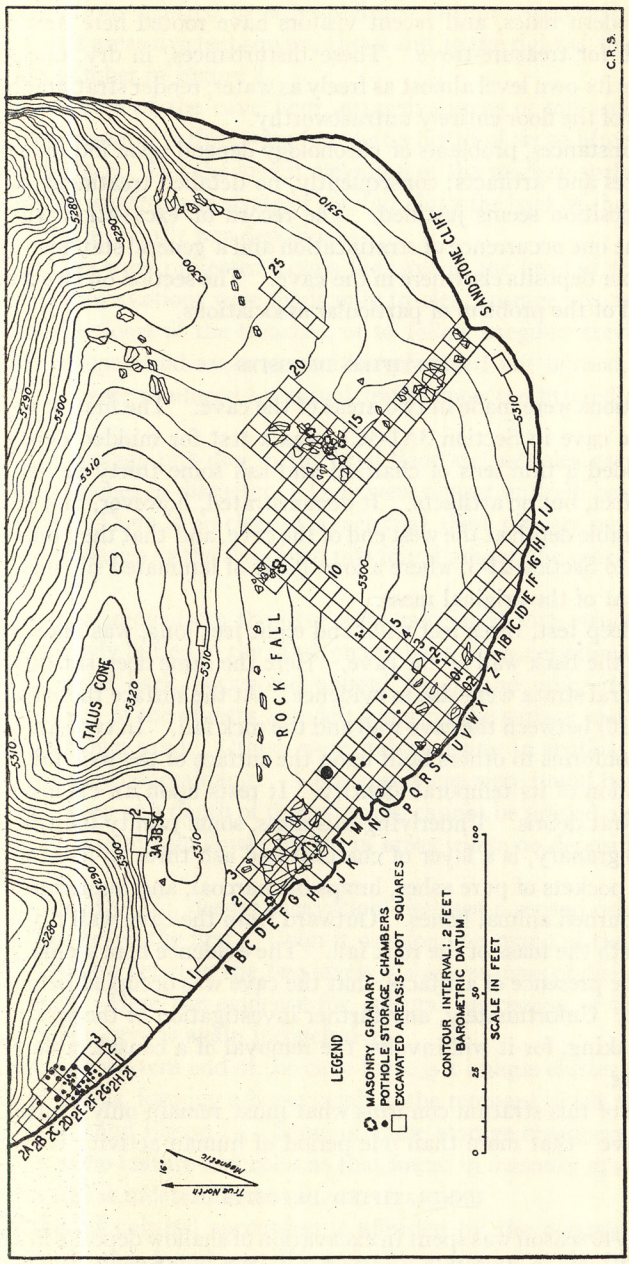


FIGURE 2. Contour map of floor of Mantle's Cave, showing areas excavated

ancient and modern relics, and recent visitors have rooted here and there in a mistaken search for treasure-trove. These disturbances, in dry, unconsolidated debris that seeks its own level almost as freely as water, render stratigraphic studies over large areas of the floor entirely untrustworthy.

In such circumstances, problems of chronology depend upon individual association of structures and artifacts; consequently, no detailed treatment of the complexities of deposition seems justified. The record of excavation will therefore be limited to the one occurrence of stratification and a general statement about the nature of the floor deposits elsewhere in the cave. The section on structures treats in greater detail of the problem of particular associations.

STRATIFIED DEPOSITS

Deep excavations were made in two areas of the cave. The first of these, along the front of the cave in Section 3A1-3C1, was a test for midden deposits. The excavation yielded a thin lens of charcoal and ash some thirty inches long at a depth of seven feet, but no artifacts. It demonstrated, however, that silt deposits exist in considerable depth at the west end of the cave, and that they once extended continuously into Section 2I-3, where a lone pillar of laminated silt six feet high is the only remnant of the original mass.

The second deep test, three feet wide and eight feet long, was made in Section 01A-01F, along the back wall of the cave. Here the same deep silt deposits were found, but cultural strata were also in evidence. At the surface there is a masonry granary (Plate 10) between the cave wall and the rock fall. In type and elevation, this structure conforms to others built upon the surface of the rock fall, and there can be no question of its temporal identity. It rests upon an extensive mass of trash and pack-rat debris. Underlying this mass, some twenty-four inches below the floor of the granary, is a layer of charcoal and ash three to five inches thick, which contains pockets of pure ashes, lumps of charcoal, and numerous fragments of broken and burned animal bones. Outward from the cave wall this layer continues underneath the mass of the rock fall. The evidence here seems conclusive, even without the presence of artifacts, that the cave was occupied before the time of the rock fall. Unfortunately, any further investigation of the stratum will be a major undertaking, for it will involve the removal of a considerable tonnage of sandstone blocks.

The presence of this stratum confirms what must remain only a suspicion elsewhere in the cave—that more than one period of human activity is represented.

UNSTRATIFIED DEPOSITS

Most of the 1940 season was spent in excavation of shallow deposits in the central part of the cave. Control of data was maintained by grid lines at five-foot inter-

vals with elevations referred to an established datum. Sections of the grid are identified as unit areas five feet square, above and to the right of the lines indicated by letter and number in Figure 2.

Throughout most of the cave floor, extensive areas of soil and debris with a recognizable horizontal surface were found at a depth of six to fifteen inches below the modern surface. (At the lowest elevation of the modern surface, these areas are underlaid by water-borne strata of silt, but along the back of the cave where the surface rises again, no silt was deposited.)

Broad trenches were projected across the cave at the level of the occupational areas. Deeper excavations were made only to clear storage pits and potholes encountered in the floors of the trenches, or to follow irregular crevices among the rocks. The occupational areas are neither plastered nor burned, and their surfaces evidently were produced by casual traffic upon the littered natural surface of the cave.

Most of the storage pits dug in the cave floor are potholes varying from nine inches to sixty inches in diameter. They were almost entirely barren of artifacts and foodstuffs. There is no clear evidence that these pits are more ancient than the masonry granaries or the slab-lined pits found among the rocks along the back of the cave.

Few of the specimens from the cave were associated with structures. Instead they were shallowly buried in the sand, on or above the occupational levels marked by scattered cedar bark, occasional animal bones, and other refuse. It seems certain that many of the objects were left lying on the surface and were later covered by wind-blown sand. Others were hidden away in shallow holes, presumably for temporary concealment. A few specimens were found beneath layers of silt; but these, even at a depth of thirty inches, cannot be proved older than others of the same type found shallowly buried in areas where no deposition of silt took place.

In one sector (3X–3Z), deeper excavation disclosed a second occupational level fourteen inches below the first. Upon it was found a mano of the type shown in Figure 26. The fill between the two levels is a coarse mass of disintegrated sandstone and shale. Here the evidence for cultural succession or for a protracted occupation of the cave is again inconclusive.

At the extreme western end of the cave there is a unique cluster of storage pits, potholes, and basins, forming a honeycomb in the remnant of silt strata adjoining the cliff (Plate 9 and Figure 2). Some of these storage chambers are lined with mortar of the same texture and color as that found in masonry granaries. Again, their relative age is indeterminate.

A suggestion of cultural succession is afforded by the occurrence of pottery. Scattered sherds were found near the masonry granaries at the front of the cave

(Section 1D + 15) and a single sherd was found in Section 1E at the west end—all within four inches of the surface. The pottery, although an undecorated culinary ware, cannot be dated earlier than about 650 A.D.; a span of three centuries or more is indicated between the culture represented by Basket Maker traits and the culture represented by pottery.

In spite of the lack of clear stratigraphy, the problems of chronology are by no means hopeless, nor is the value of the specimens in any way depreciated. Correlation of the cultural remains in the cave with strata of Hells Midden and with other sites in Castle Park (Chapter V) indicates a long, although non-residential, use of the cave, and increases the probability of finding a pre-agricultural horizon in the Yampa Canyon. However, proof of cultural succession must wait further excavation in Hells Midden, as well as in other caves that show promise of stratified deposits and specimens of datable wood.

Archaeology of Hells Midden

For volume and depth of occupational debris, Hells Midden is unrivalled in the Yampa Canyon. Although less dramatic than the cave sites, it is of major importance for chronological control in the region, and its excavation should be considered as the first objective in future archaeological work. Up to now, it has only been tested, but its yield is so rich that even this limited sampling has been of value for the interpretation of other archaeological sites.

Hells Midden (Site 16, Figure 1) is on the floor of the Yampa Canyon, southeast of the river, less than 100 yards downstream from the mouth of Hells Canyon. Above it, the cliffs veer away in a series of breaks and ledges. A half mile downstream, the lower benches converge again to form the cliffs of a short box canyon, at the head of which is Mantle's Cave. Figure 3 shows the profile of the midden, at right angles to the axis of the canyon, through the test trench dug in 1947. The photograph (Plate 12), looking downstream, shows the face of the midden exposed by excavation at the close of the 1940 season.

The excavations in 1940 were made along the irrigation ditch at the upstream end, well beneath the shelter of the overhanging ledge. Here, more than seven feet of laminated strata were found. Two days were spent in clearing and screening the debris which had slumped along the ditch, making segregation of artifacts by levels impossible.

In 1947, we dug the trench shown in Figure 3 through the crest of the mound to define the depth and the contour of strata, to look for evidence of cultural change between the various levels, and to look for thin sterile strata or varves, which might indicate seasonal abandonment, as well as thicker sterile strata representing prolonged abandonment.

As shown in Figure 3, the crest of the midden is directly beneath the lip of the

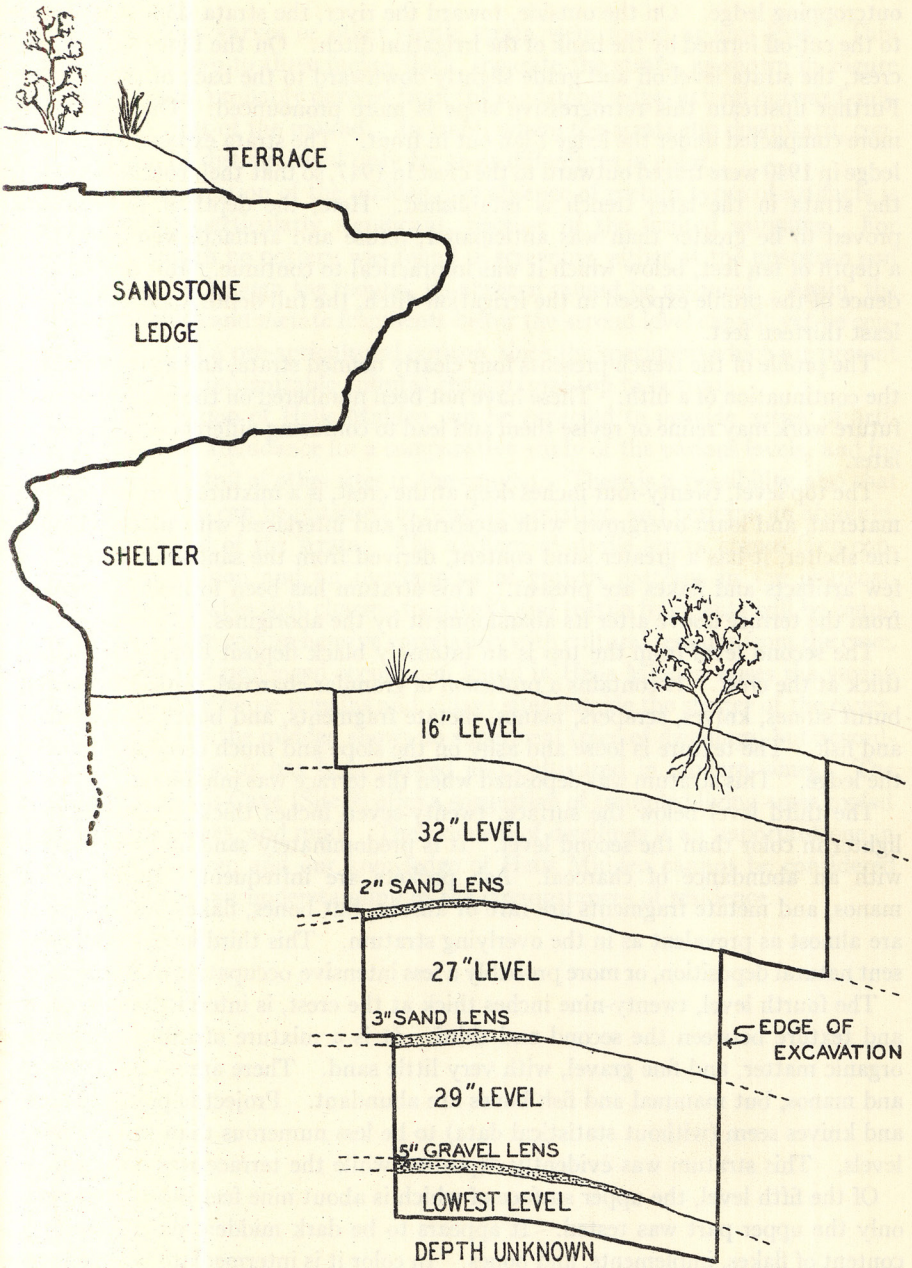


FIGURE 3. Profile through Hells Midden, showing strata revealed in test trench dug in 1947

outcropping ledge. On the outside, toward the river, the strata slope downward to the cut-off formed by the bank of the irrigation ditch. On the inner side of the crest, the strata level off and grade slightly downward to the back of the shelter. Further upstream this retrogressive slope is more pronounced. The strata are more compacted under the ledge than out in front. The strata exposed under the ledge in 1940 were traced outward to the crest in 1947, so that their continuity with the strata in the later trench is established. Here, the depth of the midden proved to be greater than was anticipated; refuse and artifacts were found to a depth of ten feet, below which it was impractical to continue. But on the evidence of the profile exposed in the irrigation ditch, the full depth appears to be at least thirteen feet.

The profile of the trench presents four clearly defined strata, and at the bottom, the continuation of a fifth. These have not been numbered on the profile because future work may refine or revise them and lead to confusing differences in notation later.

The top level, twenty-four inches deep at the crest, is a mixture of sand, organic material, and loam overgrown with sagebrush and interlaced with roots. Under the shelter, it has a greater sand content, derived from the sandstone ledge. A few artifacts and flakes are present. This stratum has been formed by erosion from the terrace above after its abandonment by the aborigines.

The second level from the top is an intensely black deposit thirty-two inches thick at the crest. It contains a profusion of granular charcoal, projectile points, burnt stones, knives, scrapers, manos, metate fragments, and bones of mammals and fish. The texture is loose and ashy on the slope and much compacted under the ledge. This stratum was deposited when the terrace was inhabited.

The third level below the surface, twenty-seven inches thick at the crest, is lighter in color than the second level. It is predominately sand and fine gravel, with an abundance of charcoal. Ash pockets are infrequent. Burnt rocks, manos, and metate fragments are rare or absent, but bones, flakes, and artifacts are almost as prevalent as in the overlying stratum. This third level may represent natural deposition, or more probably a less intensive occupation of the terrace.

The fourth level, twenty-nine inches thick at the crest, is intermediate in color and texture between the second and third. It is a mixture of ashes, charcoal, organic matter, and fine gravel, with very little sand. There are no burnt rocks and manos, but mammal and fish bones are abundant. Projectile points, flakes, and knives seem (without statistical data) to be less numerous than in the upper levels. This stratum was evidently deposited while the terrace was occupied.

Of the fifth level, the upper surface of which is about nine feet below the crest, only the upper part was tested. It appears to be dark midden material with a content of flakes, implements, and bones. In color it is intermediate between the third and fourth levels.

No continuous varves or other sterile strata were found at any level. Thin lenses of sand, two to three inches thick, separate the strata, as shown in Figure 3. These lenses, probably derived from the sandstone ledge, extend outward only as far as the crest of the mound. In front, where the strata dip downward, contact lines can be distinguished only by gross differences in color.

In the interpretation of the midden, the absence of certain types of artifacts is not at present particularly significant, because of the limited sampling. For example, although no pottery was found in screening, either at the upstream end or in the trench through the mound, its absence cannot be assumed. Again, the absence of manos and metate fragments below the second level cannot yet be construed as proof of a pre-agricultural horizon, since the specimens which are present do not show any recognizable cultural change from top to bottom.

Future excavation of Hells Midden can be expected to provide series of artifacts in sufficient abundance for a comparative study of the various levels, and for chronological control of other sites in the canyon. There is a possibility also that sufficient charcoal can be obtained to provide a relative, and perhaps an absolute, chronology for all of the strata. The absence of sterile strata argues for a continuity of deposition and an overlapping of growth patterns in the charcoal. Finally, it is probable that charred foodstuffs and textile fragments will be found to establish a more comprehensive correlation with cultural remains from the cave.

The evidence of prolonged occupation found in Hells Midden raises the vexing problem of finding house remains and village sites outside the shelter of the caves. The terrace above the midden shows no superficial trace of dwellings, but according to Mr. Mantle, it has been plowed and cultivated in modern times. The floors in Marigold's Cave (Site 9) offer a suggestion of trampled living areas roofed with poles, branches, and mud. The problem of dwellings is an important one in the Yampa Canyon, and our knowledge of Hells Midden cannot be considered complete without an understanding of the circumstances of residence.

CHAPTER IV

ABORIGINAL CULTURE

The nature of aboriginal culture in Castle Park, as determined by a detailed study of structural features, artifacts, cliff murals, and foodstuffs, is the subject of this chapter. Most of the specimens in the 1940 collection were obtained from the caves, and further work in open sites can be expected to enlarge and modify our present knowledge of prehistoric life in the canyon.

Structural Features

Contrary to early rumors, there are no cliff dwellings in the Yampa Canyon, nor any masonry rooms like those found along the lower reaches of the Green River. The structures in the caves of the Yampa are small chambers which were used for the storage of foodstuffs. Traces of floor areas in the caves are rare, and neither there nor on the terraces and benches in the canyon do we find any indication of formal architecture. Since knowledge of dwellings is limited as yet to surface observation, we cannot even speculate about them with any profit. This chapter, therefore, is principally concerned with storage chambers in the caves, about which our information is satisfactorily complete.

STORAGE CHAMBERS

The ancient inhabitants of the Yampa Canyon had no formal standards of measurement, form, or combination of structural elements; consequently, caution must be used in the classification of structures. The forms described below approximate physical types, but the archaeological evidence does not suggest any evolutionary development from simple to complex structures. It is apparent that some of the most primitive potholes contain features which also occur in the more elaborate masonry granaries.

Potholes: The most prevalent form of storage chamber was a pothole dug in compacted silt or sand of the cave floor. In Mantle's Cave, thirty-seven potholes were found during excavation. Test trenches dug in other caves indicate that pothole storage was the most common practice throughout the canyon. The storage function is indicated by the presence of scraps of foodstuffs, but the contents were removed in ancient times; at the time of excavation they were barren of anything except shreds of cedar bark, occasional artifacts, and trash.

Most of the potholes are bell-shaped, with the neck constricted for support of a round slab lid (Figure 4*a*). For greater stability the interiors were plastered with mud an inch or more thick (Figure 4*b*). Two potholes were found with a coping

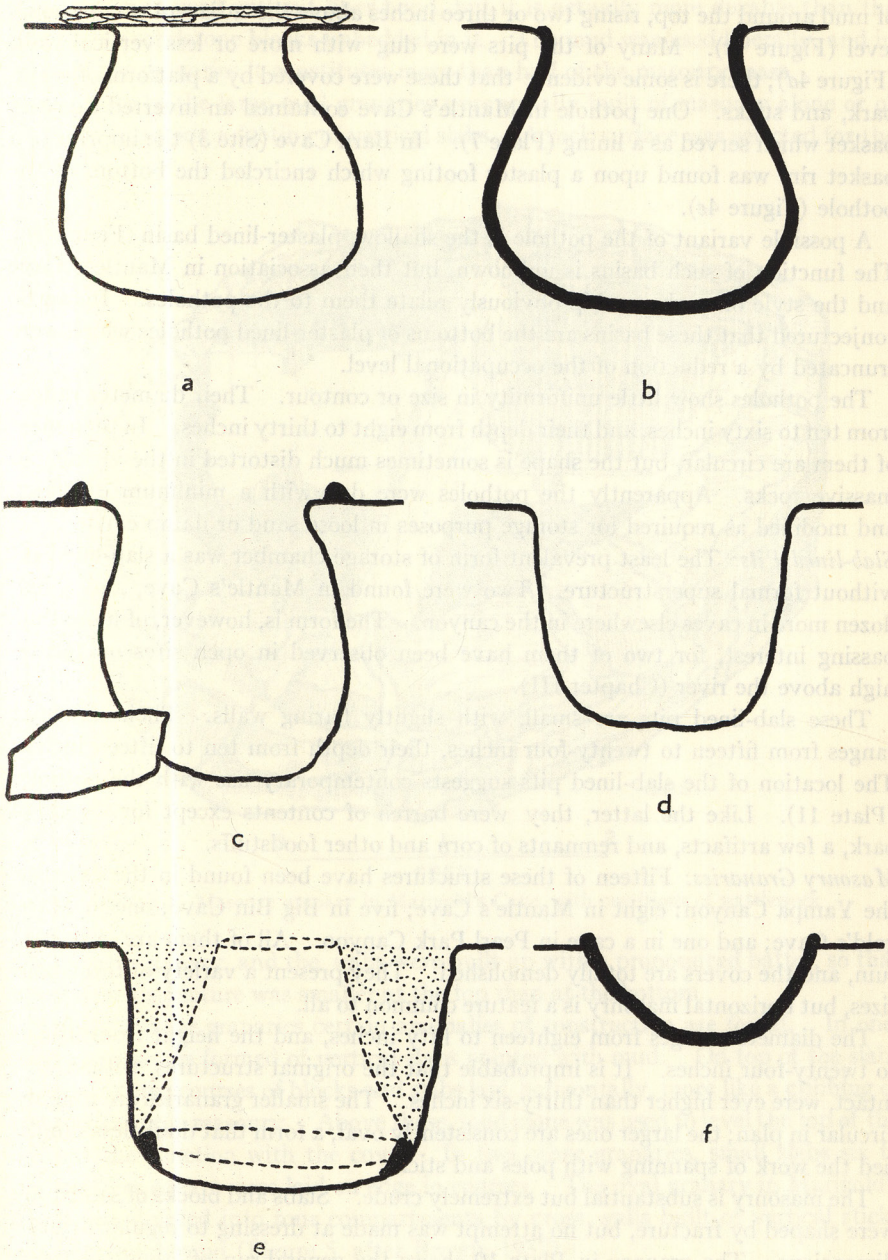


FIGURE 4. Profile drawings of various forms of pothole storage chambers in Mantle's Cave

of mud around the top, rising two or three inches above the adjacent occupational level (Figure 4*c*). Many of the pits were dug with more or less vertical walls (Figure 4*d*); there is some evidence that these were covered by a platform of earth, bark, and sticks. One pothole in Mantle's Cave contained an inverted carrying basket which served as a lining (Plate 7). In Barn Cave (Site 3) the imprint of a basket rim was found upon a plaster footing which encircled the bottom of the pothole (Figure 4*e*).

A possible variant of the pothole is the shallow, plaster-lined basin (Figure 4*f*). The function of such basins is unknown, but their association in Mantle's Cave and the style of workmanship obviously relate them to the potholes. It can be conjectured that these basins are the bottoms of plaster-lined potholes which were truncated by a reduction of the occupational level.

The potholes show little uniformity in size or contour. Their diameter ranges from ten to sixty inches, and their depth from eight to thirty inches. In plan most of them are circular, but the shape is sometimes much distorted in the vicinity of massive rocks. Apparently the potholes were dug with a minimum of effort, and modified as required for storage purposes in loose sand or damp earth.

Slab-lined Pits: The least prevalent form of storage chamber was a slab-lined pit without formal superstructure. Two were found in Mantle's Cave, and a half dozen more in caves elsewhere in the canyon. The form is, however, of more than passing interest, for two of them have been observed in open sites on terrain high above the river (Chapter III).

These slab-lined pits are small, with slightly flaring walls. Their diameter ranges from fifteen to twenty-four inches, their depth from ten to fifteen inches. The location of the slab-lined pits suggests contemporary use with the potholes (Plate 11). Like the latter, they were barren of contents except for shreds of bark, a few artifacts, and remnants of corn and other foodstuffs.

Masonry Granaries: Fifteen of these structures have been found in the caves of the Yampa Canyon: eight in Mantle's Cave; five in Big Bin Cave; one in Marigold's Cave; and one in a cave in Pearl Park Canyon. All of them are in partial ruin, and the covers are totally demolished. They present a variety of forms and sizes, but horizontal masonry is a feature common to all.

The diameter ranges from eighteen to fifty inches, and the height from fifteen to twenty-four inches. It is improbable that the original structures, with covers intact, were ever higher than thirty-six inches. The smaller granaries are roughly circular in plan; the larger ones are consistently oval, a form that doubtless simplified the work of spanning with poles and sticks.

The masonry is substantial but extremely crude. Slabs and blocks of sandstone were shaped by fracture, but no attempt was made at dressing to regular form or dimensions. The granary in Plate 10 shows the general run of stones selected.

Raw mud was used without fiber bond, but it is actually more durable than the soft Weber sandstone blocks imbedded in it. The mud was used liberally, and in some of the granaries it constitutes more than half of the masonry mass.

The sides of the large oval granaries were usually built of masonry alone or of masonry laid upon a footing of vertical slabs. A rock surface was selected for the

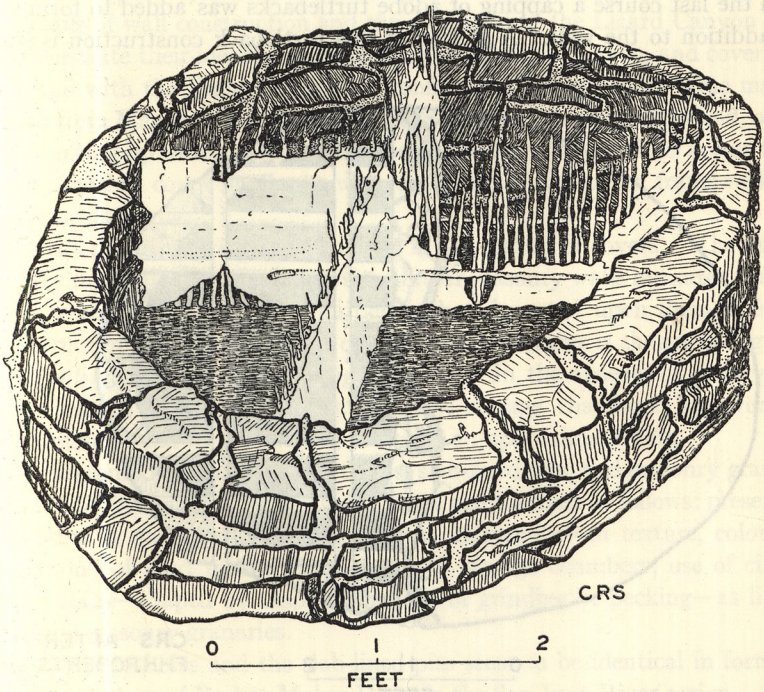


FIGURE 5. Masonry granary in Marigold's Cave, with partitions of wattlework

floor of the granary, and the walls were built up with a pronounced batter, so that the finished structure was smaller at the top than at the bottom.

In the smaller granaries certain anomalies of construction are found. In one, the lower part is formed of vertical slabs pointed with mud. On top of the slabs there are three courses of blocks and slabs laid horizontally, more like a cribbing of stones than true masonry. Above these, mud alone was used to level the top of the wall at the junction with the cover. In two other granaries, small slabs six to eight inches square were laid on edge in courses. The oval granary in Marigold's Cave was divided into four compartments by cross walls built of vertical sticks plastered with mud (Figure 5, after Brown, 1937).

In spite of the variety in forms and the crudeness of appearance, the masonry granaries are remarkably substantial. Their present collapse seems to be the result of forceful destruction in later times.

Another anomaly in construction is the use of adobe turtlebacks, best represented in the large oval granaries in Big Bin Cave. In these, the masonry was built up to a height of four or five courses, about twenty inches from the floor. Upon the last course a capping of adobe turtlebacks was added to form a dome-like addition to the wall. A section of this turtleback construction is shown in

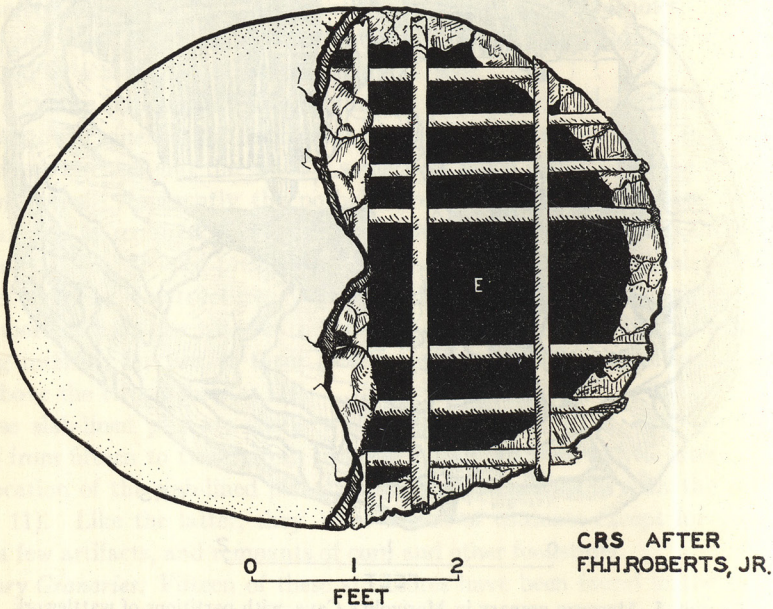


FIGURE 6. Cover of masonry granary in Lizard Canyon, northwestern Colorado

Plate 20*c*. It is formed of separately molded "loaves" of mud, the outlines of which can be distinctly seen in the photograph.

Our best evidence of the method of covering the granaries comes from outside the Yampa Canyon. In Lizard Canyon, some twenty miles south of the Yampa River, J. A. Jeancon found, in caves, four masonry granaries, one of which had the cover still in place. The cover construction is shown in Figure 6 (after a sketch by F. H. H. Roberts, Jr.: Jeancon, 1927). A frame of crossed sticks two to two and one half inches in diameter was used to support a flagging of sandstone slabs, upon which a coating of mud was laid to a depth of four inches. An opening was left

for entry into the chamber (E in Figure 6), and this was separately covered by a circular stone lid.

The wall construction of this granary is significant. Vertical slabs were used to form the base and upon them horizontal masonry was laid to a height of about thirty inches; the top of the wall was built of mud alone. This, the largest masonry granary reported, is seven feet in length.

The details of wall construction and the oval form of the Lizard Canyon granaries demonstrate their identity with those in the Yampa Canyon, and cover fragments found with the Yampa structures confirm the resemblance. One mass of dried mud from Mantle's Cave bears the casts of the supporting sticks and, on one side, the curving lip which outlined the opening in the cover used for access to the interior. Another cover fragment with one stick of the cover framework still in place was also found.

Two smaller granaries were exceptional in the matter of covers. The imprint of basketry in the mud at the top of the circular masonry walls indicates that the granaries were covered with large burden baskets inverted upon them to form a beehive structure. A restoration of one of these structures is shown in Figure 7.

Age and Cultural Identity of the Storage Chambers: In the absence of positive evidence, we cannot assign absolute dates to the storage chambers; however, two lines of argument can be followed to establish an approximate date.

a. The contemporaneous use of potholes, slab-lined pits, and masonry granaries is indicated by internal evidence which can be summarized as follows: presence of vertical slabs in masonry granaries; obvious uniformity—in texture, color, and manipulation—of mud mortar in all forms of storage chambers; use of circular sandstone slabs—shaped by chipping instead of grinding or pecking—as lids for potholes and masonry granaries.

b. Both the potholes and the slab-lined pits seem to be identical in form and function with others of Basket-Maker II age in the San Juan River region. However, we cannot ignore the possibility of the association of storage chambers with pottery in Mantle's Cave nor the peculiarities of wall construction of the masonry granaries. Pottery and masonry suggest seventh century Basket Maker III. The masonry is reminiscent of the structural experiments made by the San Juan people in building small storage rooms above ground, adjacent to the pit houses (Morris, 1939; Brew, 1946).

The testimony of structures and pottery suggests a date of about 650 A.D., and we know that the potholes and slab-lined pits were in use as late as that. This estimate ignores the problem of peripheral time lag, a discussion of which will be found in the final chapter of this report.

The cultural identity of the Yampa remains is implied in the preceding discussion of age. Although no identification can be based upon only one class of antiquities,

it can be said that the potholes and slab-lined pits conform to the Basket-Maker pattern in the San Juan. The masonry granaries appear at first sight to be limited to northwestern Colorado, northeastern Utah, and certainly in form they are. But if we consider the elements of construction, the hand of the Basket Maker is evident. The most convincing indication of Basket-Maker craftmanship is to be seen in the functional combination of mud and stone in the masonry. To the Pueblo people, stone was the primary material for wall construction, and mud mortar was a supplementary material for binding and pointing the stone. To

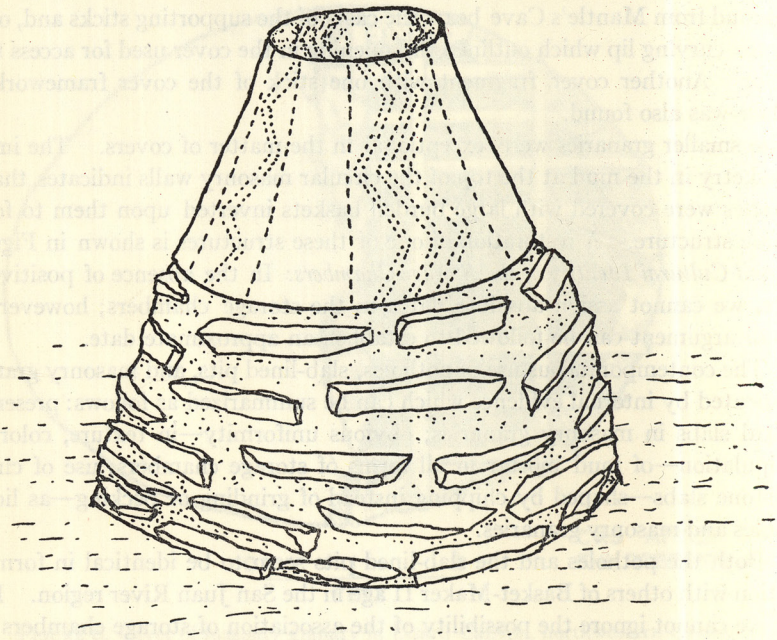


FIGURE 7. Restoration drawing of masonry granary, illustrating the use of an inverted carrying basket as a beehive cover.

the Basket Maker, mud was the primary material, and stones were used to fill and reinforce the plastic mass. Other Basket-Maker signatures in the masonry granaries are the use of vertical slab construction, the use of mud and sticks for coverings, wattle-work partitions, and circular stone lids.

It is not our intention here to identify the inhabitants of the Yampa Canyon as Basket Makers on the evidence of structures alone, but rather to assay the testimony of the structures independently of other data. Our attempt to use craftmanship as archaeological evidence may be regarded as uncritical, but there is no alternative when there are no formalized criteria.

DWELLINGS

Our data on house remains in the Yampa Canyon have been presented in the chapter on aboriginal sites; the facts are so limited that further comment must be almost pure speculation. A summary of the data may, however, be of value in planning further investigation.

The presence of floor areas in Marigold's Cave and floors and poles in Moss Cave suggests (if ancient) a house type of simple construction and perishable materials. In open sites, a shallow house floor with a superstructure of poles would leave little trace. On terraces above the middens in Castle Park, for example, erosion, weathering, and modern cultivation greatly diminish the prospect of finding any trace of dwellings.

Wickiup (?) poles and timbers lying on the surface in the cedar brakes 600 to 1000 feet above the river can be assigned to the historic period. Many of the poles are supported in the branches of living trees. The timbers here are crooked, heavy sections of cedar and pinyon pine, seven to eight feet in length. At one site, such timbers are propped on both sides against the massive horizontal limb of a living tree—the limb serving as a ridgepole five feet above the ground.

Metates occur on the benches above the river. Several metates now at Monument Headquarters were found in cedar-covered terrain on the Utah side, and one has been observed in the high country near Castle Park. Such ponderous artifacts as these are indicative in other areas of established residence; therefore, the possibility of finding subterranean houses should not be overlooked, even though surface indications are unpromising.

On both the benches and the river terraces there are fire areas, indicated by burnt stones, scattered charcoal, and black earth in association with stone implements. These areas may yield traces of house floors, in localities not too deeply eroded. Again, the slab-lined storage pits found in open sites at high altitude need to be tested for possible house associations.

The identification of house remains with aboriginal cultures will not be a simple matter, for, if the canyon was occupied for ten centuries or more, as now seems probable, a variety of dwellings of different ages can be expected.

Artifacts

The interpretation of the antiquities in Castle Park depends largely upon unit associations of artifacts in caches and storage chambers. In order to preserve those associations, certain artifacts from Mantle's Cave have been described, without regard to formal classification, in "Specimens Associated in Caches." The rest of the artifacts, from various sites in Castle Park, are described according to manufactures and materials in "Classified Specimens."

SPECIMENS ASSOCIATED IN CACHES

Cache No. 1

Buckskin pouch containing headdress and other objects found in Mantle's Cave in shallow pit beneath 15 inches of sand and debris containing scattered charcoal and kernels of corn.

Pouch. Figure 8. A square piece of deerskin, diagonally folded with hair side out. Sewn along the converging sides. The hide is part of the face and scalp of a doe. The seams along the bottom of the pouch mark the position of the eyes. The opening at the top of the pouch is a slot nine inches wide where the hide of the nose joins that of the neck. A rawhide thong is knotted on one side of the open-

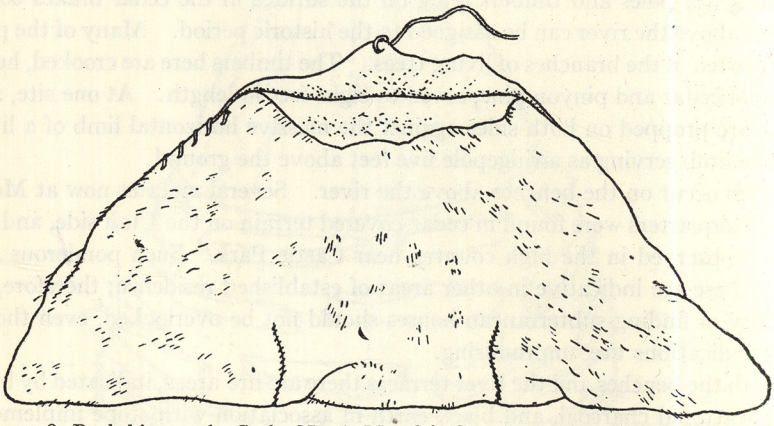


FIGURE 8. Buckskin pouch, Cache No. 1, Mantle's Cave. Pouch is fashioned from the face and scalp of a deer.

ing to serve as a tie string. The pouch is seventeen inches long at the base and eight inches high.

Feather Headdress. Plate 13. This headdress of feathers and ermine is unique—the only one, to our knowledge, found in an archaeological site. Almost perfectly preserved, it is the finest specimen in the Yampa Canyon collection.

The crest is made up of the central tail feathers of the red-shafted flicker, six feathers, at most, having been taken from each bird. The six feathers at the center of the crest, which show in lighter tone in the photograph, are tail feathers of the yellow-shafted flicker. The vanes of each feather are trimmed off on the lower part of the quill, as illustrated in Figure 9. The remaining tuft, including the natural point of the feather, forms a diamond pattern about 1.5 inches high and 0.8 inch wide. The upper two thirds of the tuft is black; the lower one third and

the bare quill below are red. The six center feathers show a corresponding pattern in black and yellow. The quills are sewn together below the tufts with two rows of slender thread of twisted sinew. The ermine strip at the base is made up

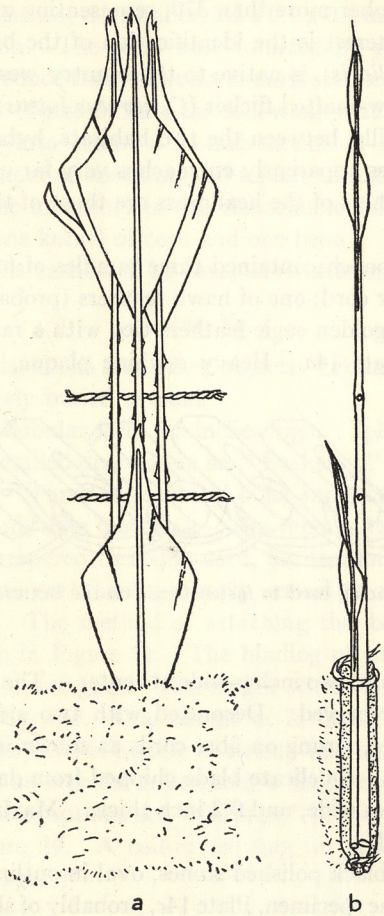


FIGURE 9. Diagram of fabrication techniques in feather headdress. *a*, view showing method of sewing feathers in place; *b*, section showing binding of ermine and buckskin at base of feather crest.

of three or more pelts of the long tailed weasel (*Mustela frenata* probably *nevadensis*) in winter pelage. At the ends of the headdress the ermine rises to the height of the tufts. The ermine is backed with a strip of buckskin about 1.5 inches wide, as shown in profile in Figure 9. Between these strips the feathers are held by lacings of fiber cord.

The length of the head band is twenty-three inches. Five inches from either end, rawhide thongs are attached to fasten the headdress in position.

The long feathers at the ends are wing feathers, untrimmed; the feathers on the crest between them number more than 370, representing at least sixty-one birds.

A point of greater interest is the identification of the birds. The red-shafted flicker (*Colaptes cafer collaris*), is native to the country west of the Rocky Mountains; whereas the yellow-shafted flicker (*C. auratus luteus*) is native to the east. Along the eastern foothills, between the two habitats, hybrids of the two species occur, but neither species apparently encroaches very far upon the habitat of the other. The yellow feathers of the headdress are those of the eastern species, and not a hybrid.

Feather Bundles. The pouch contained three bundles of feathers: one of magpie feathers tied with a fiber cord; one of hawk feathers (probably red-tail) tied with grass fibers; and one of golden eagle feathers tied with a rawhide thong.

Butterfly Ornament. Plate 14*a*. Heavy rawhide plaque, six inches long, three

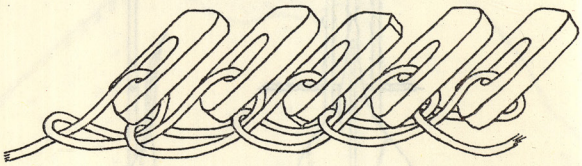


FIGURE 10. Diagram of lacing used to fasten beads on the butterfly ornament illustrated in Plate 14*a*.

inches wide at the ends, and two inches wide at center. The rawhide is not tanned, but the hair has been removed. Decorated with two strings of beads of slate or lignite, 0.2 inch square, strung on fiber cords as shown in Figure 10.

Stone Knife. Plate 14*b*. A delicate blade chipped from dark granular quartzite, 7.8 inches long, 1.2 inches wide, and 0.2 inch thick. Maximum width occurs 2.5 inches from rounded end.

Carapace Stones. Two black polished stones, oval in outline, and domed like the carapace of a turtle. One specimen, Plate 14*c*, probably of slate, is grooved around its circumference, close to the flat side. This groove is encircled by a sinew cord which trails out at either end. The other specimen, Plate 14*d*, possibly of gilsonite, is grooved but lacks the encircling cord. The portion below the groove is perforated at the ends and shallowly drilled at intervals along one side. The perforations at the ends were made by the intersection of funnel-shaped holes drilled from opposite sides. The first specimen is 1.4 inches long, 0.8 inch wide, and 0.4 inch thick. The second is of the same length and width, and 0.5 inch thick. In size and form, these objects conform very closely to the counterweights found

attached to the dorsal surface of Basket-Maker spear throwers from caves in northeastern Arizona.

Antler Plugs. The pouch held two sections of worked antler. Dimensions of the larger are 4.2 x 1 x 0.7 inches; the smaller, 3.2 x 0.9 x 0.4 inches. Both show marks of cutting and abrasion. The ends were rounded by grinding and an obvious attempt was made to reduce them to uniform cross section between the ends.

Miscellaneous Objects. These include the following: a 12-inch length of mammal tendon for processing into sinew; a 54-inch section of rawhide thongs knotted together; a broken scraper of obsidian; and a piece of fiber cord.

Foodstuffs. Last in the inventory of this remarkable collection, but of considerable importance, are one kernel of corn and one bean. The significance of these specimens for dating the cache will be considered later on.

Cache No. 2

Basket containing fishhooks and other objects. Found by Lee and Jones in Mantle's Cave, shallowly buried in sand.

Basket. Plate 17*c*. Globular form 5.5 inches high. Split-rod foundation, interlocked stitch. (For detailed description see "Basketry," p. 57.)

Fishhooks. Plate 14*e*. Three fishhooks of bone and wood. One hook attached to tapered two-ply cord, nine feet long. The remaining two hooks attached to opposite ends of an untapered three-ply cord, ten feet long. A slender thread of two strands attached to each hook probably served to secure the bait upon the unbarbed bone point. The method of attaching the bone barb to the curved wooden shaft is shown in Figure 11. The binding of cordage on all hooks was cemented in place with pine gum. The length of the hooks is about 1.5 inches.

Game Snares. Plate 18*a*, *b*, *d*. One bundle of 75 tapered snares; one bundle of twenty-four tapered snares; one bundle of twenty-one tapered snares; one bundle of four tapered snares on wooden tubes; and a single tapered snare of three-ply twist. (For detailed descriptions see "Cordage," p. 59.)

Net of Cordage. Figure 39. A coil-netted bag or game snare. (For detailed description, see "Cordage".)

Cache No. 3

Deer scalp headdress and moccasins. Found in Mantle's Cave, buried in a shallow pit lined with bark and sticks.

Moccasins. Plate 15*b*. Pair of winter shoes of deerskin. Identical in type with the Fremont Moccasin. (See also "Leather," p. 62.)

Deer Scalp Headdress. Plate 20*a*. Crown of deer scalp, presumably a doe, with ears attached. Hide tanned after removal of hair. Ears ribbed with heavy fea-

ther quills to make them stand rigid. Eye holes sewn shut (compare deerhide pouch in Cache No. 1).

Cache No. 4

Pouch of tule fabric containing feather bundle and other objects. Found in Mantle's Cave, buried under sand and trash eleven inches below surface.

Pouch. Plate 16*b*. Container, 17 inches long and 4.5 inches deep, formed by folding a piece of twined matting made of cordage and tule stalks. Ends closed with lacings of fiber cordage. Tie string of coarse fiber cordage attached at top center.

Feather Bundle. Plume of twenty-four hawk feathers tied with cord.

Rabbit Tail. Tuft of white-tailed jackrabbit.

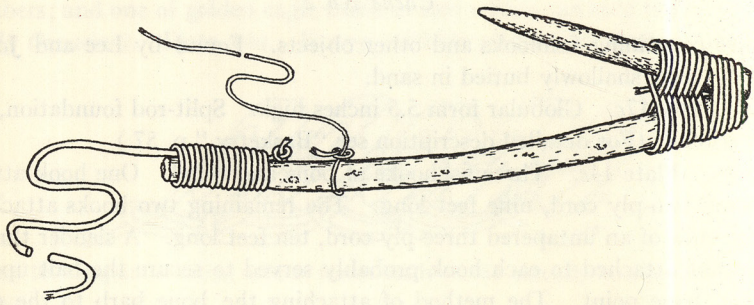


FIGURE 11. Diagram of fishhooks of bone and wood. Matrix of pine gum over the lashings can be seen in Plate 14*e*.

Sinew. Tendon from a mammal leg, fourteen inches long; the raw material for sinew.

Cache No. 5

Rabbit fur pendant and ermine pelt.

Pendant. Figure 12. Made of rabbit hair detached from hide and twisted upon cords as shown in the drawing. Five central cords were wrapped with cedar-bark strands at the center to make a loop for suspension. Both ends of the cords fashioned into fur pendants. Total length: 12 inches. Length of pendants: 4.5 inches.

Ermine Pelt. Cased pelt of weasel in spring moult of winter pelage, with streaks of brown on head and back (*Mustela frenata*, probably *nevadensis*). Tail broken during skinning; black tuft trimmed and tied to shortened segment with cord.

Cache No. 6

Net bag containing stone knives and other objects. Found in Mantle's Cave, buried two inches below the surface.

Net Bag. Coiled netting of the type shown in Figure 39. Filled with grass to form a cushion-like container for what seems to be the gear of an arrow maker. (For details of weave, see "Cordage," p. 59.)

Mammal Ribs. Two ribs, probably of deer, unworked.

Buckskin. Two scraps of buckskin, marked by numerous indentations and scratches. Probably these were used to protect the palm of the hand during the process of flaking stone.

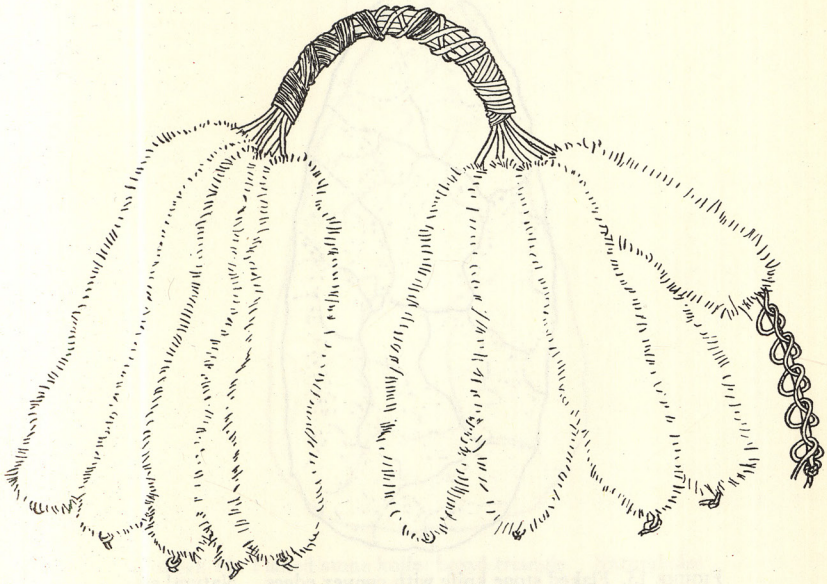


FIGURE 12. Pendant of fiber cordage and rabbit fur

Stone Knives. A group of seven knives, 2.4 to 3 inches in length, of the form shown in Figure 13. No two are made from the same kind of stone, yet they are consistently alike in form. The workmanship is inferior, and the blades are rather crude in appearance.

Trimmed Scapula. Section of mammal scapula, 4 inches long, and tapered from a width of 2 inches at one end to 1.2 inches at the other. All edges are abraded to a smooth contour.

Bone Awl. Short awl, 3 inches long, with highly polished point.

Sheephorn Wrench. Plate 17*a*. Horn of female mountain sheep perforated for use as an arrow-shaft straightener.

CLASSIFIED SPECIMENS

Flaked Stone

Implements of flaked stone in the Castle Park collection present a great diversity of forms. The quantity, however, is limited, so that only a few of the forms described can be regarded as typical for the locality. Others, represented by only two or three specimens, are included as a matter of record.

Dinosaur National Monument is rich in variety and quantity of stone suitable for flaking, and almost every kind was utilized. Quartzites predominate, in

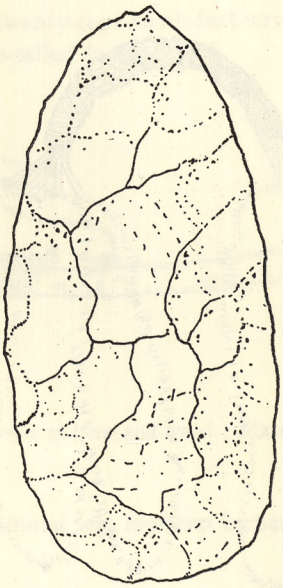


FIGURE 13. Flaked stone knife with convex edges. Natural size

colors from dark brown to milky white, and in texture from glassy smooth to granular. Obsidian is exceedingly rare, and the only flaked specimen of it is a broken scraper found in Cache No. 1. The quality of workmanship displayed in the collection is rather ordinary, perhaps because percussion flaking was more often employed than pressure flaking.

The nomenclature used to distinguish the various implements is purely descriptive, and it is not intended for rigid designation of types. The drawings, more than the text, constitute the definitive representation of forms.

Knife: leaf-shaped with convex edges. Figure 13. Symmetrical blade, apparently made by percussion flaking. Length 2.5 to 3.5 inches. Thickness: 0.2 to 0.3

inch. Prevalence of fragments suggests breakage in manufacture rather than in use, since no hafted blades (or pitch-stained blades which might indicate hafting) have been found. Most of the blades are too massive to be easily broken by manual use, and the edges do not show excessive wear.

In Mantle's Cave seven crude blades of this form were contained in Cache No. 6, two of them with broken edges. Here the number seven is suggestive of occult significance, but other examples from open sites in Castle Park certainly indicate domestic utility.

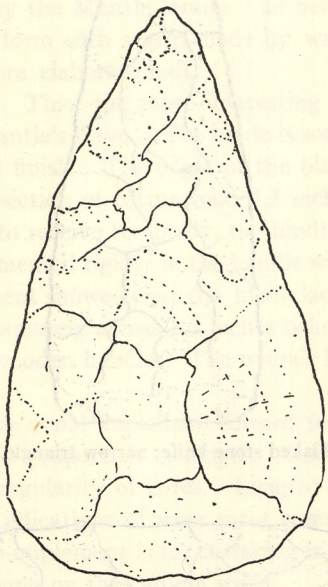


FIGURE 14. Flaked stone knife: broad triangle. Natural size

Knife: triangular with rounded base. Figure 14. A symmetrical blade, made by percussion flaking. Length: 2.5 to 3.5 inches. Thickness: 0.2 to 0.3 inch. Base broad in proportion to length. Edges thin and sharp, and, as shown by experiment, very effective for hacking wood or bone. No broken specimens were observed in the collection.

Knife: triangular with straight base. Figure 15. Symmetrical blade with narrow base in proportion to length. Length: 2.5 to 3.5 inches. Thickness: 0.1 to 0.2 inch. Represented by a cache of seven finely fashioned blades, and a few broken specimens more crudely flaked. This form is of special significance because it is the standard blank for the notched dart point used by the Basket Makers on spear-

thrower darts. However, in the Castle Park collection, no notched points of this type were found. The cache of blades referred to represents another occurrence of the number seven. The blades in question are nearly all of the same size, finely

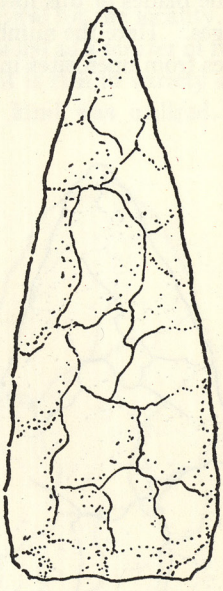


FIGURE 15. Flaked stone knife: narrow triangle. Natural size

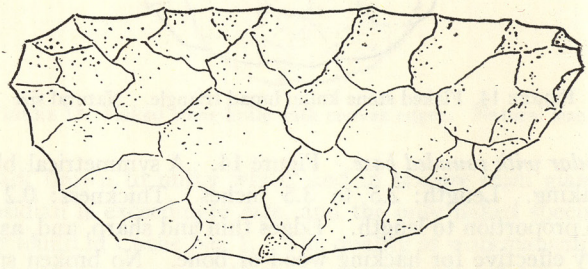


FIGURE 16. Flaked stone knife: asymmetrical. Natural size

fashioned from the same kind of stone, a translucent quartzite. The quality of the blades and their concealment in the cave indicate that they were objects of great value.

Knife with curved edge. Figure 16. An asymmetrical blade with straight back

and curved cutting edge. Length: 2 to 3.5 inches. Thickness: 0.2 to 0.3 inch. Broken specimens rare. Experiments show the implement to be very effective for sawing wood or bone. No suggestion of hafting.

Long Knife. Plate 14*b*. Long narrow blade, thin in section. Maximum width of blade occurs one-third of distance from rounded end to sharply pointed end. Length: 5.5 to 7.8 inches. Width: 1.3 to 1.6 inches. Thickness: 0.2 to 0.3 inch. No fragmentary specimens identifiable.

The long delicately formed blade shown in Plate 14*b* was contained in Cache No. 1. Two more blades of the form were found in Mantle's Cave and two have been found in open sites by the Mantle family. In historic times, tribes of the region used knives of this form with a grip made by wrapping buckskin around the middle, in lieu of a more elaborate haft.

Hafted Knife. Plate 19*d*. This, the most interesting stone implement in the collection, was found in Mantle's Cave. The blade is somewhat coarsely chipped from a black stone of dull finish. The edges of the blade are sharp but rather jagged. The handle is a section of cottonwood 4.3 inches long, finished to rectangular section and split to receive the blade; the binding was done with willow splints, and the blade is cemented rigidly in the handle with pine gum.

An X-ray of the implement showed that the blade lacks a point or tang inside the handle. It is broken squarely across 1.8 inches below the slightly flaring hilt at the junction with the wooden handle. The overall length of the knife is 8.3 inches.

Pick. Figure 17. Massive ovoid implement formed from stone core by percussion flaking. Very thick in proportion to length. One end consistently smaller than the other, despite irregularity of cores. Length: 1.5 to 4 inches. Thickness: 0.6 to 1.3 inches. Indications of wear most common on small end. The most obvious utility of the implement is for surfacing metates and manos and for cutting the petroglyphs found on the canyon walls.

Convex Scraper. Figure 18. A long curved flake removed from a core by percussion fracture. Secondary flaking along the edge on the convex side, usually around the entire circumference. The implement probably served a variety of domestic purposes.

Projectile Point: side-notched; concave base. Figure 19. Formed from triangular blank. Notches located nearly at the midpoint of the sides. Base deeply arched, but unnotched. Length: 1.5 to 2 inches. Thickness: 0.1 to .15 inch. Of the four examples found, all are delicately flaked and fragile, and only one is unbroken. The notches constitute a feature of extreme structural weakness. These points resemble very closely the standard Shoshoni arrow point.

Projectile Point: corner-notched; rounded base. Figure 20. Formed from ovoid blank. Sides convex. Barbs sharp and slightly recurved. Thin in section,

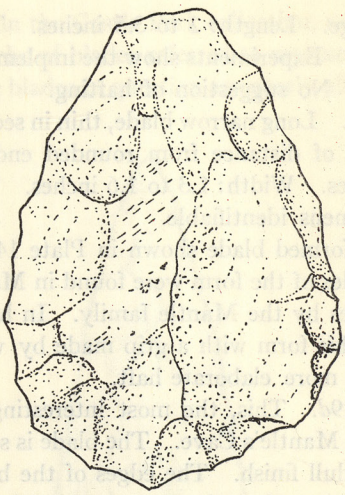


FIGURE 17. Pick fashioned from stone core. Natural size

FIGURE 18. Scraper fashioned from convex stone flake. Natural size

FIGURE 19. Projectile point: side-notched; concave base. Natural size

fragile, finely flaked and symmetrical. Length: 1.3 to 2 inches. Size and form indicate use as arrow point.

Projectile Point: miniature. Figure 21. Stemmed point formed by pressure flaking. Length: 0.6 to 0.8 inch. Thickness .05 to 0.1 inch. Base usually rounded and sides slightly convex.

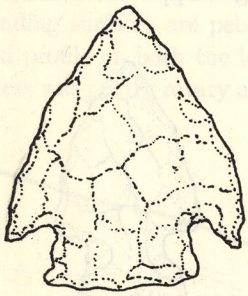


FIGURE 20. Projectile point: corner-notched; rounded base. Natural size

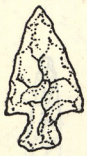


FIGURE 21. Projectile point: miniature. Natural size

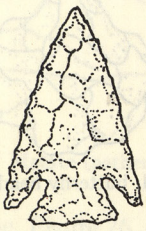


FIGURE 22. Projectile point: triangular; corner-notched; straight base. Natural size

Projectile Point: triangular; corner-notched; straight base. Figure 22. Formed from thin triangular blank. Notches are deep with parallel sides, bisecting the base angles of the triangle. Length: 1 to 1.5 inches. The workmanship is exquisite, and the points are very fragile. Presumably these points were used on arrows, but the notches seem ill-suited to binding on an arrow shaft.

Projectile Point: stemmed; rounded base. Figure 23. Formed from ovoid blank. Notches broad and irregular. Long stemmed without clearly defined barbs.

Thick and clumsy in cross section. Length: 1.5 to 2 inches. These points would serve equally well for arrows or spear-thrower darts.

Butterfly Drill. Figure 24. Drill for manual use, with flat round head for grip of thumb and fingers. Shaft slender and very fragile. Length: 1 to 2 inches.

Hafted Drill. Plate 19*c*. Flaked stone point, attached with rawhide binding to the end of a stick 25 inches long. Upper end of stick shows wear from rotation in a

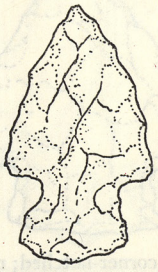


FIGURE 23. Projectile point: stemmed; rounded base. Natural size

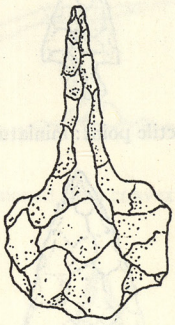


FIGURE 24. Drill: butterfly head. Natural size

socket. Marks and abrasions on the stick do not indicate use of a cord for rotating the drill. The point of the drill is rather crudely chipped out of dull black stone.

Ground Stone

Metate (*Nether Millstone*). Figure 25. One metate was found in Mantle's Cave, and fragments of another were found in Hells Midden. They conform to a single type. The material is sandstone, roughly fractured to subrectangular shape. The specimen from the cave is 17 inches long, 10 inches wide, and 3 inches thick. A pebbled milling surface was prepared by hammering the face of the stone, a

process that was repeated as often as the surface wore smooth. The resulting depression is a shallow concavity without clearly defined margins. It is evident that each metate required a mano or handstone of matching contour.

Mano (Handstone). There are eleven specimens, fragmentary or entire, of manos, from the cave and from sites in the open. The forms include natural pebbles, and stones dressed on one or more surfaces. However, all manos have two characteristics in common; the grinding surfaces are pebbled to provide a "tooth" for milling and worn to a curved profile on both the long and the short axes. It is evident that the milling process was partly rotary and not purely axial.

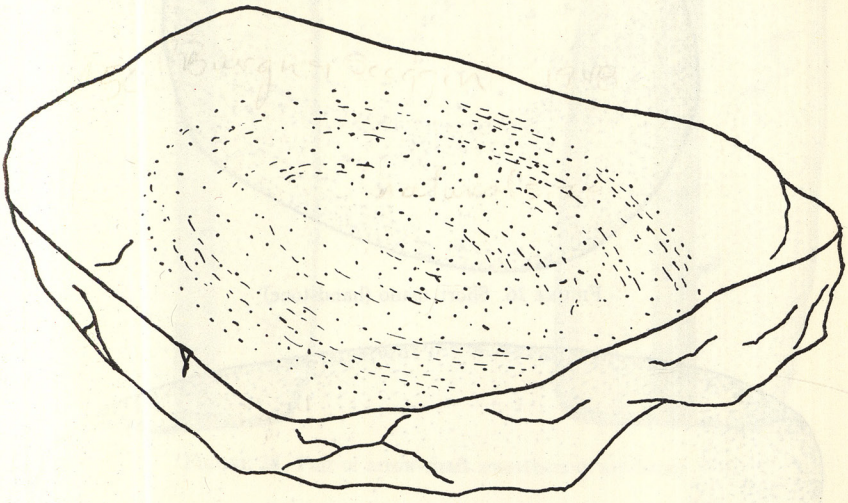


FIGURE 25. Metate (nether millstone)

The short manos of dressed stone, Figure 26, are symmetrically finished. Both surfaces were used for grinding. The long manos, Figure 27, were sometimes dressed on all surfaces, but only one side was used for milling. These normally have two facets on the grinding surface, evidently produced by raking the stone back and forth across the metate, with only a slight rotary motion.

Hoe or Maul. A piece of tabular sandstone, 4.3 x 3.7 x 1.3 inches in dimensions. The edges are notched near the midpoint to a depth of 0.3 inch for hafting. Steward (1941, Figure 47 and p. 311) reports their occurrence in the Johnson Canyon-Paria River region in southern Utah. The function of the implement is conjectural.

Stone Ball. A sphere of stone, evidently a concretion, 1.7 inches in diameter. Stone balls are characteristic in archaeological sites along the Green River drainage.

Arrow-shaft Smoothers. Figure 28. One pair of arrow-shaft smoothers was found in Mantle's Cave. The two halves are almost identical in size, with matching

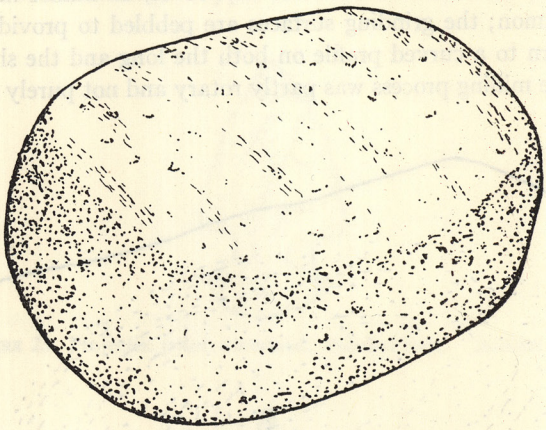


FIGURE 26. Short mano (handstone)

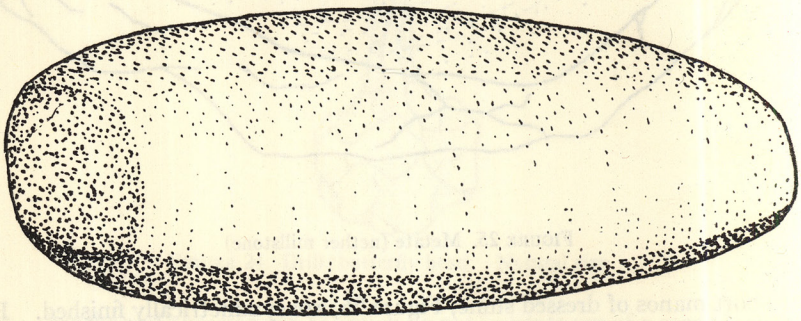


FIGURE 27. Long mano (handstone)

grooves. The dimensions are 4 inches long, 1.5 inches wide, and 0.7 inch thick. In use, they were clasped in one hand while the arrow-shaft was rolled and abraded between them with the other.

Objects of Slate. Some 25 thin pieces of slate, ranging in length from 0.5 to 8 inches, were found in Mantle's Cave. None was completed to any finished form

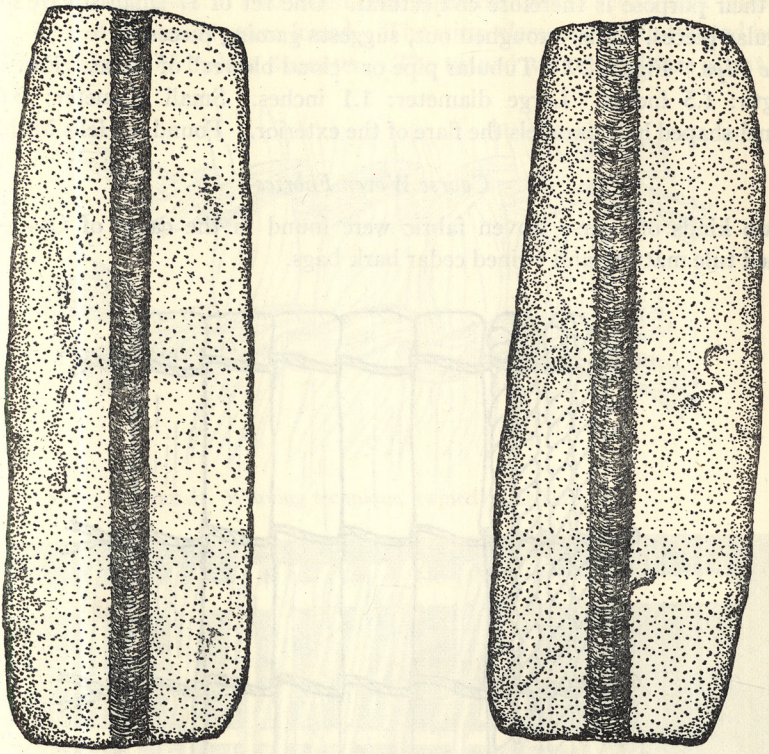


FIGURE 28. Pair of arrow-shaft smoothers of sandstone

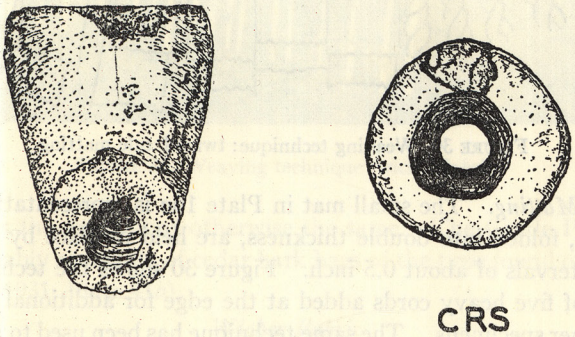


FIGURE 29. Tubular pipe or "cloud blower"

and their purpose is therefore conjectural. One set of 17 small square and rectangular pieces, crudely roughed out, suggests gaming pieces.

Stone Pipe. Figure 29. Tubular pipe or "cloud blower" of stone. End broken. Length: 1.5 inches. Large diameter: 1.1 inches. Small diameter: 0.6 inch. Funnel-shaped hole parallels the flare of the exterior. Found in Hells Midden.

Coarse Woven Fabrics

Two kinds of coarse woven fabric were found in the caves of Castle Park: twined tule matting and twined cedar bark bags.

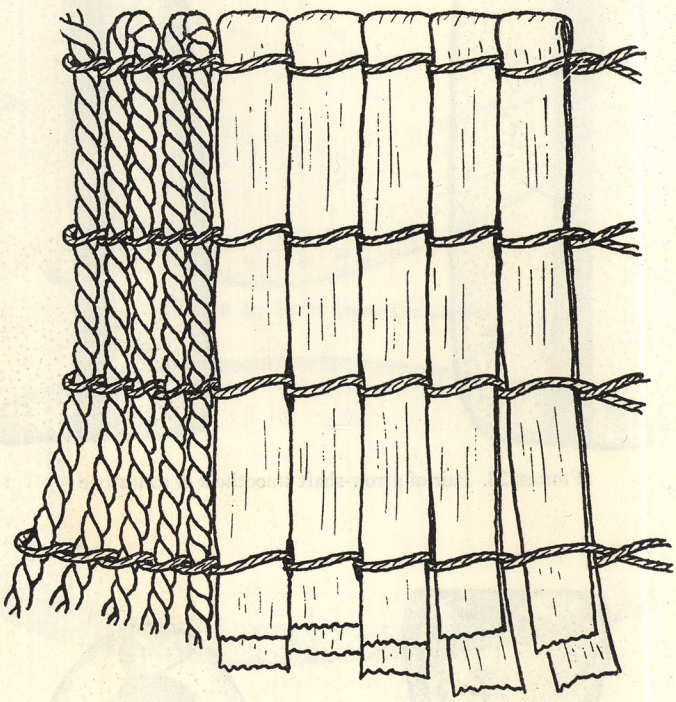


Figure 30. Weaving technique: twined tule matting

Twined Tule Matting. The small mat in Plate 16*a* is representative of the type. Stalks of tule, folded into double thickness, are held in place by rows of twined cordage at intervals of about 0.5 inch. Figure 30 shows the technique in detail. The selvage of five heavy cords added at the edge for additional strength is not present on other specimens. The same technique has been used to make the pouch of tule matting in Cache No. 4, Plate 16*b*.

Twined Cedar Bark Bags. Two fragments of coarse twined cedar bark fabric, in the technique of Figure 31, were found. The warp elements are untwisted hanks of cedar bark about 0.5 inch in diameter. The twined weft strands are about one-

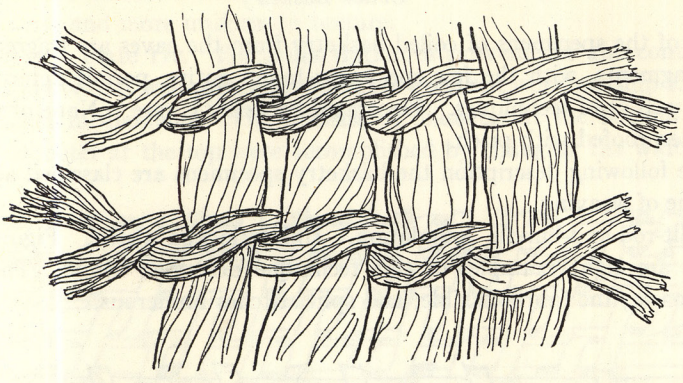


FIGURE 31. Weaving technique: twined cedar bark bags

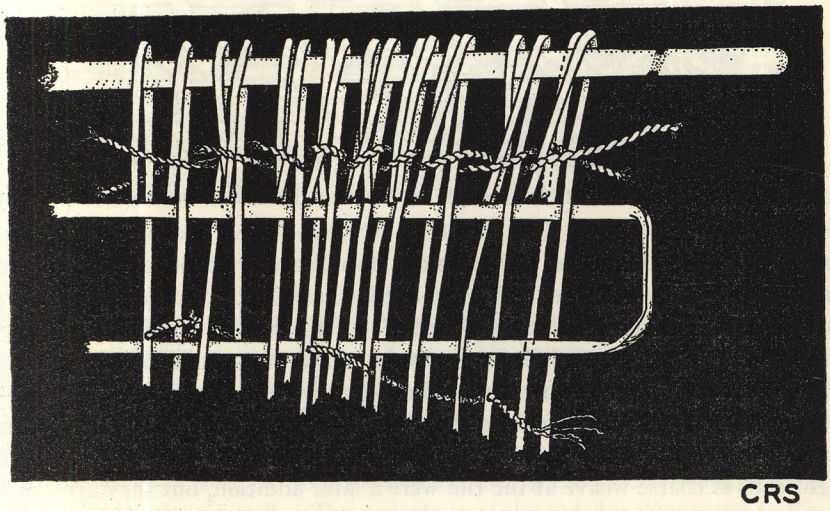


FIGURE 32. Weaving technique: wicker fabric

half as large as the warps, but otherwise the same. The Castle Park specimens are unquestionably remnants of cedar bark bags of the type found on the Fremont River (Morss, 1931, Plate 41*b*).

Wicker Fabric

The rim fragment of a wicker container of indeterminate form is illustrated in Figure 32. The weaving elements, bent over an osier rim, are strands of split

willow. The use of cordage to reinforce the weft strands makes it doubtful that the fragment represents a standardized weaving technique.

Coiled Basketry

Most of the specimens of coiled basketry from the caves are fragmentary, but these fragments, with the few specimens found entire, permit determination of form as well as of techniques. Decorated basketry is rare. None of the baskets was waterproofed with pitch.

In the following description the basketry specimens are classified according to technique of weaving.

a. Split-rod-and-bundle foundation. Uninterlocked stitch. Figure 33.

There are eight examples of this technique described below. The weave is rather coarse, the fabric flexible, and split stitches numerous.

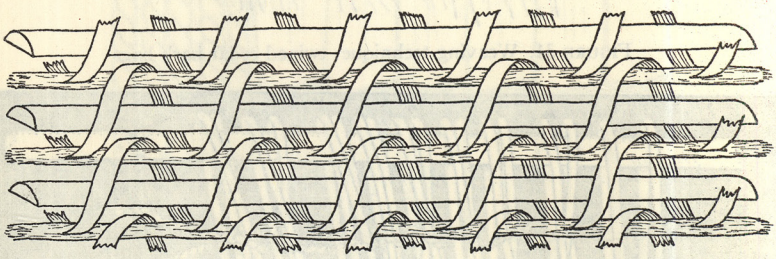


FIGURE 33. Coiled basketry technique: split-rod-and-bundle-foundation; uninterlocked stitch

Carrying Basket. Plate 17*d*. Dimensions: top diameter 22 inches, bottom diameter 10 inches, height 9 inches. A worn-out basket with bottom missing, used as a liner for a pothole storage chamber, Plate 7. Two holes in the side were plugged with wads of fiber. These holes occur at the points of attachment for a headband worn across the forehead when the basket was carried on the back. The zig-zag design was executed with black-stained splints woven into the fabric. Contrasting panels of red or brown stain were executed after the basket was finished. Eight coils of coarse weave at the rim were a later addition, but they are identical in technique and decoration with the lower part of the basket.

Tray. A fragment of a shallow tray, worn-out and patched with coarse stitching. Its last service was as a cover for the carrying basket described above; its position in relation to the basket is shown in Plate 7. The interior of the tray is deeply charred, indicating its original use for parching or popping corn with live coals.

Globular Form. Fragments of a basket similar in form to the one shown in Plate 17*c*. Curvature of the fragments indicates a diameter of about 12 inches. The identity of the form is indicated by the details of the weave.

In our specimen, since the tongue appears on the foreshaft, and the opposite end is sharpened, the inference is that the first bend at the notches was made the wrong way so that the slot came out on the short, useless half of the stick. The foreshaft presumably was then too short to be re-cut for a second attempt.

Arrow or Dart Shaft. Plate 19*b*. This 13-inch fragment of the nock end is the only example of an arrow or dart shaft in the collection. The nock is battered, and no clear trace of notches for a bowstring can be observed. The shaft is 0.4 inch thick and seems better suited for a spear-thrower than for a bow. The feathers used for winging, three in number, are reduced to remnants of quill held under wrappings of sinew. No ownership marks are in evidence. The material of the shaft is red-berried elder, *Sambucus sp.*

Osier Plaque. Plate 19*e*. A plaque made from 41 hardwood sticks, 14.5 inches long, lashed together with sinew cords, as shown in Figure 41. Its width is 9 inches. Two sticks at the center are decorated with spiral stripes, which show in whiter tone the trace of spiral windings probably of flat rawhide thongs. As shown in the photograph (Plate 8) the plaque was found lying upon a surface of bark and sticks in a shallow pit. It was covered with a stone lid of the sort used to cover pothole storage chambers and masonry granaries.

Leather

Articles of raw or tanned hide, which we have grouped as objects of leather, are among the most numerous specimens in the collection. A few leather articles have already been described as parts of caches. Other fragments, unprocessed and not yet identified, have been omitted from the present study. Consequently, the leather articles still to be considered are actually few in number.

Buckskin Bag. A patchwork of tanned and untanned buckskin 27 inches long, 14 inches wide at the base, and 6 inches wide at the top. Its shape seems to have resulted from accident rather than design. Its greatest interest lies in the variety of sewing techniques employed. These are illustrated in Plate 20*b*.

Fremont Moccasins. Plate 15*b*. (Cache No. 3.) A pair of winter moccasins fashioned from deerskin. They are stuffed with cedar bark and laced with fiber cords. Among the lacings is a segment of tapered cordage of the kind used for game snares.

This pair of moccasins seems to be identical with those found on the Fremont River in Utah (Morss, 1931, Fig. 5, Plate 38). The Fremont specimens are made from the hide of the mountain sheep, but the technique of manufacture is the same. Hide from the leg of sheep or deer, with the dewclaws attached, formed the upper and was turned under at the toe to form a sole with dewclaw hobnails. The heel and the inside face of the upper were fashioned from separate pieces of hide sewn to the dewclaw strip. As Morss has remarked, the Fremont type of moccasin was

ingeniously designed except that all its seams occur at points of excessive wear. As might be expected, they show considerable repairing with shapeless patches on the soles.

Dewclaw Strip of Deerhide. In the Yampa Collection there is a bundle of four strips of deerhide with dewclaws attached. These were the raw materials for the Fremont moccasin.

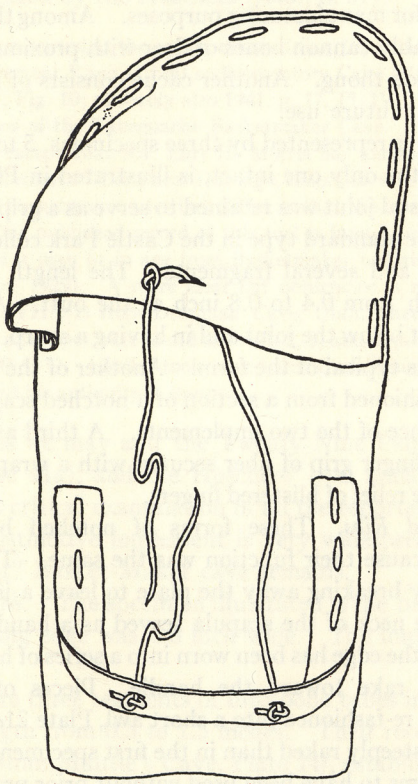


FIGURE 42. Yampa moccasin, showing techniques of sewing and lacing

Yampa Moccasin. Plate 15*a*. A distinctive type of moccasin, exemplified by three specimens. The pair which we have illustrated is 7.5 inches long. The third moccasin, not illustrated, is 6 inches long, but otherwise identical. All of them are obviously reduced in size by drying. The techniques of sewing and lacing are shown in Figure 42.

The soles are heavy slabs of hide. The hair, worn on the upper side, appears to be buffalo.

Bone

Bone artifacts of distinctive form in the Castle Park collection are awls, notched scapulae and ribs, chisel points, gaming pieces, bone tubes, and bodkin.

Besides these, there are numerous bones altered by splitting and cutting, or "roughed out" for purposes not evident. Some fragments are by-products—discarded joints and splinters removed from finished tools. Other fragments are mammal bones saved for manufacturing purposes. Among these is a bundle of four mammal bones (probably cannon bones of deer with proximal joint removed) tied together with a rawhide thong. Another cache consists of five unaltered cannon bones stored away for future use.

Long Awl. This type is represented by three specimens, 5 to 7.4 inches long. The longest of these, and the only one intact, is illustrated in Plate 21*b*. In the long awl a portion of the distal joint was retained to serve as a grip.

Short Awl. This is the standard type in the Castle Park collection, represented by five intact specimens and several fragments. The length ranges from 2.5 to 4 inches, and the width from 0.4 to 0.8 inch at the butt. All are alike in being square-cut on the shaft below the joint and in having a sharp, highly polished point. The awl in Plate 21*d* is typical of the form. Another of the same form, Plate 21*e*, is unusual in being fashioned from a section of a notched scapula—convincing evidence of the co-existence of the two implements. A third awl, Plate 21*i*, was provided with a padded finger grip of fiber secured with a wrapping of bark—an obvious expedient for the relief of blistered fingers.

Notched Scapulae and Ribs. These forms of notched bone implements are described together because their function was the same. The mammal shoulder blade was prepared by breaking away the plate to leave a jagged edge projecting along the spine. The neck of the scapula served as a handle. In the specimen illustrated, Plate 21*a*, the edge has been worn into a series of highly polished, deeply grooved teeth which rake toward the handle. Pieces of two other notched scapulae (one of them re-fashioned into a short awl, Plate 21*e*) are less deeply worn and the teeth are less steeply raked than in the first specimen.

The notched rib seems to have been used without prior preparation, the natural edge of the bone being sharp enough for the purpose intended. Our examples, five in number, were found together in Basket Cave. The one shown in Plate 21*c* is typical of them all.

Harold and Betty Huscher (1943, p. 37) suggest that these notched implements were used for scraping hides. It seems to us more probable that the serrations resulted from processing mammal tendons into sinew. Our examples of tendon, both unworked and shredded, and cordage of twisted sinew suggest such a use for the implements. The rake of the teeth in our largest specimen, as well as in one illustrated by the Huschers (*Ibid.*, Plate 6*g*), indicates that the implement was

held in the hand and scraped back and forth over strands of sinew or fiber, and the polished sides at the base of the notches indicate that the implement was pressed down with some force upon the taut strands.

The significance of the notched scapulae and ribs will be more apparent in the discussion of cultural relationships (Chapter V), but it is pertinent here to mention their distribution as traced by the Huschers (*Ibid.*, p. 37).

This scapula tool is not represented at the earlier classical San Juan Basketmaker or Pueblo sites and is not listed for the Fremont River (Utah) or Promontory Cave (Utah) sites. However, Dr. Hurst (1942, p. 15, Pl. III, Fig. 10; probably also 1941, p. 17, Pl. IV, Fig. 11) found this type of scraper in his investigations of the Tabeguache Basketmaker Cave. A single occurrence might be regarded as intrusive, except that Mr. Earl H. Morris has announced its presence in considerable numbers at a Basketmaker II site near Durango, Colorado, which agrees in many essential respects with the classical Basketmaker sites but differs in that the houses are dug into a hillside (Morris, 1941, p. 282). One published record of this tool is from Lovelock Cave (Nevada) but the level is not stated and it may be in age from Basketmaker to Paiute of the immediate prehistoric (Loud, Harrington, 1929). A more clear cut occurrence is recorded by E. R. Smith (1941, p. 35, Pls. VII, 14; VIII, 1) from Deadman Cave, Utah, where the scapula tool and a similar tool of rib (deer or antelope) were found in levels 2, 3, and 4; possibly representing a time range of 2000 B. C. to 1000 A. D. Similar tools were found in shellmounds of the San Francisco Bay region where a considerable antiquity is shown.

To these occurrences we may add the Twenty Nine Palms Region, California (Campbell, 1931, Plate 41*a*), and the Huschers' own finds from Mesa County, Colorado. Without a critical examination of all the reported occurrences, we can safely say that this distinctive implement is very widespread in the territory of early and "generalized" Basket-Maker cave remains.

Chisel Point. Plate 21*h*. The specimen illustrated is the broken point of a chisel or spatula. Its working edge was 0.8 inch wide. The implement was probably used for fleshing hides.

Bone Tubes. There are three segments of bird-bone tubes in the Castle Park collection, ranging in length from 0.5 to 1.5 inches. Their resemblance to the bone tubes in the necklace from Mantle's Cave, Plate 14*f*, establishes their ornamental purpose.

Gaming Pieces. The thin rectangles of polished bone in Plate 21*g* show the extremes in size of 16 more or less similar pieces. Their resemblance to the pieces of worked slate previously described suggests their identity of purpose. Both the bone and the slate pieces, however, lack the criss-cross grooves found on small, exquisitely-made gaming pieces from the Basket-Maker Caves of the San Juan. They seem, instead, to be carelessly made or unfinished.

Bodkin. Plate 21*f*. A slender, highly polished needle, 5 inches long, with a remnant of joint at the end to serve as a grip.

Fur Cloth

A few fragments of fur cloth were found. Strips of rabbit fur about 0.2 inch wide were twisted to bring the soft fur outside to form a fluffy cord. These were interwoven to form blankets, probably without the usual warp foundation of fiber cordage.

Feather Cloth

A single scrap of feather cloth is evidence only that the art of making it was known.

Necklace

A necklace of whole juniper berries and bird bones was found shallowly buried in Mantle's Cave. No other articles were associated with it. The original string had disintegrated. When re-strung, it measured 28 feet in length. A detailed view of a short segment of the necklace is illustrated in Plate 14*f*.

Pottery

The ceramic art in Castle Park is represented by sherds of plain gray ware from Mantle's Cave, Barn Cave, and Marigold's Cave. None of the forms is restorable.

The ware is culinary; and many of the sherds are covered on the exterior with scales of ash and carbon. The paste is dense and hard. The tempering material consists of particles of coarse crushed rock. The surfaces are unslipped, rough in texture, and undulating in contour. The interior of the vessel walls shows black strata of carbonaceous material contained in the clay before firing. Near the outer surface of the vessel wall, this carbonaceous material has been oxidized by repeated contact with cooking fires.

The sherds from Mantle's Cave appear to be parts of two round-bottomed cooking pots of the form illustrated by Morss, from the Fremont River, (1931, Plate 20*b*). The rim profiles of these are shown in Figure 43*a* and *b*.

A single sherd from Barn Cave, with the scar of a handle attachment, may be part of a small pitcher or dipper. The rim profile is shown in Figure 43*c*.

The culinary ware from Castle Park seems to be closely related to seventh century Basket-Maker coiled ware of the San Juan region, rather than to pottery of the Woodland or the Plains.

Cliff Murals

Mural paintings and intaglios on the canyon walls are the most conspicuous aboriginal remains in Dinosaur National Monument. They represent the most northerly extent of an art which is widespread and continuous throughout the

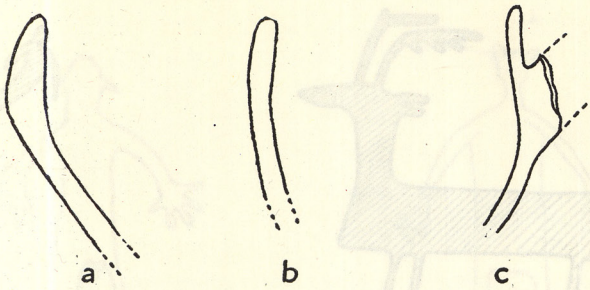


FIGURE 43. Rim profiles of pottery: *a*, *b* from Mantle's Cave; *c* from Barn Cave.

FIGURE 44. Cliff Murals: Orchard Panel. (Figures re-grouped in drawing)

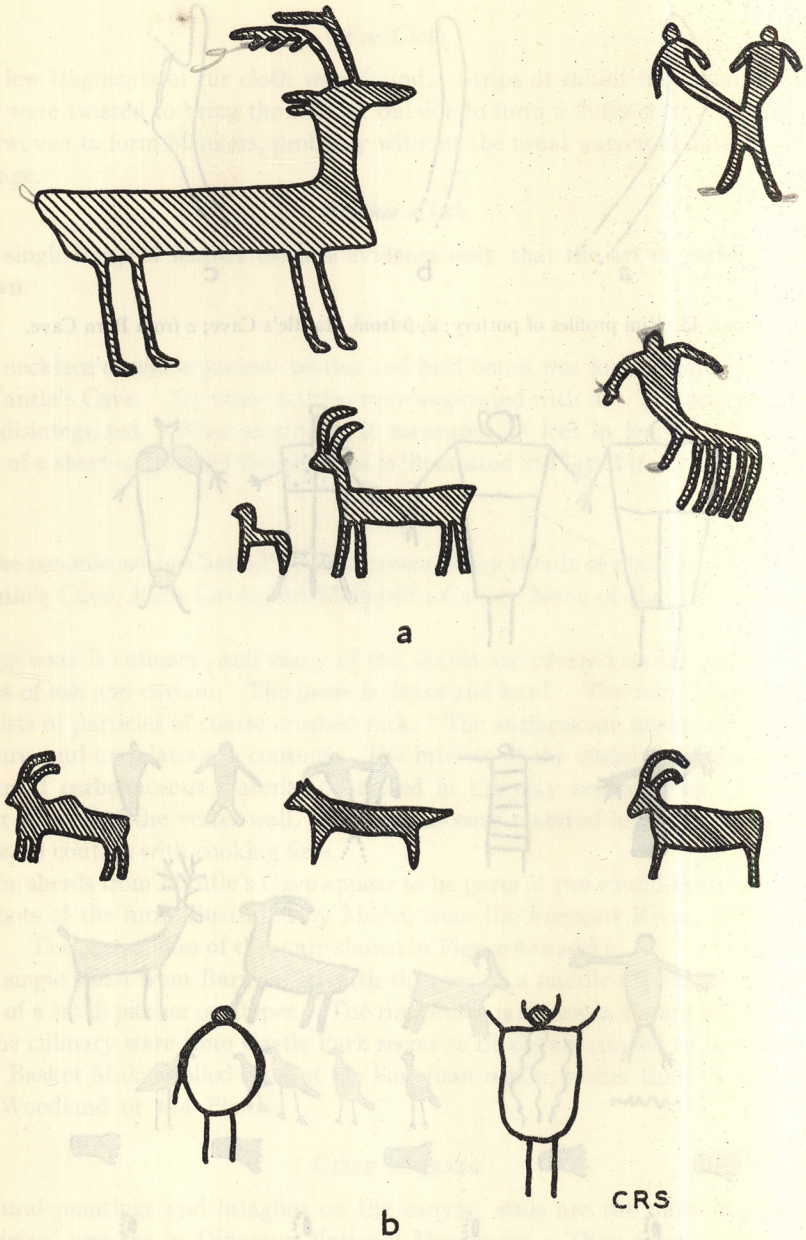


FIGURE 45. Cliff Murals: *a*, School House Panel; *b*, Ladder Panel. (Figures re-grouped in drawings.)

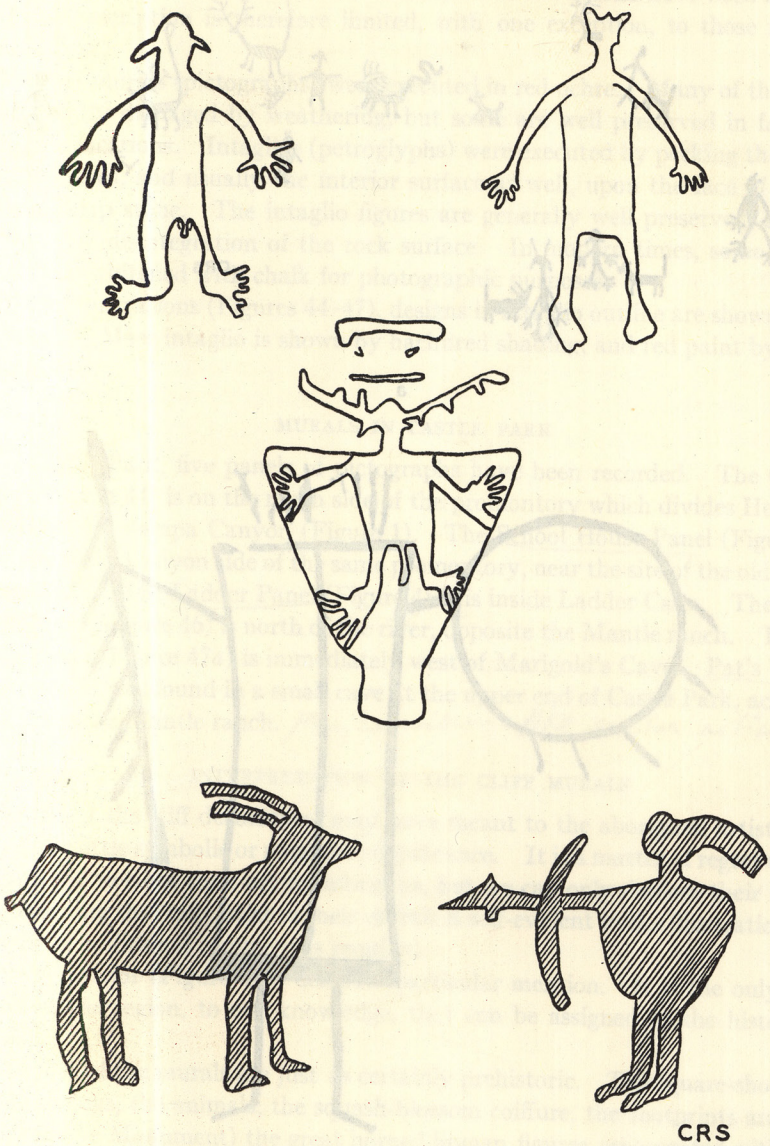
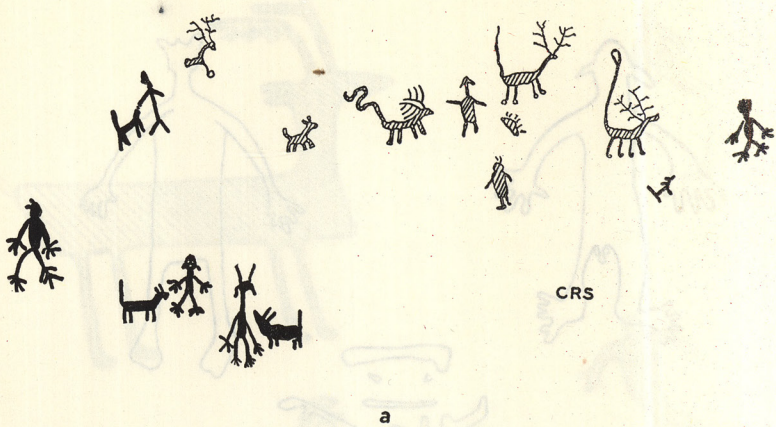
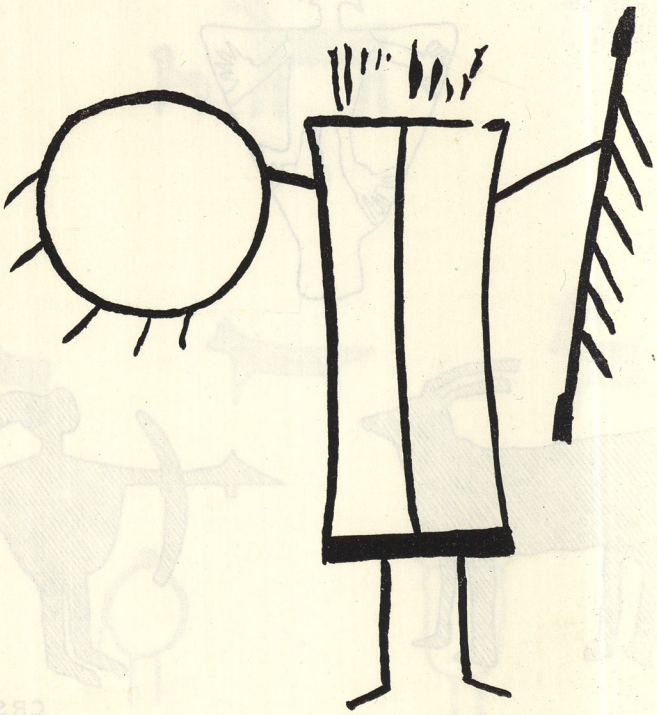


FIGURE 46. Cliff Murals: Crow's Nest Panel. (Figures re-grouped in drawing)



a



b

FIGURE 47. Cliff Murals: *a*, Dog Flats Panel; *b*, Pat's Warrior. (Figures re-grouped in drawing)

Colorado Plateau. Within the Monument, few of the murals have been recorded, and our description is therefore limited, with one exception, to those found in Castle Park.

Painted murals (pictographs) were executed in red ochre. Many of these have been greatly damaged by weathering, but some are well preserved in favorably sheltered locations. Intaglios (petroglyphs) were executed by pecking the outline of the figures, and usually the interior surface as well, upon the face of the cliff with a sharp stone. The intaglio figures are generally well preserved, although dimmed by disintegration of the rock surface. In modern times, some of them have been whitened with chalk for photographic purposes.

In our illustrations (Figures 44–47), designs in intaglio outline are shown by line drawings. Mass intaglio is shown by hachured shading, and red paint by masses of solid black.

MURALS IN CASTLE PARK

In Castle Park, five panels of pictographs have been recorded. The Orchard Panel (Figure 44) is on the north side of the promontory which divides Hells Canyon from the Yampa Canyon (Figure 1). The School House Panel (Figure 45*a*) is on the Hells Canyon side of the same promontory, near the site of the old Mantle Homestead. The Ladder Panel (Figure 45*b*) is inside Ladder Cave. The Crow's Nest Panel (Figure 46) is north of the river, opposite the Mantle ranch. The Dog Flats Panel (Figure 47*a*) is immediately west of Marigold's Cave. Pat's Warrior (Figure 47*b*) was found in a small cave at the upper end of Castle Park, across the river from the Mantle ranch. May be modern - like similar motif at MF 154.

INTERPRETATION OF THE CLIFF MURALS

Whatever the cliff decorations may have meant to the aboriginal artist, for us they have little symbolic or narrative significance. It is a matter of regret that the Indians did not use their art to inform us, but we can only deplore their neglect. Any meaning that may exist in their murals is self-evident in the illustrations, and very little additional comment is required.

Pat's Warrior (Figure 47*b*) deserves particular mention. It is the only pictograph in the region, to our knowledge, that can be assigned to the historic Indians.

The rest of the murals are just as certainly prehistoric. The square-shouldered human beings, the animals, the squash-blossom coiffure, the footprints and (elsewhere in the Monument) the great horned human figures ornamented with necklaces are familiar forms in the country of the Basket Makers and Pueblos.

The cheerful centaur (Figure 45*a*) does not, we believe, represent a mounted horseman. The realism of the animal forms elsewhere portrayed is lacking, and the spirit of the drawing is contrary to the art of the historic period.

The bow and arrow is frequently represented in the murals, but there is no suggestion of a spear-thrower.

Below Castle Park, in Rainbow Park, there is a pictograph worthy of mention. It is a painting of a hunch-backed flute player called Kokopeli by the Hopi Indians of Arizona. The characteristic features of the figure, as depicted upon painted pottery and cliff murals of the prehistoric Pueblos, are the flute, the exaggerated hunchback, and an enormous erect penis. The pictograph here referred to was found by the National Park Service reconnaissance party which explored the Yampa Canyon in 1942 (Baldwin, 1947). The recent suggestion by Cutler (1944) that Kokopeli may be one with the medicine men of the Andes, who in modern times travel from one village to another with a flute and a bag of corn, deserves further study.

Foodstuffs

A study of the animal and plant life of Dinosaur National Monument is now in progress. Thus far, however, our knowledge of plant and animal foods, wild and domesticated, is limited in the number of specific or generic identifications. Unidentified species or genera of probable occurrence can be conjectured, but for these no historical interpretations are warranted.

FOOD ANIMALS

The animal species listed in Appendix II may be considered the natural resources for the economy of the ancient people. Burnt and broken bones found in Hells Midden show a preponderance of deer, cottontail, prairie dog, and fish.

Our identified prehistoric faunal specimens do not include domesticated dog or turkey, but further excavation is required to confirm their absence.

FOOD PLANTS

Wild Plants. Grass seeds and root fragments have been found in the caves. It is probable that berries, pine nuts, and fruits of cactus were also harvested in prehistoric times. For identifications see Appendix III.

Cultivated Plants. Three cultivated plants have been found in Castle Park: corn, beans, and pumpkin—all of them prehistoric.

a. *Beans. Phaseolus vulgaris* L. (See Appendix III.)

b. *Pumpkin. Cucurbita moschata* Duch. (See Appendix III.)

c. *Garden Pea. Pisum sativum* L. (See Appendix III.) This occurrence of an Old World domesticated plant, recently introduced to America, is not so startling as might at first be supposed. In view of the disturbed nature of the cave deposits, we can confidently class it with the inevitable Bull Durham tobacco sacks which turn up even in apparently undisturbed caves.

d. *Corn.* For our knowledge of the corn from Castle Park we are indebted to the

study made by Dr. Edgar Anderson, Geneticist, Missouri Botanical Garden. He first began his study in 1942, when our specimens were forwarded to him by Mr. Volney H. Jones, of the Ethnobotanical Laboratory, University of Michigan, where they were first sent for examination.

Dr. Anderson's summary of his researches on the corn is contained in Appendix I. His truly surprising conclusions as to its age and origin, together with the findings of Carter, merit most careful consideration by archaeologists. The evidence points now to an agricultural economy in the Northern Periphery established independently of the Basket-Maker-Pueblo province in the San Juan River country. Further research in chronology is needed for a full understanding of the relationships of the two prehistoric provinces, but there can be no question that our older ideas of the history of agriculture in the Southwest require some revision.

Our own interpretation of the work of Anderson is presented in Chapter V, where the evidence of cultivated plants is considered in relation to other archaeological evidence.

CHAPTER V

CULTURAL RELATIONSHIPS

In order to interpret the antiquities in Castle Park, two problems must be considered: the nature of the culture which existed within the canyon; and relationships of culture and chronology in adjoining areas. As must be evident from our presentation, the existing data are too limited for final solution of these problems. For that reason we have separated the discussion of each problem into two parts. The first part—"Synthesis"—embodies conclusions well within the range of the evidence. The second part—"Conjectures"—is concerned with opinions and speculations suggested, but not proved, by the evidence. The orthodoxy of these we leave to the reader's own conscience.

Internal Relationships

The question to be determined by internal evidence is whether one, or more than one, culture is represented by the various aboriginal sites in Castle Park.

SYNTHESIS

Turning first to the caves we can tabulate the following traits of material culture:

Structures
- Masonry granaries
- Slab-lined pits
- Potholes

Artifacts
- Flaked Stone
  - Knives
  - Scrapers
  - Projectile points
  - Butterfly drills
- Ground Stone
  - Metates
  - Manos
  - Arrow-shaft smoothers
  - Worked slate
  - Spear-thrower weights (?)
  - Pipe
- Textiles
  - Twined tule matting
  - Twined bark bags

Fur cloth
Feather cloth
Basketry
Wicker fabric
Coiled: split-rod foundation; interlocked stitch
Coiled: split-rod-and-bundle foundation; uninterlocked stitch
Cordage
Snares: tapered fiber cord
Snares: tapered fiber cord on wooden tube
Bowstring: sinew
Nets: "single carrick bend" knot
Articles of Wood
Seed harvester: hoop of twigs
Arrow foreshaft
Arrow or dart shaft
Osier plaque
Leather Articles
Ermine pelt
Sinew thread and cordage
Buckskin bags
Fremont moccasin
Yampa moccasin
Deer-scalp headdress
Rabbit fur pendant
Scraps of buckskin and hide
Bone Articles
Long bone awl
Short bone awl
Antler plugs
Sheep-horn wrench
Fishhooks
Notched scapulae and ribs
Gaming pieces
Feather work
Headdress
Feather bundles
Miscellaneous
Necklace
Cedar bark "couches"
Pottery

Plant Foods

Dent corn
Beans
Grass seeds
Pumpkin

Since there is no evidence of stratigraphy, the relationships of the traits listed above depend upon the secondary evidence of unit associations. Most of the data on these associations have been presented in the description of structures and artifacts, so that only a brief review is necessary here.

a. The storage chambers, the coiled basketry (split-rod-and-bundle foundation; uninterlocked stitch), and the corn are contemporaneous. Evidence: baskets used as liners for potholes and as beehive covers for masonry granaries; vertical slabs used in slab-lined pits and in masonry granaries; round slab lids used on masonry granaries and potholes; corn kernels and cobs found in all types of storage chambers.

b. The feather headdress is contemporaneous with corn, beans, feather bundles, the long stone knife, buckskin bag, sinew laces, and cordage. Evidence: Cache No. 1.

c. The deer scalp headdress is contemporaneous with the Fremont moccasin and with tapered cordage. Evidence: Occurrence in Cache No. 3; the use of a tapered cord as a lace in one of the moccasins.

d. Coiled basketry (split-rod foundation; interlocked stitch) is contemporaneous with tapered cordage, bone fishhooks, and nets. Evidence: Cache No. 2.

e. The two principal kinds of coiled basketry are contemporaneous. Evidence: the use of split rods for foundation material in both; the occurrence of the same basket forms in both techniques including trays used for parching corn and seeds; the occurrence of both techniques indiscriminately in loose trash; and the cross-correlation of both techniques in caches.

f. Netting is contemporaneous with leaf-shaped blades, curved stone scrapers, sheep-horn wrench, and short bone awl. Evidence: Cache No. 6.

g. Twined tule matting is contemporaneous with feather bundles, the use of sinew, coiled basketry (split-rod-and-bundle foundation; uninterlocked stitch), and circular slab lid on pothole storage chamber. Evidence: Cache No. 4 and association of objects shown in Plate 7.

Considering these associations and the general circumstances of position of isolated artifacts (such as the necklace and the Yampa moccasins), we believe that most, if not all, of the culture traits tabulated for the caves in Castle Park belong to a single culture.

Outside the caves, in surface sites on the river terraces, the cultural inventory is limited to artifacts of stone. Here, in spite of the diversity of types, our series

are too meager for any decisive comparison except between the cave culture and Hells Midden.

The identities of stone artifacts between the cave culture and the second level below the surface in Hells Midden are as follows: metate (Figure 25); manos (Figures 26, 27); knives (Figures 13, 14, 15, 16); pick (Figure 17); curved scraper (Figure 18); projectile points (Figures 20, 21, 22, 23); and butterfly drill (Figure 24). These resemblances seem to us conclusive evidence that the people who lived at the midden were the same people who stored foodstuffs and objects of value in the caves.

CONJECTURES

a. The various surface sites in Castle Park, although not identified with Hells Midden and the caves by a convincing series of artifacts, probably belong to the same occupation.

b. The deposits in Hells Midden indicate a long and continuous occupation by hunting people whose culture was enriched at the last by the addition of cultivated plants (corn, beans, and pumpkin) and new inventions (pottery and the bow and arrow). These later additions to a simple economy would explain the survival of such archaic and widespread traits as twined tule matting, the spearthrower, and game snares. The absence of pottery in Hells Midden is particularly suggestive, even though excavation has been too limited to rule out its presence entirely.

c. The presence of caches of obviously valuable personal effects in the caves suggests that the inhabitants made a hasty exodus from the region and that they never returned. It is not likely that drouth and consequent crop failures were responsible for abandonment in a region so close to the mountains.

Relationships with Adjoining Regions

The region of Dinosaur National Momument is a point of contact for three cultural areas: the Great Plains, the Great Basin, and the Colorado Plateau. We might expect, therefore, to find in Castle Park a blend of all three. However, these cultural areas are at best a convenient expression for general unities of environment and economy, somewhat vague in detail and yet inflexible in time. It cannot be assumed that the Momument area was a perennial rendezvous for the Indians as it was at a later time for trappers in the days of the fur trade.

It is well known that the domesticated horse, introduced by the Spanish, so revolutionized the culture of tribes of the mountains and the plains that their archaeological remains, when identified, reflect scarcely any details of their life in historic times. We suspect, therefore, that the practice of agriculture on the southwestern Plateau may have revolutionized the habits of many wandering

tribes in prehistoric times. Since we lack linguistic and somatic data, our comparisons of cultures have to be based upon a rather lifeless consideration of assemblages of artifacts in order even to establish cross-dates and distributions; we can make no conclusive tribal identifications.

SYNTHESIS

a. *Relationships with Historic Cultures.* In historic times, sometime before 1776 A. D., the Colorado plateau east of the Colorado river was occupied by tribes which had acquired the European horse (Stewart, 1942). Their culture then became essentially that of the Plains tribes, as far as economy, weapons, and dress were concerned. The Monument area was occupied by the Ute Indians, a Shoshonean-speaking tribe. To the north in Wyoming were the Comanches and other Shoshonean tribes.

Our interest in the historic tribes is not concerned with their material culture as such, but with certain traits which might provide cultural and chronological connections with the antiquities of Castle Park. The following list of traits, therefore, is limited to those which we might expect to find in Castle Park if any of the eastern or northern tribes frequented the caves in historic times.

Buffalo-skin tipi
European horse
Tailored buckskin clothing
Tailored moccasins
Rawhide shield
Long lance
Iron projectile points
Feather war bonnet
Ceremonial elbow pipe
Glass beads
Hooded cradle of osiers and buckskin
Pitch-coated basketry
European cloth
Cooking pot with conical base
Porcupine-quill embroidery

None of these traits appears in the caves of Castle Park. The headdress of feathers and ermine from Mantle's Cave is not like those made by the nomadic hunters in historic times; the train is lacking as well as eagle feathers and bead ornamentation. The headband flares at the side of the head instead of encircling it. It is at least possible that the headdress might represent one of these tribes at an earlier day, but it is excluded, both by type and archaeological association, from the period of the historic buffalo hunters.

There are two possible connections with the historic tribes of the eastern Plateau. First, there are the wickiup or tipi sites, distinguished by scattered poles and timbers on the high benches above the cliff and in Moss Cave up-river at Harding's Hole. These remains seem to be entirely unrelated to the other materials from the caves. Second, there is the pictograph called Pat's Warrior, shown in Figure 47*b*, which, among hundreds of cliff murals, is the only one that shows cultural traits of the historic period.

Earlier than the historic nomads were the Athapascan hunters who came into the plateau region from the north, the ancestors of the Navaho and Apache who now occupy much of the Pueblo country in Arizona and New Mexico. The time of their arrival on the Plateau is thought by most writers to be after 1000 A.D., but no positive temporal evidence has yet been found for their earliest movements. On the northern Plateau, Harold and Betty Huscher (1943) have found archaeological remains in open sites which they ascribe to the Athapascan hunters. Whatever the merits of their ingenious argument—which is by no means proved—their data are worthy of examination. The following traits which the Huschers believe to be Athapascan occur in the Castle Park collection. (The references are to our own illustrations.)

Notched bone implements: Pl. 21*a*, *c*
Curved knife: Fig. 16
Stemmed projectile point with rounded base: Fig. 23
Pick: Fig. 17
Circular slab lid: Pl. 7
Pothole storage chamber

The traits listed above are represented by only a few specimens and provide no significant parallels with the antiquities of Castle Park.

Moreover, of the traits which the Huschers regard as diagnostic for the Athapascan—masonry without mortar used in stone circles and towers, sand-tempered pottery, high altitude habitat, absence of kitchen middens and notched bone tools—only the latter are present in Castle Park. Athapascans may have been in the Monument region during their travels, but we find no convincing trace of them in the Yampa canyon.

West of the Colorado River, the Plateau and the Great Basin were occupied by tribes and bands of Shoshonean-speaking peoples who possessed a simpler material culture than the eastern tribes. Among them were the tribes called by early explorers "Diggers" because of their custom of digging edible roots and bulbs. Unlike the Plains culture, the Plateau culture was not completely transformed in historic times. Many of the western tribes were remote from the avenues of Caucasian travel and very late in obtaining articles of European manufacture. (With these tribes we may include the Ute Indians of the period preceding acquisition of

the horse.) Consequently, absence of historic culture elements in archaeological sites west of the Colorado is not necessarily proof of prehistoric age.

The following list of traits for the western Plateau tribes is limited only to those which show some resemblance to traits in the Castle Park collections.

Seed harvester
Fur cloth
Coiled basketry
Twined basketry
Games snares of cordage and netting
Feather headdress
Side-notched arrow point
Fishhooks

The foregoing list of traits shows at once that the ethnographic situation in the West is totally different from that in the East. First, all of the traits, probably even the feather headdress and the side-notched arrow point, are ancient ones which have survived until modern times. Second, nearly all of them have wide geographical distribution in prehistoric cave deposits, although their distributions are not co-extensive. Third, nearly all of them represent primitive arts of working in wood and fiber and equally primitive habits of food gathering. (The coiled basketry is made with both interlocked and uninterlocked stitches on a three-rod foundation; Weltfish, 1930.)

For the present, we can only conclude that no ethnographic connection can be established between the antiquities of Castle Park and the tribes of the western Plateau. The Yampa Canyon situation is, in a minor degree, the same as that in Lovelock Cave, Nevada, where obviously ancient remains show convincing resemblances to historic cultures of the Plateau. In the Castle Park collections, for example, the contemporaneous manufacture of interlocked and uninterlocked basketry has its only ethnographic parallel among the Great Basin tribes (Weltfish, 1930). In function also, the basketry parallels are striking—trays for parching corn or seeds, and burden baskets carried on the back and supported by a tumpline over the forehead. And yet the absence of twined and wicker basketry in Castle Park as well as technological differences in coiling seems to us to rule out any specific relationship in the art.

Our data on feather headdresses from the Great Basin (Holmes, 1912; Steward, 1933) and California (Holmes, 1902, p. 135) permit no detailed comparisons, for the Great Basin examples are feather crests that completely encircle the head without a train of feathers at the back, and the headband of the California specimen appears to be of fur. Of greater interest is the whole assemblage of objects associated with the California specimen: a pouch of twined tule matting, feather headdress, two feather bundles, a bundle of netting, a needle, a fur sash, and a

length of ribbon, evidently braided. This pouch of ceremonial objects was the property of a Tulare Indian. The type of container, the inventory of objects, and the owner's secrecy about possession together afford an astonishing parallel to the caches found in Mantle's Cave. Also worthy of note is the resemblance of the fur sash to another found by Nusbaum in DuPont cave in a Basket Maker site in southwestern Utah (Nusbaum, 1922, Fig. 8).

The distinctive side-notched arrow point, Figure 19, is considered to be historic Shoshoni (Steward, 1936, Figure 14*f*). In Castle Park it occurs in Hells Midden (level not known) and in surface sites elsewhere in the canyon.

Despite certain parallels in cultural detail (see Stewart, 1942, for tabulation) we do not believe that the Castle Park antiquities can be identified with historic tribes in ethnographic areas adjacent to Dinosaur National Monument.

b. *Comparison with Prehistoric Cultures.* In the ancient cave cultures of the Plateau, we find more specific data for comparison. Of the many sites reported upon in the literature, we have selected only those which lie within reasonable geographical range of the Yampa River. The comparisons are made with total cultural assemblages whenever possible rather than with specific sites. The cave complexes considered here are the following: Fremont River, San Juan River, Tabeguache Creek, Promontory Caves, and Nevada Caves. The first three are similar in environment to Dinosaur National Monument; the last two are in much more barren and desolate country.

Fremont River. Range: The western tributaries of the Green River from the Fremont River to Nine Mile Canyon (Minnie Maud Creek), 200 miles to the north. Sources: Morss, 1931; Leh, 1936.

The following culture traits are found both in Castle Park and the Fremont Culture. (The references are to our own plates and figures.)

Adobe turtlebacks in wall construction: Pl. 20*c*
Slab-lined pits: Pl. 11
Wattle partitions in storage chambers: Fig. 5
Masonry on top of vertical slabs
Potholes: Pl. 9
Basket-liner in pothole: Pl. 7
Flaked stone knives: Figs. 13, 14, 15
Pick: Fig. 17
Scraper: Fig. 18
Butterfly drill: Fig. 24
Short mano: Fig. 26
Metate: Fig. 25
Arrow-shaft smoothers: Fig. 28
Twined tule matting: Fig. 30

Twined cedar bark bags: Fig. 31
Fur cloth
Coiled basketry: Figs. 33, 34
Tapered cord snares: Fig. 37
Arrow foreshaft: Pl. 19*a*
Fremont moccasin: Pl. 15*b*
Short bone awl: Pl. 21*d*
"Medicine" pouches
Feather bundles (including red-shafted flicker)
Corn (including some strongly dented)
Beans
Pumpkin
Grass seeds
Corn cobs on sticks (Pl 22 a, b)
Pottery (gray ware, undecorated)
Stone ball

Tabeguache Creek. Range: Tabeguache Canyon and other tributaries of the Dolores in southwestern Colorado. Sources: Hurst, 1940, 1941, 1942, 1943, 1944, 1945.

The following culture traits are found in both the Tabeguache Caves and in Castle Park. (References are to our own plates and figures.)

Slab-lined pits
Potholes
Pick: Fig. 17
Projectile point: Fig. 20
Notched bone implements: Pl. 21*a*, *c*
Butterfly drill: Fig. 24
Metate: Fig. 25
Short mano: Fig. 26
Twined tule matting: Fig. 30
Fur cloth
Arrow foreshaft: Pl. 19*a*
Osier plaque (?): Pl. 19*e*
Short bone awl: Pl. 21*d*
"Medicine" pouches
Sheep-horn wrench: Pl. 17*a*
Feather bundles
Corn

San Juan. Range: The San Juan River and its tributaries in southern Utah and northern Arizona. More specifically, we are concerned with those caves in which

the primary discoveries of the classic Basket-Maker culture were found. Sources: Guernsey, 1931; Kidder and Guernsey, 1919; Guernsey and Kidder, 1921; Nusbaum, 1922; Morris, 1925 and 1936; Morris and Burgh, 1941; Weltfish, 1932; Judd, 1926; Pepper, 1902; Haury, 1945. (Of the many references to the Basket-Maker culture, we have thought it necessary to list only those sources which contain detailed descriptions of structures and artifacts from the caves in the San Juan River country.)

The following cultural traits are found both in classic Basket-Maker culture and in Castle Park. (References are to our own plates and figures.)

Adobe turtle-back wall construction
Wattlework partitions
Slab-lined pits
Potholes
Flaked stone knife: Fig. 15
Hafted knife: Pl. 19*d*
Miniature projectile point: Fig. 21
Hafted drill: Pl. 19*c*
Metate: Fig. 25
Mano: Fig. 26
Arrow-shaft smoothers: Fig. 28
Spear-thrower weights (?): Pl. 14*c*, *d*
Pipe: Fig. 29
Twined tule matting: Fig. 30
Twined cedar bark bags: Fig. 31
Fur cloth
Feather cloth
False braid on basket rim: Fig. 35
Snares on wooden tubes: Fig. 38
Netting: Fig. 39
Arrow foreshaft: Pl. 19*a*
Dart shaft: Pl. 19*b*
Osier plaque (?): Pl. 19*e*
Short bone awl: Fig. 21*d*
Neckalce: Pl. 14*f*.
Ermine pelts
Sheep-horn wrench: Pl. 17*a*
Rabbit fur pendant: Fig. 12 (feather in BM)
Pottery
Corn
Beans

Pumpkin
Grass seeds
"Medicine" pouches
Corn cobs on sticks
Miniature baskets.

Promontory Caves. Range: Caves in the vicinity of the Great Salt Lake. Specifically, our trait list refers to the culture found by Steward in Cave I, a later occupation than that in Cave II. Sources: Steward, 1937.

The following culture traits are found in both Cave I of the Promontory Culture and in Castle Park. (References are to our own plates and figures.)

Arrow-shaft smoothers: Fig. 28
Worked slate
Twined tule matting: Fig. 30
Wicker fabric: Fig. 32
Netting: Fig. 39
Short bone awl: Pl. 21*d*

Nevada Caves. Range: Caves in southeastern Nevada. Sources: Loud and Harrington, 1929; Wheeler, 1942; Harrington; 1933.

The following cultural traits occur both in the Nevada Caves and in Castle Park. (References are to our own plates and figures.)

Potholes
Pick: Fig. 17
Flaked stone knife: Fig. 16
Fur cloth
Snares on wooden tubes: Fig. 38
Fremont moccasin: Pl. 15*b*
Sheep-horn wrench: Pl. 17*a*
Fishhooks: Fig. 11
Feather bundles
Twined tule matting
Grass seed
Corn
Beans
Notched bone implements: Pl. 21*a*, *c*

The Durango Rock Shelters in the Animas River Valley in southwestern Colorado, excavated by E. H. Morris, are not included in the tabulations because as yet only a brief notice has been published (Morris, 1941, and personal communication). The culture represented is Basket-Maker, contemporary with the classic manifestation in the San Juan River country. Of particular interest is the basketry. With one exception, all of it is uninterlocked stitching on a split-rod-and-bundle founda-

tion (Figure 33). The exception is a basket with stitches interlocked on a two-rod-and-bundle foundation (the standard foundation for the classic Basket Makers). Other features of interest at the site are house floors on hillside terraces and in the shelters; a scarcity of twined-woven cloth and sandals and a proportionately greater abundance of leather and hide; an abundance of notched scapulae and ribs; and an economy in which hunting was as important as agriculture.

Another untabulated collection, exhibited in the Thorne Photographic Studio at Vernal, Utah, contains a few foreign items, such as a modern California basket; but it consists principally of undocumented artifacts from caves in northwestern Colorado and northeastern Utah. The identification of these Fremont River culture traits is unmistakable. Items of special interest are a mummy (flexed position, undeformed skull, cedar bark robe); a basket fragment (uninterlocked stitch, split-rod-and-bundle foundation) with a design of stepped triangles characteristic of the San Juan Basket Makers; a pottery pitcher similar to one illustrated by Morss (1931, Pl. 20*a*); and three hafted knives almost identical with the specimen from Mantle's Cave (Pl. 19*d*).

An exhaustive review of the cave cultures of the plateau cannot be attempted here, but from the tabulated data we can draw certain conclusions relevant to the archaeology of Castle Park.

a. The culture of Castle Park shows virtual identity with the Fremont Culture in east-central Utah.

b. The only reasonable interpretation of the Fremont Culture is the one proposed by Morss: a laggard culture, basically Basket-Maker in content, which survived without marked change into early Pueblo times.

c. The problem of chronology is not yet satisfactorily settled. On the evidence of the pottery in Castle Park, the seventh century might be regarded as the terminal date for the occupation. However, the pottery associations found by Morss and Leh clearly indicated survival of the Fremont Culture until the ninth century. The Yampa Canyon was apparently abandoned earlier.

d. The distribution of the Fremont Culture along the Green River and its tributaries is continuous from the Fremont River, Utah, to Dinosaur National Monument—a distance of 200 miles. The implication is that a considerable population occupied this region for a period of several centuries; yet the lack of any formal architecture makes the occupation appear more casual than it probably actually was.

e. The feather headdress is the one object whose antiquity may be questioned. We believe, however, that it is ancient and not alien to the Fremont Culture. Our reasons for this belief are its presence in a "medicine" pouch of the sort characteristic of the early Basket Makers and the widespread occurrence in the Fremont Culture and the classic Basket-Maker culture of feather bundles and other ma

terials for its manufacture. Its antiquity is entirely plausible on archaeological evidence; whereas a hypothesis that it is late or intrusive leads to logical impossibilities.

f. Surface ruins west of the Colorado River cannot be satisfactorily linked with the Fremont Culture by comparison of traits, in spite of their close proximity in Nine Mile Canyon on Minnie Maud Creek. We think it quite possible that the shallow pit houses at the western end of Nine Mile Canyon (Gillen, 1938) and perhaps others in eastern Utah (Steward, 1941) will prove to be more closely related to the Fremont Culture than is now apparent. It is significant that Steward finds the ruins in western Utah essentially Basket-Maker in culture content, even in sites where the pottery is as late as Pueblo II.

CONJECTURES

In comparison with the Basket-Maker-Pueblo culture to the south during the period from 400 to 900 A.D., the Fremont Culture seems static and uninspired. The pottery found along the Green River suggests a passive acceptance of southern culture traits, and even downright indifference to the rapid and vigorous development of culture in the San Juan drainage. However, there is some evidence that the basic culture of the Fremont people is as old as that of the San Juan Basket Makers, and at first not inferior. At present we can only suggest the possibility that the basic Basket-Maker culture may have been widespread on the Plateau and initially prosperous along the western slope of the Rocky Mountains. The occurrences of the same Basket-Maker elements in the Tabeguache Caves, the Durango Rock Shelters, and the Yampa Canyon suggest a new line of approach to the problem.

The speculations of Julian H. Steward concerning the range and origin of the Fremont Culture are of particular interest. In his survey of the Colorado River south of the junction with the Fremont he found a discontinuous distribution of Anasazi and Fremont traits in the region where the river system contains a minimum of arable land on the canyon floors. He concluded therefore that the contact was roundabout rather than direct, and he speculated upon the origin of the northern culture as follows:

> It appears at present that the source of the original Northern Peripheral culture should be sought in western Colorado or extreme eastern Utah, a region which is virtually unknown archeologically. (Steward, 1941, p. 355.)

The most important question to be considered is the direction of movement of the Basket Makers in the Southwest. Their origin is still a mystery, for at the time of their earliest appearance in the San Juan they were flourishing farmers engaged in the practice of textile arts of rare sophistication. The question that con-

cerns us is whether the Basket Makers on the upper reaches of the Animas River, the Dolores River, and the Green River were always laggard neighbors of the San Juan people, or at one time their equals in cultural equipment and in enterprise.

Tree-ring dates argue for an earlier development of the Basket Maker culture along the San Juan and Colorado Rivers. Most notable is Cave DuPont in southern Utah, west of the Colorado River. Here Nusbaum collected ancient wood that has been dated at 217 A.D. (Stallings, 1941.)

The evidence of the corn, on the other hand, argues for an independent cultural development on the upper Green River and its tributaries. The results of Dr. Anderson's research on this problem (Appendix I) can be summarized for comment here as follows:

1. The Castle Park corn is identified as Mexican Pyramidal in type, with both pure and transitional strains represented. Although it resembles the modern Mexican strain to an astonishing degree, its presence in the Yampa is the result of slow transmittal northward, with successive adaptations to changing latitudes, or a possible transmittal to both Mexico and northwestern Colorado from some unknown center of dispersal. In either case, the process of adaptation must have taken several decades at the least, and probably much longer.

2. Proceeding south along the Green and Colorado Rivers toward the San Juan Basket-Maker province, the central Mexican characters of the Yampa corn appear in "diluted" form in sixth century Basket-Maker corn (which shows affinities with western Mexican corn) and more strongly again in the centuries following, as "more of the germplasm of the new type of maize filtered into that area." On this evidence, it is clear that the Fremont culture was not entirely passive in its relations with the Anasazi of the Four Corners region, since the direction of influence here is unquestionably from north to south.

If we were to make the contrary assumption that Anasazi corn spread north and weakened the central Mexican strain in the Fremont region, we should be forced to the conclusion that agriculture was much older in the north. Our evidence now indicates only that the Yampa corn dates back to the sixth century, even though other circumstances of association have convinced us that it was cultivated in Castle Park as early as 400 A.D.

The evidence of the species of pumpkin already referred to is less forceful in its implication than that of the corn, but it strengthens the probability of an independent agricultural development in the north.

As to the origin of the Yampa corn, the Great Plains seem to be the most plausible source, as suggested by Gladwin (1937), Carter (1945), and Anderson. Carter's postulated date of 700 B.C. for the introduction of corn into the southern United States fits our Castle Park timetable very reasonably, but the problem of identification of the varieties of corn involved is still obscure.

With our present information, reconciliation of the conflicting evidence is possible only if we accept the theory of multiple influences upon agriculture in the Southwest. The most we can now attempt is to frame a tentative scheme for further inquiry. The following reconstruction of ancient events is admittedly imaginative, and if further research should damage it badly, as we anticipate, it will at least serve the valuable purpose of reviving problems too long dormant.

We begin with scattered tribes who supported themselves by hunting, fishing, and harvesting wild plants. Their habitat was the headwaters of the eastern and northern tributaries of the Colorado River. Although they lived at rather high altitudes, they belonged to the plateau rather than the mountains. Their culture, during the first century of the Christian Era, included certain material traits widespread in western North America: the spear-thrower, coiled basketry, fur cloth, shelters of poles and brush, twined tule matting, nets and snares for capturing game, and tackle for catching fish. Of these people we can expect to find little trace, for their material culture is naturally not represented in open sites by the perishable artifacts which would serve to identify them.

To these people on the headwaters of rivers, along the western slope of the mountains, domesticated corn was introduced from the Plains. The new plant revolutionized their existence and gave them an opportunity to elaborate their simple culture. They soon found that corn thrives better in a more temperate climate, farther down-river in the canyons. How rapidly the art of agriculture may have been transmitted it is impossible to say, but we suspect that it may have been very rapidly, outdistancing its bearers on the Plateau, and drawing more than one tribe or linguistic group into the canyons of western Colorado and eastern Utah.

A century seems sufficient for our postulated extension of agriculture, so that by 200 A.D. many groups of people in the northern Colorado River drainage would have had the necessary means for cultural development. The Basket Makers of the San Juan drainage, (who meanwhile had acquired another race of corn, affinal to western Mexican corn) were the only group that took full advantage of their opportunity. Our eastern and northern groups clung to a hunting economy and the older arts, until—reluctantly and late—in the seventh and eighth centuries they began to receive impulses of new traits and ideas from the south where an enterprising and extensive cultural development was well under way.

From the seventh century to the ninth, the Fremont people seem to have received, at second or third hand, late Basket-Maker and early Pueblo pottery, and eventually the domesticated bean. Their contact with the Anasazi continued to be remote, the ninth century witnessing their permanent eclipse in the canyons of northeastern Utah and northwestern Colorado.

CHAPTER VI

SUMMARY

Castle Park is an open glade in Yampa Canyon on the eastern side of Dinosaur National Monument in northwestern Colorado. In its landscape, life forms, and environment it resembles the canyon country of southern Utah and northern Arizona.

In prehistoric times, Castle Park was the habitat of a group of Indians who lived by hunting, fishing, and agriculture. The time of their occupation was from about 400 to 800 A.D. Some of our evidence indicates that this group was native to the region in earlier times, and that they turned from a roving hunter's life to a more settled existence in the canyon after they adopted the practice of cultivating corn. In the canyon they continued to live for several centuries in apparent security. They seem to have been little stimulated by the appearance now and then of new arts, such as making of pottery, building of pueblos, and cultivating of beans, all of which flourished farther south in the Pueblo area.

The caves in Castle Park, most of which were too damp and cold for habitation, served for the storage of foodstuffs and treasured possessions, and for occasional shelter. It may be conjectured that houses of poles, matting, and hide sheltered the people in terrace villages along the river. The large midden deposits of floor sweepings and kitchen refuse testify to a long and populous occupation not evident in architectural remains.

The racial and tribal identities of the ancient inhabitants are obscure, since we have neither skeletal remains nor traditional history to guide our speculations. Comparisons with other cultures must be limited to relics of industrial and aesthetic arts. Looking to adjacent areas, we find virtual identity of the Castle Park culture with the Fremont culture, immediately to the south along Green River and its tributaries. It is apparent that the antiquities of Castle Park should be classified as a northern extension of the Fremont culture, which is now known to be widely distributed in east-central Utah.

The Fremont culture is essentially Basket-Maker in content, with some significant departures from the classical San Juan manifestation. Most notable in the Fremont culture is the absence of such sophisticated objects as cloth sandals of exquisite weave and flutes having a five-tone scale. These objects, dating from the fifth century in their highest development, represent a cultural stability and an aesthetic virtuosity attained only by the San Juan Basket Makers. The only comparable aesthetic expression in the north is to be found in the cliff murals and (on the Fremont River) figurines which, in spite of a common ancestry with arts of the San Juan, diverged under local inspiration.

In contrast to the classic San Juan Basket-Makers, we find in the Fremont region a people whose practice of agriculture did nothing to diminish their interest in the older occupations of hunting, fishing, and harvesting wild plant foods. These older customs they shared with other groups west of the Rockies on the fringe of the Plateau: in the Animas and Tabeguache valleys of southwestern Colorado, along the high western slope of the mountains, and in the arid country west of the Colorado River. Whether this peripheral and laggard culture was, during the early centuries of the Christian era, the means of introducing corn from the Plains to the northern Plateau is a question to be answered by further research. We have here used the existing evidence to formulate a working hypothesis, admittedly conjectural, but necessary in directing further inquiry.

APPENDIX I

RACIAL IDENTITY OF THE CORN FROM CASTLE PARK

By Edgar Anderson

The maize from Yampa Canyon is remarkably similar to modern varieties from central Mexico and remarkably unlike most Basket-Maker corn. In the most extreme examples (A-274a, Plate 22b and A-412) it has the short, evenly-tapered ears with row-numbers of 16 or above and the pointed, heavily dented kernels that Anderson and Cutler (1942) described as the "Mexican Pyramidal" race. In dry maize fields from Zacatecas to Hidalgo it would be possible to duplicate these two ears from Yampa Canyon in many modern fields of white Mexican dents.

When, where, and how this distinctive race of maize was first differentiated we do not know. There are no facts and almost no theories. About the dent corns themselves we know a great deal. They radiate from the *mesa central* in all directions. Crosses with them form the basis of the productive commercial varieties of the United States corn belt (Brown and Anderson, 1947), of the central Mexican corn belt (Anderson, 1946) and perhaps also of certain Guatemalan varieties (Anderson, 1947). From the northern flint corns of the eastern United States, from the compressed-eared varieties of western Mexico to which Basket-Maker corn is allied, and from the tropical flints they differ in such a large number of genes that if they are crossed with these other kinds of maize only once, their influence upon the morphology of their descendants persists for numerous generations.

The denting of the kernels from which they derive their popular name is due to a peculiar distribution of hard and soft starch. A column of soft starch through the middle, extending up to the tip, produces a variable set of results depending upon the relative amounts of the two starches. If there is just a little soft starch, it produces a visible cap at the tip. With a larger deposit the cap shrinks upon drying, producing a basin or indentation in the center of the kernel. With a still greater accumulation the surface of the kernel shrinks still further, producing a rough or wrinkled dent. The genetic basis of these various grades has never been worked out in detail, but it is known that, if a deeply dented variety is crossed with an undented one, the hybrid will be either capped or only slightly dented and that various grades of denting may appear among the progeny.

From this discussion it should be clear that the dent corns of central Mexico are a highly differentiated race and that the chance of a morphologically identical variety having an independent origin elsewhere is extremely unlikely.

Archaeologically, there is nothing like these Mexican dents known from the eastern United States and it is only in the Great Plains and in the Southwest that varieties indicating their influence have been discovered. From the Great Plains a variety of maize types have been turned up in various excavations, but the sequence of these types is as yet unknown, though apparently complex. In the Southwest the denting and high row-number indicative of Mexican Pyramidal influence do not put in their appearance until about Pueblo I (Carter and Anderson, 1945). To the highly skilled agriculturalists of the Four Corners region the introduction of a little new germplasm into their comparatively uniform corn was an opportunity of which they apparently made good use. With these new genes they were able to increase the row-number of the original Basket-Maker ear. From this mixture there came the wide-eared, large-grained varieties like some of those still grown by Hopi farmers. The long-eared types which characterize most of the Pueblo region today appeared at a still earlier date.

As soon as Mr. Scoggin's excavations of maize were submitted for examination it was realized

that for the study of cultural sequences and relationships in the Southwest it was material of extreme significance. An effort has been made to locate, examine, measure, and photograph all of the relevant collections in other museums in order to prepare a comprehensive report. In the five years since that time most of this material has been seen and measured, but there are still important collections which have not been reached, and until they are included a full scale technical report would be premature. However, certain conclusions are already justified by the evidence.

1. Much of the maize excavated at Yampa Canyon is of the same general type. Whereas only two of the ears are exaggeratedly Mexican Pyramidal, the other ears bearing kernels are transitions to the same type and like them could be duplicated (aside from their discoloration) in modern Mexican fields. Many of the bare cobs and shelled kernels from other parts of the Mantle's Cave exhibit some of the same distinctive characters. The following cob collections have row-numbers of 16 or above: A-1039, A-944, A-274 (Plate 22*a*, *b*), A-1029. The following collections of kernels have pointed grains: A-274 (Plate 22*a*, *b*), A-412, A-416, A-624, A-626. The following have deeply dented kernels: A-967, A-614, A-933, A-416, A-1052, A-1111, A-624, A-1129, A-410, A-626, A-1146. It would appear likely that these many-rowed, more- or less-pointed dents were grown somewhere near Yampa Canyon over a considerable period of time.

2. These many-rowed dents are now known archaeologically from other localities in the Southwest. While nothing as extreme as these ears has yet been reported, collections from Vernal, Utah, and from Cottonwood Canyon in the same state, show approaches to this extreme condition. As a matter of fact when all the collections from Utah are averaged it will apparently be possible to demonstrate objectively the way in which the influence of these many-rowed dents extended from northwestern Colorado to the Four Corners region, becoming more and more diluted with increasing distance, yet in the Four Corners region, at least, becoming increasingly evident as the years advanced and more of the germplasm of the new type of maize filtered into that area.

3. It is almost unimaginable that the many-rowed, pointed dents of Yampa Canyon and of central Mexico could have had separate origins. This means either that the Yampa dents reached that area by a process of diffusion from Mexico or that these dents had their origin in some other place as yet undetermined and that from this center of origin they spread by one route to central Mexico and by the other to northwestern Colorado.

4. From whence and in what manner did this distinctive race of maize reach Yampa Canyon? It most certainly could not have come through the Four Corners region, which had another type of maize (associated with *western* Mexico) before the diluted dents began to spread into that area. Nor is it likely that it reached Colorado suddenly in one jump. Dent corns are remarkably adaptable and can be cultivated far north of Mexico, but this cultivation always has to be developed gradually. Since most varieties of maize are very much adapted to the length of day of their own latitude, if they are moved very far north it takes a number of generations before they can be re-selected to the new habitat. The maize from Yampa Canyon represents as extreme a type of Mexican dent as has ever been cultivated successfully so far north.

APPENDIX II

IDENTIFICATION OF MAMMAL REMAINS

By Richard E. Pillmore

The identification of mammal remains from archaeological sites in Castle Park was made by comparison with known material in the University of Colorado Museum. A considerable portion of the specimens remain unidentified because of the lack of sufficient comparative material. Among the unidentified specimens there are bones of birds and fishes as well as mammals. The identified genera are listed below.

Order Lagomorpha
- Family Leporidae
  - Genus *Lepus* Jack Rabbit
  - *Sylvilagus* Cottontail

Order Rodentia
- Family Sciuridae
  - Genus *Marmota* Marmot
  - *Citellus* Ground Squirrel
  - *Cynomys* Prairie Dog
- Family Geomyidae
  - Genus *Thomomys* Pocket Gopher
- Family Castoridae
  - Genus *Castor* Beaver
- Family Cricetidae
  - Genus *Peromyscus* White-footed Mouse
  - *Neotoma* Wood Rat
  - *Ondatra* Muskrat

Order Carnivora
- Family Canidae
  - Genus *Canis* Coyote
    - Wolf
  - *Vulpes* Red Fox
- Family Mustelidae
  - Genus *Mustela* Weasel
  - *Mephitis* Striped Skunk ?

Order Artiodactyla
- Family Cervidae
  - Genus *Cervus* American Elk
  - *Odocoileus* Deer
- Family Bovidae
  - Genus *Bison* Bison
  - *Ovis* Mountain Sheep

The identification of the striped skunk was made by comparison of the hair and is, therefore, considered doubtful.

In the series of mammal remains examined, the Wood Rat and the Cottontail are most abundantly represented.

APPENDIX III

PREHISTORIC PLANT MATERIALS FROM CASTLE PARK

By Volney H. Jones[1]

On April 24, 1942, we received a consignment of 52 lots of archaeological plant materials which had been collected in Yampa Canyon, Dinosaur National Monument, Colorado. These were submitted by the late Mr. Charles R. Scoggin in the name of the University of Colorado Museum with a request for a report on their nature and significance. A typewritten itemized report was issued to Mr. Scoggin on August 5, 1942,[2] describing the materials and presenting such identifications and interpretations as could be placed on them.

The bulk of the material was corn. Thirty-six lots were either exclusively or primarily corn, but mixed in with the corn or in separate lots was an assortment of other plant materials and also one lot of insect remains. The corn as well as the other materials was described and classified in the report issued to Mr. Scoggin. In view of the unusually well-preserved condition and interesting nature of the corn, however, I felt that it should be submitted to a corn specialist for closer study. I obtained Mr. Scoggin's permission to send the corn to Dr. Edgar Anderson of the Missouri Botanical Garden, who considered it to be very significant and has prepared an appendix on it (Appendix no. I). I have, therefore, deleted all comments on the corn and have confined myself to the other specimens.

This was a very interesting group of materials, and most of it was quite well preserved by desiccation. Nevertheless, a number of the items had to be left unidentified as we were at some disadvantage in having no familiarity with the flora of the immediate area and in lacking suitable comparative collections from that region. Certain of the specimens are particularly significant and have been discussed in some detail, but the entire list is presented regardless of the lack of identifications of some items, as the site is a critical one in an area relatively unworked archaeologically, so that a full record seems merited.

Itemization of Materials

In the list which follows the lots are listed under the original numbers under which they were submitted. These lot numbers are followed by the laboratory serial number assigned them in the Ethnobotanical Laboratory (placed in parenthesis). Those lots which were entirely of corn are omitted from the list.

A 234 (3223)

A quantity of corn kernels with other materials mixed in as follows:

Five seeds of Utah Juniper, *Juniperus utahensis* (Engelm.) Lemmon, all of which have been perforated at the top apparently by gnawing of rodents. Juniper berries were eaten, and juniper seeds were used as beads by some Indians, but no indication of the purpose of these seeds is apparent.

Two shells of pinyon nuts, *Pinus edulis* Engelm., which have also been gnawed.

Three slender yellow seeds which appear to be tree seeds but are unidentified. These likely are accidental inclusions in the site and probably have no significance.

[1] Curator of Ethnology in charge of the Ethnobotanical Laboratory, Museum of Anthropology, University of Michigan.

[2] Ethnobotanical Laboratory Report no. 219, Laboratory nos. 3223–3274, issued August 5, 1942 (typewritten, not published). A copy of this report is on file in the Ethnobotanical Laboratory. Mr. Robert F. Burgh, Assistant to the Director, University of Colorado Museum, informs me that the original, issued to Mr. Scoggin, is not in their files and presumably did not reach the Museum.

A 272 (3224)

A bulb of some plant, probably of the lily family. Unidentified.

A 329 (3227)

A portion of the root of a plant, apparently of the family Umbelliferae. This may possibly be of the plant referred to as "Osha" (*Ligusticum porteri* Coult. & Rose) the roots of which were widely used in medicine by several Southwestern tribes, but we were unable to make positive identification.

A 382 (3228)

Associated with a few kernels of corn was a portion of a pierced-rod coiled basket. The rods seem to be of wood of some coniferous tree. We have no suggestion as to the source of the sewing material.

A 413 (3231)

A number of objects of irregular shape which seem to be rodent droppings. These have been attacked by insects (weevils ?) and much of their interiors destroyed, leaving a fine brown powder.

A 416 (3232)

With a number of corn kernels was a single kidney bean (*Phaseolus vulgaris* L.) of deep purple, almost black color and about 12 mm. long by about 7 mm. wide.

A 439 (3233)

Along with a single kernel of corn was a kidney bean (*Phaseolus vulgaris* L.) very similar to that in A 416 but lighter in color and slightly narrower. These two beans are sufficiently similar to have been of the same horticultural variety.

A 453a (3234)

A quantity of yellow spongy material in lumps somewhat twisted together. On being chewed, this becomes gelatinous and has a somewhat bitter taste. It has apparently been cooked by roasting and probably is a food material, but we have been unable to identify the plant source.

A 454 (3236)

A bulb probably from some plant of the lily family but differing from the one mentioned under A 272 and apparently from a different species of plant. We were unable to identify it.

A 471 (3238)

Four globular fruits about 5 mm. in diameter, yellow and somewhat ridged. We have no suggestion as to the plant origin and purpose of these.

A 504 (3239)

A portion of a root or rootstock of an unidentified plant. It has a general similarity to no. A 329 but appears to be from a different species.

A 516 (3241)

A small quantity of dark brown elliptical seeds seeming to be of some species of goosefoot (*Chenopodium* sp.).

A 850 (3248)

According to Mr. Scoggin, this lot was found under circumstances indicating prior disturbance by white men. In addition to a kernel of corn it contained the following:

One kidney bean (*Phaseolus vulgaris* L.), brown in color and about 13 mm. long by about 8 mm. wide.

One garden pea (*Pisum sativum* L.), which is not a native American plant.

A 902 (3249)

A small quantity of seeds (caryopses) of the grass usually called Indian millet, *Oryzopsis hymenoides* (Roem. & Schult.) Ricker.

A 924 (3251)

Four well-preserved seeds of pumpkin of the species *Cucurbita moschata* Duch.

A 962 (3255)

A small pine cone with some of the nut shells still in place but with the kernels removed by gnawing of rodents. This cone is from the pinyon pine, *Pinus edulis* Engelm.

A 963 (3256)

A small lump of resin which seems to be pine resin. Although resin was used by various Indian tribes as an adhesive, in forming water-proof coatings for baskets, and in other ways, the purpose of this resin is not evident.

A 1128a (3269)

A small quantity of broken insect parts, mixed with sand. These are apparently intentionally ground-up bodies of grasshoppers.

A 1147 (3272)

A small quantity of grass seeds similar in every way to A 902 and of the same species.

A 1148 (3273)

A few seeds (achenes) apparently of wild sunflower, *Helianthus* sp.

A-D-1 (3274)

A small quantity of debris made up of a wisp of hair of fur, a small part of a leaf, a number of small seeds, and bits of other material. This appears to have come from a rodent nest.

Cultivated Plants

That the former inhabitants of this site were agricultural is attested not only by the quantity of corn from the site but also by the less abundant specimens of beans and pumpkin seeds.

Beans occur in three of the lots (A 416, A 439, A 850) with a single bean in each lot. Scoggin stated explicitly (letter, April 20, 1942) that these were the only beans recovered, so apparently beans were either not extensively cultivated or the accidents of preservation were not favorable. The three beans are all kidney beans (*Phaseolus vulgaris*) and are the type of the large, glossy-coated ones commonly found in Pueblo sites and in modern Pueblo agriculture. The three beans are fairly similar in size and form but vary somewhat in color. The bean from lot A 850 is from a disturbed area and may not be representative of the period but does not differ appreciably from the others except in color. Evidence seems to indicate that the kidney bean reached the Pueblo area at about the beginning of Developmental Pueblo (Pueblo I) times, but beans have been reported from Basket-Maker sites in marginal areas although seemingly absent from the classical Basket-Maker sites in the San Juan.

Evidence of the pumpkin consists of only one lot of four seeds (A 924). These well-preserved seeds are of the large flat type so commonly found in sites of Modified Basket-Maker (B.M. III) and Pueblo periods. The Striped Cushaw type of *Cucurbita moschata*, with seeds very similar to these, is still widely cultivated among the modern Pueblos, who consider it an ancient type.

These three native cultivated plants which occur in the material from the Dinosaur National Monument—corn, bean, pumpkin—were, of course, the three major crop plants of North American Indian agriculture and usually were associated. The particular types found in this locality conform to the pattern of the crop complex designated as "Plateau" (or alternately as "Anasazi") by Carter,[3] which, as the name suggests, was characteristic of the Anasazi archaeological sequence and the modern Pueblos. In the material submitted to us there was no evidence of other cultivated plants, such as cotton, the gourd, and sunflower, which have been reported archaeologically

[3] Carter, George F. "Plant Geography and Culture History in the American Southwest." *Viking Fund Publications in Anthropology*, No. 5, New York, 1945. See pp. 118–121 for characterization of this complex, pp. 18–25 for discussion of typical pumpkins, and pp. 69–73 for discussion of bean types.

in the Pueblo area. If these had been cultivated by the former inhabitants of the Dinosaur National Monument area it would seem, in view of the excellent preservation conditions there, that some evidence of them should have been noted, but too much weight must not be placed on negative evidence.

One pea (*Pisum sativum*) was noted in lot A 850, which was from a disturbed area. The pea is an Old-World domesticate which was introduced into the Southwest in Spanish colonial times (*post* 1540 A.D.). Peas have not been found in American archaeological sites except in historic levels, a fact which seems to bear out Scoggin's observation that the area producing the pea had been disturbed previously by white men.

Uncultivated Food Plants

Two lots (A 902 and A 1147) were composed of grass seeds which are identical in nature. These seeds are of Indian millet (*Oryzopsis hymenoides*), which occurs throughout most of the Southwest and was formerly an important food plant of the Indians of the northern Arizona plateau and the adjacent Great Basin region. It seems safe to assume that both of these lots represented food caches. Several years ago I published a paper on Indian uses of this grass,[4] in which I summarized the data from archaeology, ethnology, and other sources on the geographical and chronological distribution of its use, and presented some information on methods of preparation and on food value. This grass seems to have been an important food since Basket-Maker times, and its use has been reported in modern times for some of the Pueblos and tribes of the Great Basin. These two lots from Dinosaur National Monument furnish interesting and valuable data supplementary to that already brought together.

Pinyon nuts occur in two lots (A 234 and A 962). In both lots the shells have been gnawed by rodents and the kernels removed. There is no direct evidence that these nuts were gathered for food, but the nuts of the pinyon pine were a food staple gathered and stored in quantity over the Southwestern plateau and Great Basin regions. It seems safe to conclude that the presence of these nuts can be accounted for as a portion of the food supply.

The bulbs in lots A 272 and A 454 also were probably gathered for food. A number of bulbs were eaten by the Great Basin food-gathering tribes and to a lesser extent by the Pueblos. Chamberlin[5] lists a number of bulbs, such as sego, camass, onions, and spring beauty as entering the food supply of the Gosiute, but we were unable to identify the specimens definitely with any of these.

The seeds of wild sunflower noted in lot A 1148 probably can be considered as food. These seeds are definitely of the size and general aspect of those of the wild sunflower and were not cultivated. Sunflower seeds were gathered and prized as food by many Southwestern tribes.

The seeds of the goosefoot (*Chenopodium* sp.) were used widely as food by Indians of the western United States. The seeds in lot A 536 seem to be goosefoot seeds, and if so can likely be interpreted as food. Possibly also the gelatinous material in lot A 453a and the roots in A 329 and A 504 may be food, but there is no direct evidence to support this conjecture.

In spite of the fact that the former inhabitants of the Dinosaur National Monument region were agricultural, there seems to be ample evidence that they also made rather full use of the wild plant resources of their environment. Although none of these products was found in a context to demonstrate conclusively its function as food, the documented use of these products as food by modern tribes of the general area is highly suggestive.

[4] Jones, Volney H. "An Ancient Indian Food Plant." *El Palacio*, 44 (nos. 5–6, February 2–9, 1938), 41–53.

[5] Chamberlin, Ralph V. "The Ethno-botany of the Gosiute Indians of Utah." *American Anthropological Association, Memoirs*, 2, part 5, May 1911 (renumbered as *Memoir* 11). See pp. 338–339 in particular.

Insects as Food

The material contained in lot A 1128a was particularly interesting. In submitting this, Scoggin remarked (letter, April 20, 1942):

> The material in bottle A 1128a perplexes me and may not be intelligible to you. A great quantity of this material was found in a cist pit and may be insect remains.

Since it was evident that this material was of insect origin, it was submitted to the Insect Division of the Museum of Zoology of the University of Michigan. It happened that Dr. Theodore H. Hubbell, then Professor of Zoology at the University of Florida,[6] was working during the summer of 1942 in the Insect Division. As the material fell into the particular group in which he specializes it was referred to him. After a very thorough examination he reported as follows (letter, August 4, 1942):

> The sample . . . consists of about ½ cubic inch of finely divided dark brown material. About ⅓ of it is sand. The remainder consists of insect remains in a finely comminuted state, with a few scattered parts of leaves and plant stems.
>
> The insect remains are almost wholly composed of grasshoppers of the first, second, third and fourth instars. All of those that could be identified belong to the genus *Melanoplus*, and appear to be mostly of one species, though there may be more than one. Most of them are adult, and the majority are in the second and fourth instars. The bodies are finely divided, and the parts are jammed together in the greatest confusion, legs sticking into heads, legs clumped together, etc., as if they had been mashed or chopped or ground up into a solid mass. I see no way in which such a selective collection of insects could have been formed except through human agency, especially in view of their condition.

Dr. Hubbell lists a number of other insects which occur with the grasshoppers in the mass in greater or lesser amount. Fly puparia are numerous and are explained as being of maggots that fed on the grasshoppers after they had been placed in the pit. In addition there was an ant, a few beetles, and other insects which might have become accidentally mixed in or might have crept into the cist for shelter. There is no reason to think that any except the grasshoppers were intentionally collected. Dr. Hubbell concludes:

> In my opinion there is no other explanation for this material than that it represents insect food stored by the makers of the cist pit where it was found.

I do not recall any previous archaeological reports of grasshoppers found under conditions to suggest that they had been gathered as food. There are, however, many ethnological accounts indicating that grasshoppers were a prominent food among certain Indian tribes of California and the Great Basin regions. For instance, Mooney[7] in reporting on the Cosumnes tribe of California tells of their gathering grasshoppers and cooking them in pits. Essig[8] states that vast amounts of grasshoppers were eaten by Indians of California and lists four species of *Melanoplus* (the genus found by Hubell in the material from the site) as well as other genera so used. Essig describes the driving of grasshoppers into pits of coals where they were roasted and then eaten in various ways, one of which involved grinding them into a meal. Powell,[9] speaking of the Ute Indians, gives the following account:

[6] Dr. Hubbell is now Professor of Zoology and Curator of Insects in the Museum of Zoology, University of Michigan.

[7] Mooney, James. "Notes on the Cosumnes Tribes of California." *American Anthropologist*, o.s. 3 (no. 3, July 1890), 259–262. See p. 260.

[8] Essig, E. O. "The Value of Insects to the California Indians." *Scientific Monthly*, 38 (no. 2, February 1934), 181–186. See pp. 183–184.

[9] Powell, J. W. *Exploration of the Colorado River of the West and Its Tributaries, 1869–1872*. Washington, Government Printing Office, 1875. See p. 128.

During the autumn, grasshoppers are very abundant. When cold weather sets in, these insects are numbed, and can be gathered by the bushel. At such time, they dig a hole in the sand, heat stones in a fire near by, put some in the bottom of the hole, put on a layer of grasshoppers, then a layer of hot stones, and continue this until they put bushels on to roast. There they are left until cool, when they are taken out, thoroughly dried, and ground into meal. Grasshopper gruel, or grasshopper cake, is a great treat.

Powell's account seems to offer the best explanation of the sand content and the pulverization of of the material from Mantle's Cave. It was not observed that the material had been roasted or affected by fire or heat in any way, but this might have escaped us. The material was not checked with this feature in mind, and the effects of roasting might not be readily evident. Nevertheless, it seems reasonable to interpret the insect cache as food supply and to assume that it was prepared in much the same way as the Ute process described by Powell.

BIBLIOGRAPHY

ANDERSON, EDGAR

1945 "What is Zea Maize? A Report on Progress." *Chronica Botanica*, 9: 89–92.

1946 "Maize in Mexico—A Preliminary Survey." *Annals Missouri Botanical Garden*, 33: 147–247.

1947 *Corn Before Columbus*. Des Moines: Pioneer Hi-Bred Corn Co.

ANDERSON, EDGAR AND HUGH C. CUTLER.

1942 "Races of Zea Maize. I. Their Recognition and Classification." *Annals Missouri Botanical Garden*, 29: 69–86.

BALDWIN, GORDON C.

1947 "An Archaeological Reconnaissance of the Yampa and Green Rivers." *The Kiva*, 12: 31–36.

BOLTON, HERBERT EUGENE

1928 "Escalante in Dixie and the Arizona Strip." *New Mexico Historical Review*, 3: 41–72.

BREW, JOSEPH OTIS

1946 "Archaeology of Alkali Ridge, Southeastern Utah." *Papers Peabody Mus. American Arch. and Eth.*, 21.

BROWN, F. MARTIN

1937 "The Prehistoric Ruins of Castle Park." *Southwestern Lore*, 3: No. 2, 22–28.

1937a "Dendrochronology." *Antiquity*, December, 409–426.

CAMPBELL, ELIZABETH W. CROZER

1931 "An Archaeological Survey of the Twenty Nine Palms Region." *Southwest Museum Papers*, No. 7.

CARTER, GEORGE F.

1945 "Plant Geography and Culture History in the American Southwest." *Viking Fund Publ. in Anthrop.*, No. 5.

CARTER, GEORGE F. AND EDGAR ANDERSON

1942 "A Preliminary Survey of Maize in the Southwestern United States." *Annals Missouri Botanical Garden*, 32: 297–322.

COSGROVE, C. B.

1947 "Caves of the Upper Gila and Hueco Areas in New Mexico and Texas." *Papers Peabody Mus. American Arch. and Eth.*, 24: No. 2.

CRESSMAN, L. S.

1942 "Archaeological Researches in the Great Basin." *Carnegie Inst. of Wash. Publ.* 538.

CUTLER, HUGH C.

1944 "Medicine Men and the Preservation of a Relict Gene in Maize." *Journal of Heredity*, 35: 290–294.

DALE, H. G.

1918 *The Ashley-Smith Explorations and the Discovery of a Central Route to the Pacific, 1822–1829*. Cleveland: The Arthur H. Clark Co.

GILLEN, JOHN

1938 "Archaeological Investigations in Nine Mile Canyon, Utah." *University of Utah Bulletin*, 28: No. 11.

GLADWIN, HAROLD S.

1937 "Excavations at Snaketown: Comparisons and Theories." *The Medallion Papers*, No. 26.

GUERNSEY, S. J.
1931 "Explorations in Northeastern Arizona." *Papers Peabody Mus. Amer. Arch. and Eth.*, 12: 1.

GUERNSEY, S. J. AND A. V. KIDDER
1921 "Basket-Maker Caves in Northeastern Arizona." *Papers Peabody Mus. Amer. Arch. and Eth.*, 8: 2.

HARRINGTON, M. R.
1933 "Gypsum Cave, Nevada." *Southwest Mus. Papers.*, No. 8.

HAURY, EMIL W.
1945 "Painted Cave, Northeastern Arizona." *Papers, Amerind Foundation*, No. 3.

HENDERSON, JUNIUS
1927 "The Prehistoric Peoples of Colorado." *Colorado: Short Studies of its Past and Present. University of Colorado Semicentennial Publ.*, pp. 1–22.

HOLMES, W. H.
1902 "Anthropological Studies in California." *Ann. Rep. U. S. Nat. Mus. for 1900*, Part II, p. 155.
1912 "Paiute." *Handbook of the Amer. Indians. Bur. Amer. Eth.* Bulletin 30, Part II.

HURST, C. T.
1940 "Preliminary Work in Tabeguache Cave." *Southwestern Lore*, 6: No. 1.
1941 "The Second Season in Tabeguache Cave." *Southwestern Lore*, 7: No. 1.
1942 "Completion of Work in Tabeguache Cave." *Southwestern Lore*, 8: No. 1.
1943 "Preliminary Work in Tabeguache Cave No. II." *Southwestern Lore*, 9: No. 1.
1944 "1943 Excavation in Cave II, Tabeguache Canyon, Montrose County, Colorado." *Southwestern Lore*, 10: No. 1.
1945 "Completion of Excavation of Tabeguache Cave No. II." *Southwestern Lore*, 11: No. 1.

HUSCHER, BETTY H. AND HAROLD A.
1943 "The Hogan Builders of Colorado." *Southwestern Lore*, 9: No. 2, 1–92.

JEANCON, JEAN ALLARD
1927 "Antiquities of Moffat County, Colorado." *The Colorado Magazine*, 4: 19–27.

JUDD, NEIL M.
1926 "Archeological Observations North of the Rio Colorado." *Bur. Amer. Eth.*, Bulletin 82.

KIDDER, A. V. AND S. J. GUERNSEY
1919 "Archeological Explorations in Northeastern Arizona." *Bur. Amer. Eth.*, Bulletin 65.

LEH, L. L.
1936 "Prehistoric Ruins in Range Creek Canyon, Utah." *Univ. Colo. Studies.* 23: 159–168.

LOHR, EDISON P.
1948 "Winter Dig in Yampa Canyon." *Desert Magazine*, April.

LOUD, L. L. AND M. R. HARRINGTON
1929 "Lovelock Cave." *Univ. Calif. Publ. Amer. Arch. and Eth.*, vol. 25, No. 1.

MORRIS, E. H.
1925 "Exploring in the Canyon of Death." *Nat. Geographic Mag.*, 48: 263–300.
1936 "Archaeological Background of Dates in Early Arizona Chronology." *Tree Ring Bulletin*, 2: 34–36.
1939 "Archaeological Studies in the La Plata District." *Carnegie Inst. of Wash. Publ.* 519.
1941 No title. Report on Field work at Durango, Colorado, 1939. *Notes and News. American Antiquity*, 6: 282.

MORRIS, EARL H. AND ROBERT F. BURGH
1941 "Anasazi Basketry: Basket Maker II through Pueblo III. A Study Based on Specimens from the San Juan River Country." *Carnegie Inst. of Wash. Publ.* 533.

MORRIS, RICHARD, ELLEN GLAZIER, ROBERT THALLON, AND MARIE WORMINGTON.
1937 "The Canyon of Lodore—Yampa River Reconnaissance of 1936." *Trail and Timberline*, No. 219: 3–14.

MORSS, NOEL
1931 "The Ancient Culture of the Fremont River in Utah." *Papers Peabody Mus. Amer. Arch. and Eth.* 12: no. 3.

NUSBAUM, JESSE L.
1922 "A Basket-Maker Cave in Kane County, Utah: with Notes on the Artifacts by A. V. Kidder and S. J. Guernsey." *Indian Notes and Monographs*, No. 29.

PEPPER, G. H.
1902 "The Ancient Basket Makers of Southeastern Utah." *Supp. Amer. Mus. Journal*, 2: No. 4, guide leaflet 6.

POWELL, J. W.
1875 *Exploration of the Colorado River of the West and its Tributaries Explored in 1869, 1870, 1871, and 1872, under the Direction of the Secretary of the Interior.* Washington: Government Printing Office.

QUAIFE, MILO MILTON (editor)
1927 *Death Valley in '49 by William L. Manly.* Chicago: The Lakeside Press.

STALLINGS, W. S., JR.
1941 "A Basketmaker II Date from Cave du Pont, Utah." *Tree Ring Bulletin*, 8: No. 1.

STEWARD, JULIAN H.
1933 "Ethnography of the Owens Valley Paiute." *Univ. Calif. Pub. in Amer. Arch. and Eth.*, 33: 233–350.
1936 "Pueblo Material Culture in Western Utah." Univ. New Mexico Bulletin no. 287. *Anthrop. Series*, 1: No. 3.
1937 Ancient Caves in the Great Salt Lake Region. *Bur. Amer. Eth.* Bulletin 116.
1941 "Archeological Reconnaissance of Southern Utah." *Bur. of Am. Eth.* Bulletin 128: 277–356.

STEWART, OMER C.
1942 "Culture Element Distributions: 18. Ute—Southern Paiute." *Anthrop. Records*, 6: No. 2, Univ. of Calif.

UNTERMAN, G. E. AND B. R. UNTERMAN
1946 "Stratigraphic Column of the Uinta Mountains and Vicinity." *Papers, Utah Field House of Natural Hist.*, No. 1. Mimeographed.

WELTFISH, GENE
1930 "Prehistoric North American Basketry Techniques and Modern Distributions." *Amer. Anthrop.* new series, 32: 454–95.
1932 "Preliminary Classification of Prehistoric Southwestern Basketry." *Smiths. Inst. Misc. Coll.*, 87: No. 7.

WHEELER, S. M.
1942 *Archaeology of Etna Cave, Lincoln County, Nevada.* Carson City: Nevada State Park Commission. Mimeographed.

PLATE 1. (Upper) Castle Park, looking southeast from Marigold's Cave toward mouth of Hells Canyon. Cliff at left is 600 feet high. Blue Mountain in background.

PLATE 2. (Lower) Mantle's Cave, looking southwest from mouth of box canyon. Trenches and earth mounds represent final stage of excavation.

PLATE 7. (Upper) Large carrying basket *in situ*, showing cover of matting, basket tray, and circular sandstone lid.

PLATE 8. (Lower) Osier plaque *in situ*, Mantle's Cave. Circular sandstone lid which covered the plaque is shown in background.

PLATE 9. (Upper) Honeycomb of pothole storage chambers dug in silt deposits at west end of Mantle's Cave. Face of cliff at right.

PLATE 10. (Lower) Masonry granary at west end of Mantle's Cave, section 01E, overlying deep stratum of charcoal shown in Plate 4.

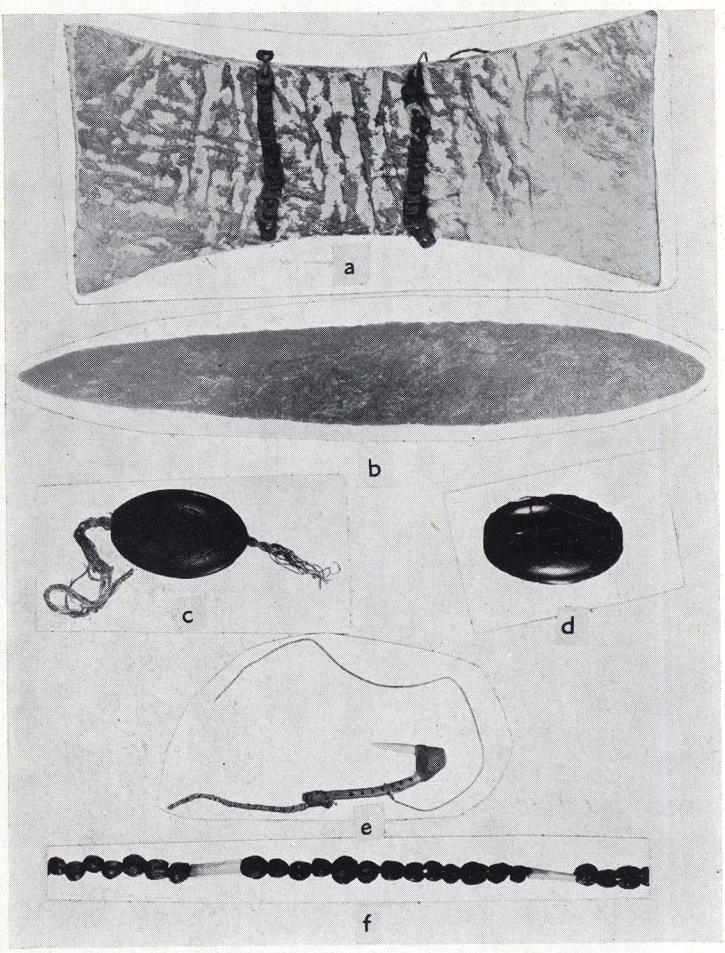


PLATE 14. Specimens from Mantle's Cave: *a*, butterfly ornament of rawhide; *b*, stone knife; *c*, *d*, carapace stones—all from Cache No. 1; *e*, one of three fishhooks from Cache No. 2; *f*, section of 28-foot necklace of bone tubes and juniper-berry seeds. Length of *a*, 6 inches; others to same scale.

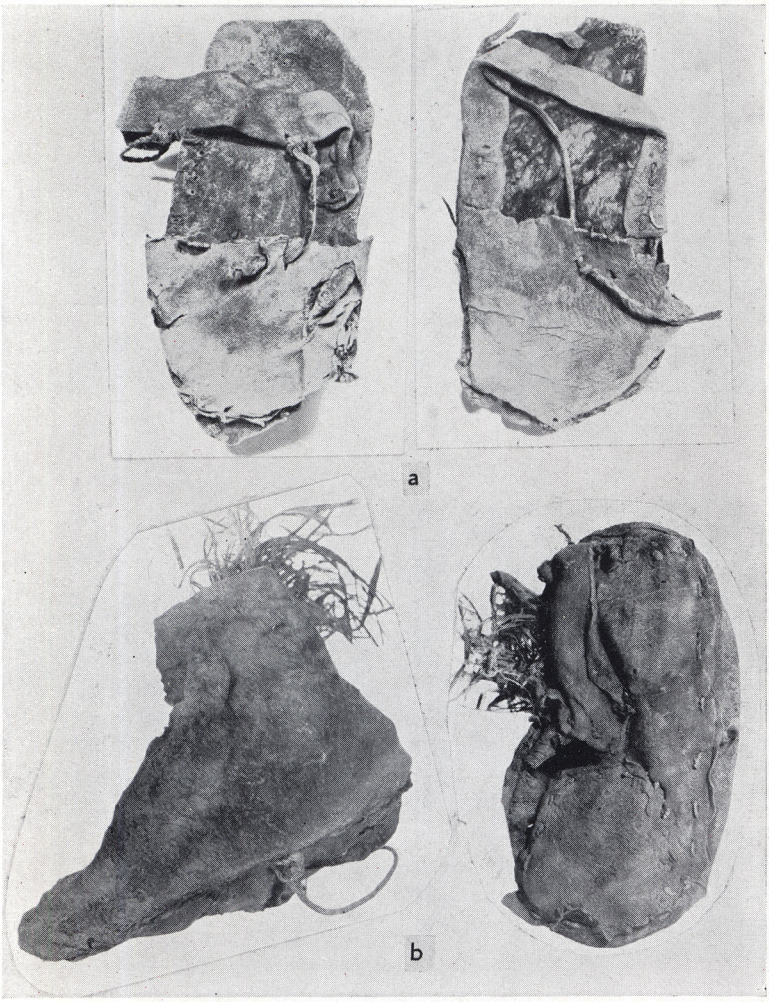


PLATE 15. Moccasins from Mantle's Cave: *a*, pair of Yampa moccasins, length 7.5 inches; *b*, pair of Fremont moccasins from Cache No. 3, length 8.5 inches. (Both pairs of moccasins have shrunk after burial in the cave.)

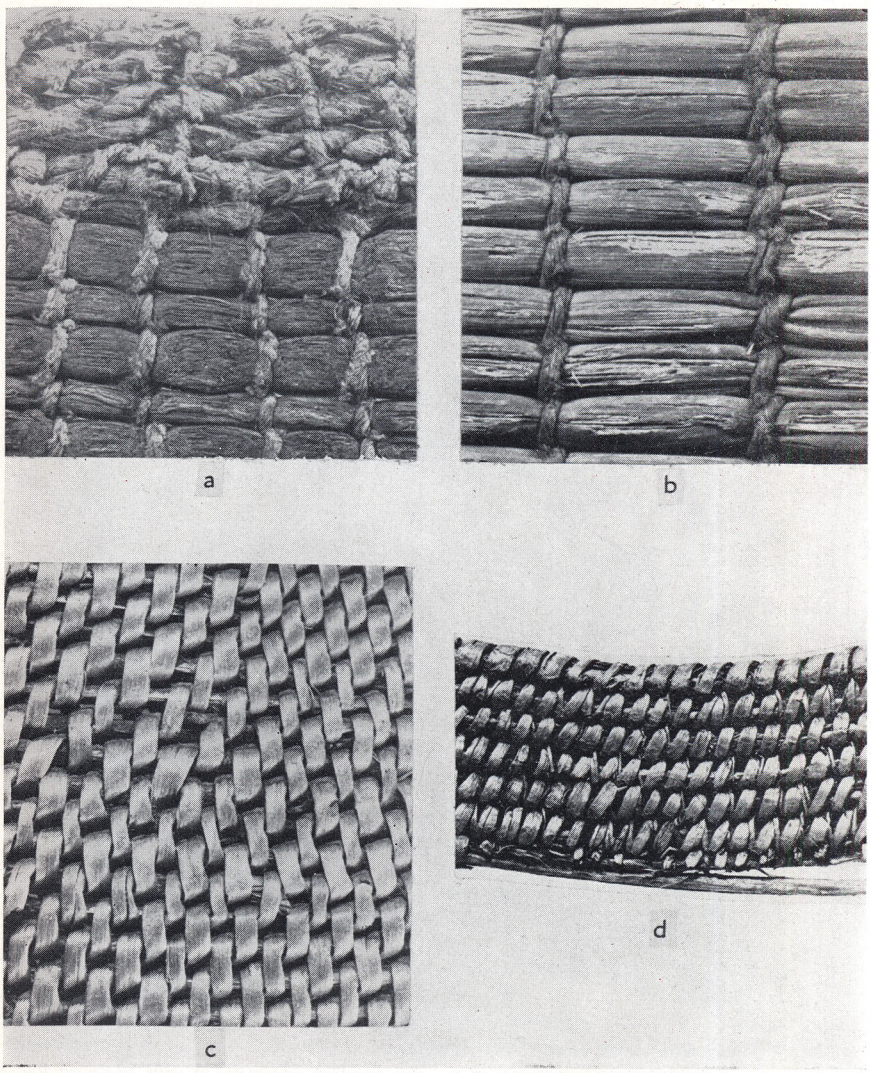


PLATE 16. Basketry and textiles from caves in Castle Park: *a*, texture of twined tule fabric with cord selvage (see also Figure 30); *b*, texture of pouch made of twined tule fabric from Cache No. 4; *c*, texture of basketry with interlocked stitches on split-rod foundation (see Figure 34); *d*, texture of basketry with uninterlocked stitches on split-rod-and-bundle foundation (see Figure 33). All specimens natural size.

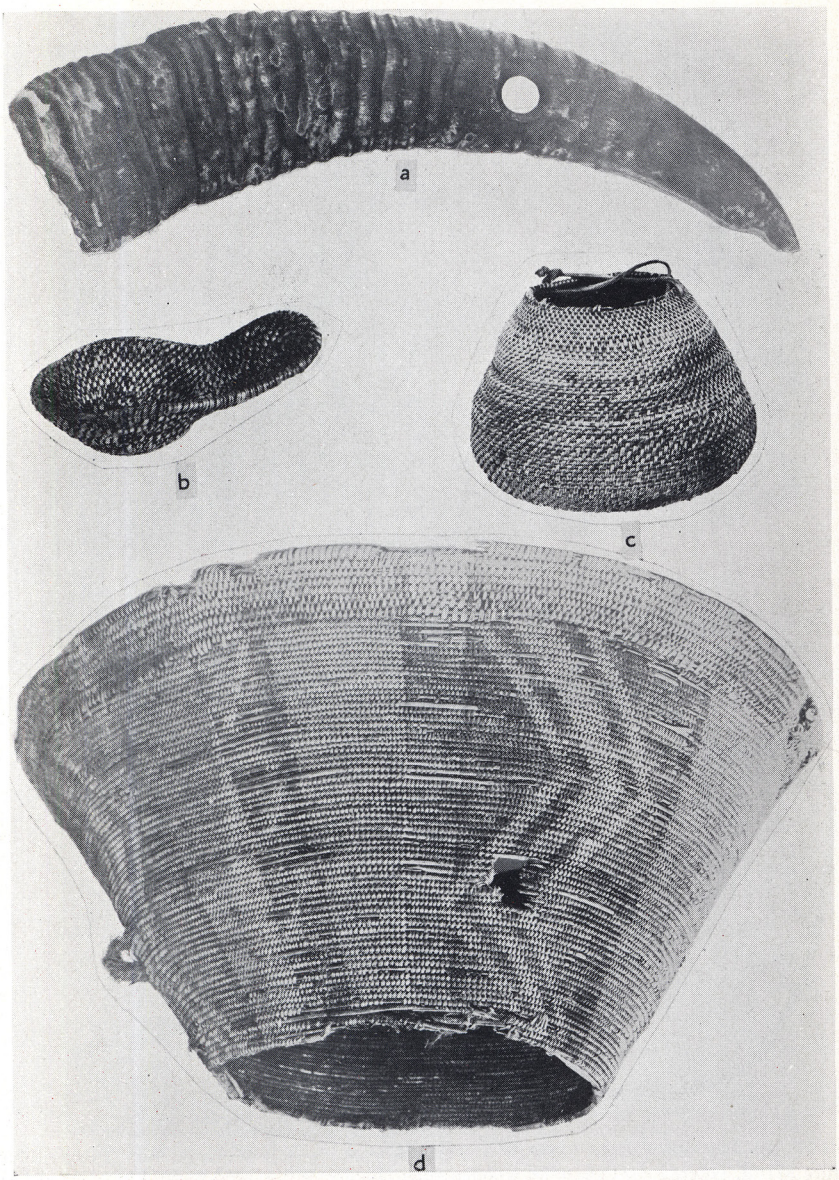


PLATE 17. Specimens from Mantle's Cave: *a*, sheep-horn wrench for straightening arrow shafts, from Cache No. 6, length 8.5 inches; *b*, basketry dipper in technique of Figure 34, length 6.5 inches; *c*, globular basket from Cache No. 2, in technique of Figure 34, height 5.5 inches; *d*, large carrying basket (Plate 7) in technique of Figure 33, diameter at top 22 inches.

PLATE 18. Specimens from caves in Castle Park: *a*, *b*, *c*, bundles of tapered cord snares (Figure 37); *d*, tapered cord snare on wooden tube (Figure 38); *e*, seed harvester made of twigs, diameter of loop 8 inches. (For description of snares see "Cordage," Chapter IV.)

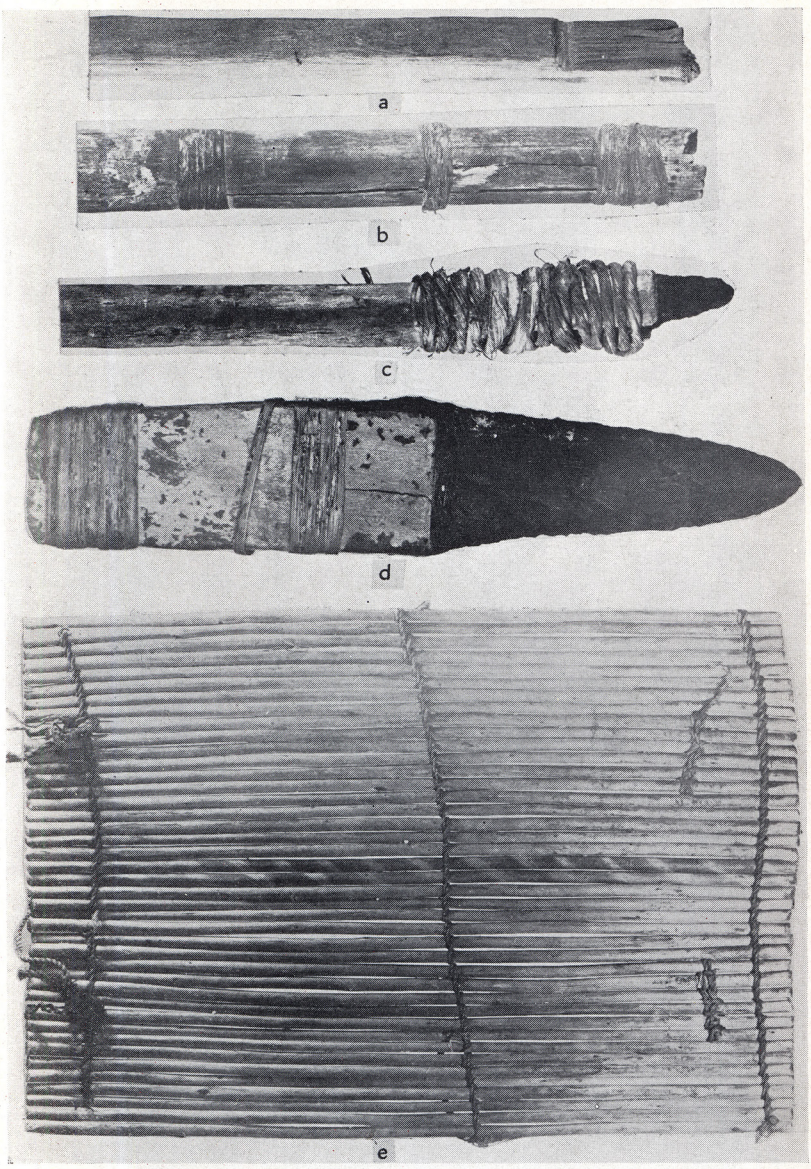


PLATE 19. Specimens from caves in Castle Park: *a*, rejected tongue of arrow or dart foreshaft, diameter 0.3 inch; *b*, nock-end of arrow or dart shaft, diameter 0.4 inch; *c*, stone drill point hafted on wooden shaft, diameter of shaft 0.25 inch; *d*, hafted stone knife, length 8.3 inches; *e*, plaque of willow osiers, length 14.5 inches (see also Fig. 41).

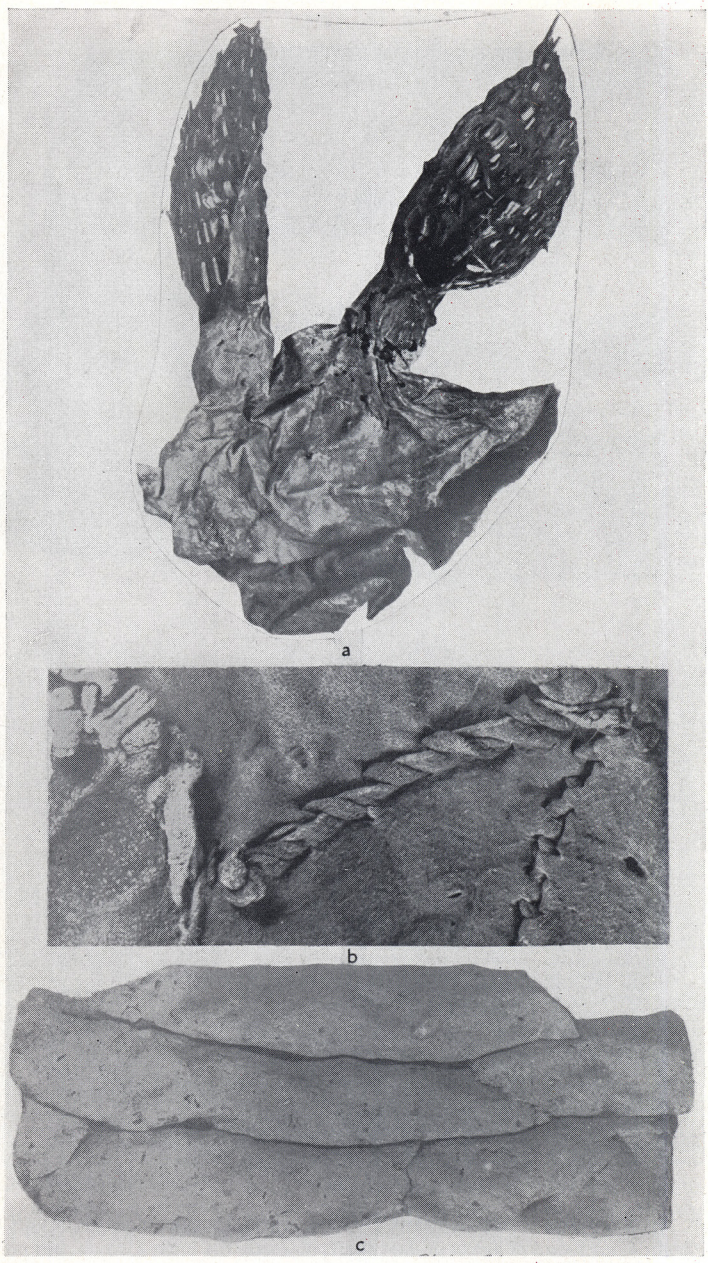


PLATE 20. Specimens from caves in Castle Park: *a*, deer-scalp headdress, height 12 inches; *b*, detail of leather bag showing varieties of sewing; *c*, section of adobe turtleback wall construction from masonry granary in Keyhole Cavern at Big Bin Cave, length 11 inches.

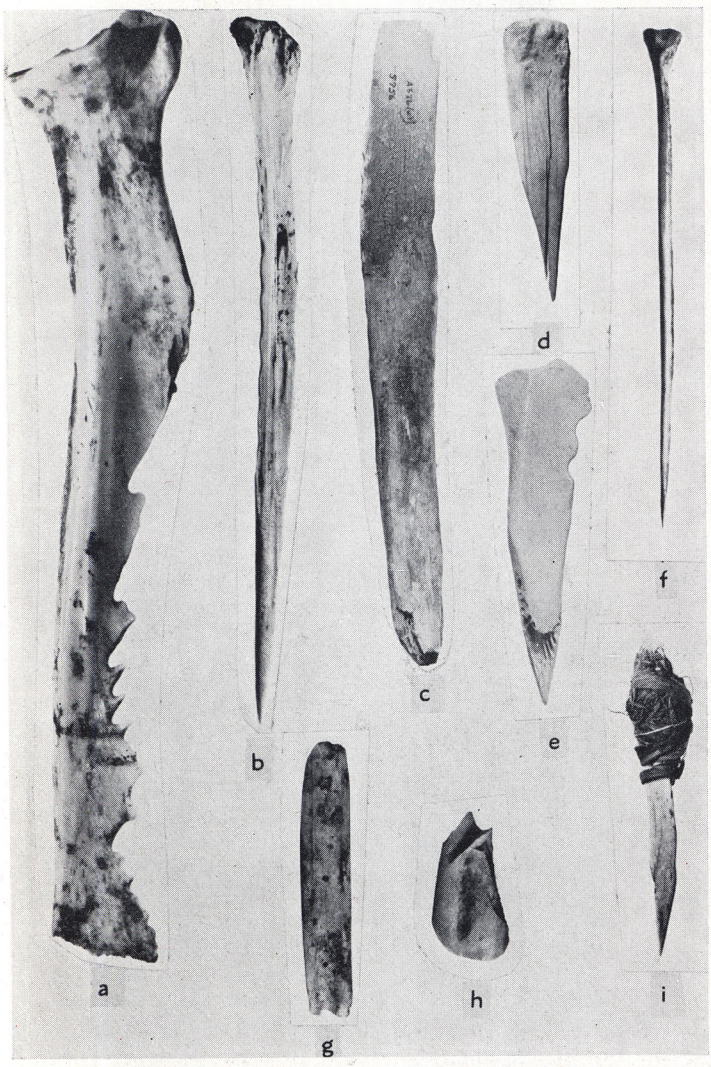


PLATE 21. Bone artifacts from caves in Castle Park. For description see "Bone," Chapter IV. Length of *a*, 10 inches; others to same scale.

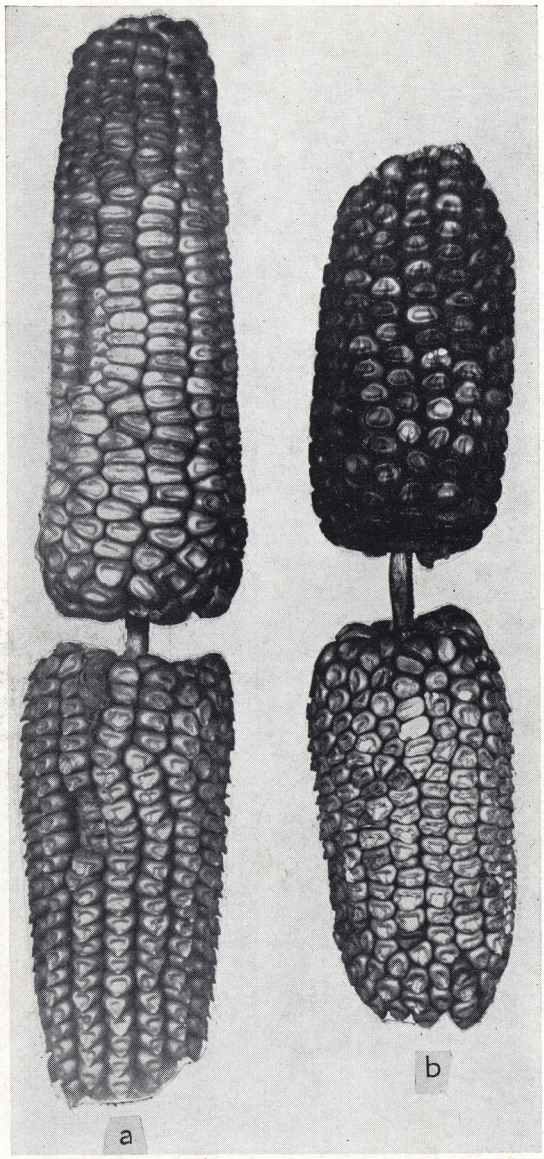


PLATE 22. Corn (*Zea maize*) of Mexican Pyramidal type from Mantle's Cave. For description, see Appendix I. Length of *a* (both ears), 9 inches.

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