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EXCAVATIONS AT HELLS MIDDEN
DINOSAUR NATIONAL MONUMENT

BY
ROBERT H. LISTER

ASSISTANT PROFESSOR OF ANTHROPOLOGY
UNIVERSITY OF COLORADO

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PREFACE

The excavation of a portion of Hells Midden was undertaken as a part of a comprehensive study of the archaeology and natural history of Dinosaur National Monument by the University of Colorado Museum with the co-operation of the National Park Service. The results of the archaeological studies made in the area through October, 1947, have been presented by Robert F. Burgh and Charles R. Scoggin (Burgh and Scoggin, 1948). This report will refer to their work frequently, and it will attempt to follow their general form of presentation of material and their terminology in order to standardize to some degree these reports on Dinosaur National Monument.

The archaeological investigations described in this paper were accomplished during the summers of 1948 and 1949. The 1948 party was composed of certain members of the University of Colorado Museum staff, one member of the Department of Social Sciences of the University of Colorado, and five students of anthropology and one of biology. Museum staff members included Dr. Hugo G. Rodeck, Director; Mr. Robert F. Burgh, Assistant to the Director; and Mr. Lowell Swenson, Technical Assistant to the Director. The author represented the Department of Social Sciences and served as Instructor for the 1948 Field School. Five of the students—Mr. Edward Malin, Mr. Byron Houseknecht, Mr. Earl Wilson, Mr. Don Woodard, and Mr. Adair Fehlmann—were from the University of Colorado; the sixth student, Mr. William Bullard, was from Harvard University. Mr. Charles Corliss, also a University of Colorado student, ably served as cook for the party. Mr. Swenson and Mr. Fehlmann devoted the major portion of their time in the field to biological studies.

In 1949, the field party consisted of Dr. Hugo G. Rodeck, Director, and Mr. Herbert W. Dick, Assistant to the Director—both of the Museum staff. University of Colorado students included Mr. Duane L. Roberts, Mr. David S. Curtis, Mr. Charles W. Best, and Mr. Adair Fehlmann. Mr. Don Woodard served as cook for this party.

The expeditions were organized as joint undertakings of the University of Colorado Museum and the Department of Social Sciences. They served as Field Schools in archaeological techniques for the students, who participated in all phases of the excavations and reconnaissance and received university credit.

This report is based upon the field notes prepared by the author in 1948 and by Mr. Herbert Dick in 1949 as well as upon those notes kept by other museum staff members and students. The laboratory analysis of the material was undertaken by the author, who assumes all responsibility for the interpretations derived from it. All line drawings were prepared by the writer; photographs were taken by the writer and by museum staff members.

Mr. and Mrs. Charley Mantle, of Castle Park, gave their full co-operation to our parties, as they had to all previous University of Colorado groups working

in Yampa Canyon and vicinity. In addition to furnishing us with much valuable information about the region, they kindly gave us permission to camp and excavate on their property. Without their assistance our labors would have been much more difficult.

Sincere thanks for administrative assistance, field services, and authorization for field work in the National Monument go to the following officials of the National Park Service: Mr. Jesse L. Nusbaum, Senior Archeologist, Department of the Interior; Mr. David H. Canfield, Superintendent, Rocky Mountain National Park; Dr. Jesse D. Jennings, Archeologist, Region Two; and Mr. Jess H. Lombard, Custodian, Dinosaur National Monument. The work was done under permit from the Secretary of the Interior, and members of the Museum staff served as collaborators with the National Park Service.

Appreciation for their part in making this report more complete is also due the following individuals: Miss Anna O. Shepard, Ceramic Laboratory, Carnegie Institution of Washington, for her sherd analysis; Dr. Edgar Anderson, Missouri Botanical Garden, for his examination of the corn; Mrs. Kate Peck Kent, Valley School, Ligonier, Pennsylvania, for her study of the textile remains; Dr. Howard J. Dittmer, of the University of New Mexico, for checking the identification of material used in the cloth; Dr. Lincoln La Paz, Institute of Meteoritics, University of New Mexico, for an analysis of a metallic fragment; Mr. William Fisher, graduate student at the University of Colorado, for the mineralogical identification of artifacts; Mr. Donald Baird, also a graduate student at the University of Colorado, for a study of some of the cartridge cases recovered; and Miss Evelyn Bauer, Librarian, Museum of New Mexico, for information regarding the publication dates of *Judge*.

To all members of the field parties whose names are listed above, the author wishes to express special thanks for their splendid co-operation and diligent work in the field. Mr. Burgh attended to all mapping and cataloguing of specimens in 1948 and gave valuable assistance in reconnaissance, in determining excavation techniques, and in interpretation. Mr. Dick generously turned over to the author all field notes and artifacts from the 1949 season in order that they could be analysed and reported upon in this paper.

Plans for the setting up of a Field School were developed by Dr. Omer C. Stewart, of the Department of Social Sciences, and Dr. Rodeck. To Dr. Rodeck also goes credit for the planning of the research program, for seeing it through two field seasons, and finally for furnishing the necessary proddings, suggestions, and stimulation to the writer in order to see that this report was prepared.

My wife, Florence Cline Lister, has assisted in many ways in the preparation of the manuscript.

ROBERT H. LISTER

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EXCAVATIONS AT HELLS MIDDEN DINOSAUR NATIONAL MONUMENT

CHAPTER I

INTRODUCTION

The archaeology of Castle Park, Dinosaur National Monument, has recently been reported upon (Burgh and Scoggin, 1948). Their report covers most adequately the history of early exploration and archaeological investigations, the environment, a survey and description of aboriginal sites and culture, and a detailed account of the excavations undertaken in Mantle's Cave and of material recovered from it.

They found that the culture of Castle Park, as revealed by archaeological work conducted until October, 1947, 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." (Burgh and Scoggin, 1948, p. 10)

During the 1948 season, the principal work was the partial trenching of Hells Midden, Castle Park—a task requiring most of the five weeks spent in the field. Minor excavations were undertaken in Marigolds Cave, Rat Midden, Signature Cave, and on Hells Half Acre. Archaeological reconnaissance trips were made along the Yampa River and in an area adjacent to Dinosaur National Monument Headquarters in Utah. The 1949 season was devoted to additional trenching of Hells Midden, the excavation of habitation remains in Marigolds Cave, and in reconnaissance.

This report will deal with the Hells Midden excavations almost entirely, with but a mention of the work at Marigolds Cave and Rat Midden. A somewhat detailed description and analysis of the material recovered from the excavations in Hells Midden will be undertaken on the assumption that a new and earlier chapter in the prehistory of this most interesting area is revealed. The culture of the upper portion of Hells Midden is identified with the Fremont River culture, but stratigraphically earlier deposits indicate the presence of pre-horticultural, pre-pottery horizons represented by a series of stone and bone artifacts extending to a depth of 4.55 meters below the surface of the midden.

THE CASTLE PARK REGION

Since this report is to be considered preliminary in nature and since Burgh and Scoggin (pp. 12-15) have written in considerable detail of the environment of Castle Park, my statements on this subject will be rather limited in nature and mostly extracted from their paper.

Dinosaur National Monument, in northwestern Colorado and northeastern Utah, is stratigraphically a part of the Colorado Plateau province. The great sedimentary strata in this area have been folded, faulted, and sculptured by wind and water into very spectacular formations through which the Green and Yampa Rivers have eroded deep, narrow, meandering canyons. In many places along the Yampa River cliffs border the river; elsewhere the cliffs break away to form high terraces and steep slopes which grade upward to the level of the mountains on both sides. Elevations range from approximately 5000 feet at river level to about 9000 feet at the summit of the highest peak in the Monument.

At intervals, where the cliffs do not border the water, the river flows through small open parks one to three square miles in size. Such an area is Castle Park. These parks offered an aboriginal population many advantages over the surrounding terrain. In the winter when neighboring mountains are snow covered and the temperatures there are uncomfortably low, the parks are apt to be free of snow and several degrees warmer. Potable water can be obtained from the Yampa River and from fresh-water springs in the canyon bottoms. Game, fish, and wild-plant products were present for the hunter and gatherer, and arable land alongside the river was available for the horticulturalist. Sagebrush, service berry, mountain mahogany, and oak are the most abundant shrubs found on the higher mountain slopes. On the talus slopes and benches above the river, juniper and piñon pine grow. Along the Yampa River there are thickets of willow, and on the canyon floor there are found cottonwood, box elder, rabbit brush, mormon tea, and cactus. Because this region is a refuge for wild life, game is still very plentiful. Mammals of the area include deer, cottontail rabbit, porcupine, beaver, muskrat, chipmunk, badger, mountain lion, lynx, bobcat, swift fox, coyote, and ringtail. Formerly buffalo, antelope, and mountain sheep were native. Several kinds of fish are found in the Yampa River. Reptiles found in the Yampa Canyon include lizards, horned lizards, water snake, and occasionally rattlesnake. Birds include red-shafted flicker, bluebird, robin, magpie, vulture, bluejay, crow, goose, heron, dove, and grouse and sagehen in the mountains.

Aboriginal occupants of Castle Park took advantage of the topographic features found there. Caves were utilized principally as storage places for corn and other foodstuffs and for caching various perishable articles, such as baskets, nets and snares, and wooden implements. Small storage structures were frequently con-

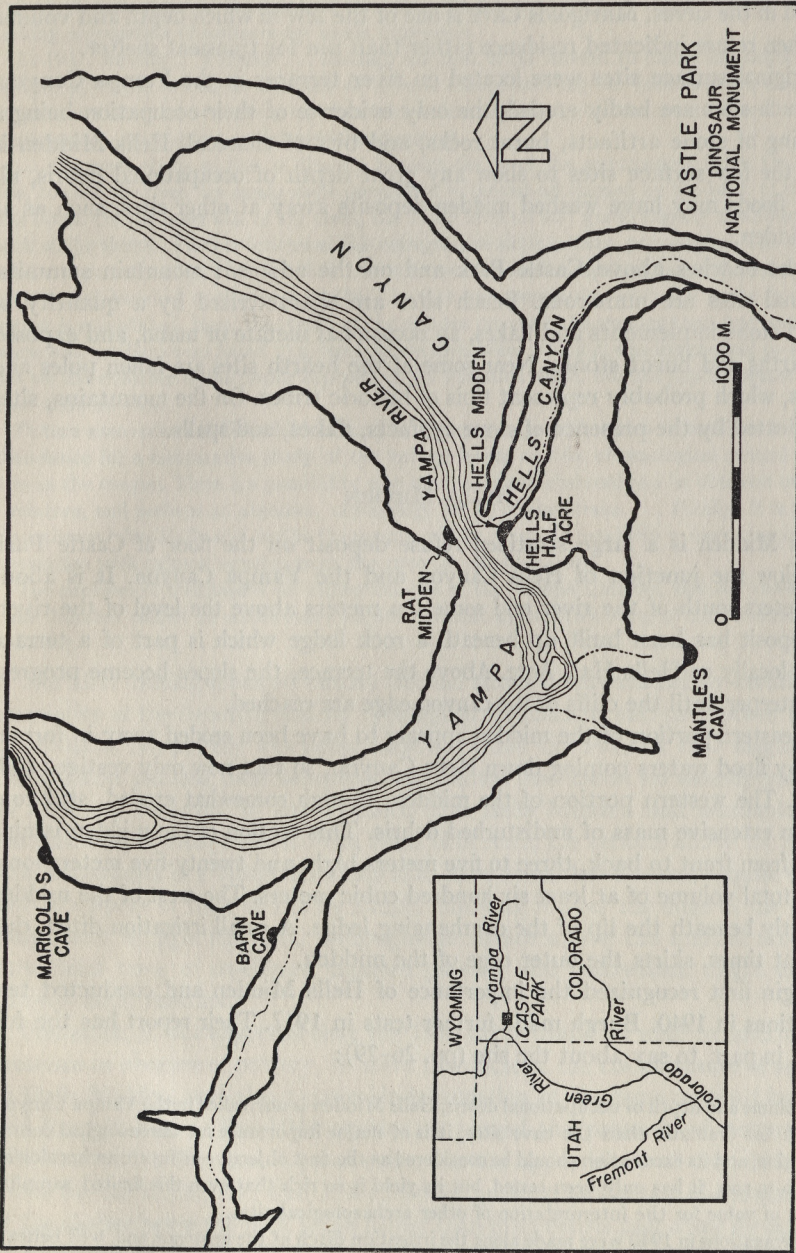


FIG. 1. Map of Castle Park, showing archaeological sites mentioned in this report

structed in the caves. Marigolds Cave is one of the few in which depth and volume of kitchen refuse indicated residence rather than use for transient shelter.

Aboriginal surface sites were located on river terraces in the Yampa Canyon. Most such sites are badly eroded, the only evidence of their occupation being a scattering of stone artifacts, burnt rocks, and bits of charcoal. Hells Midden is one of the few surface sites to show any great depth of occupational debris, although floods may have washed midden deposits away at other sites, such as at Rat Midden.

On the benches above Castle Park and on the adjacent mountain summits, aboriginal sites are numerous. Bench sites are characterized by a quantity of chipped stone implements and flakes, an occasional metate or mano, and exposed fire hearths and burnt stones. Near some of the hearth sites are fallen poles and timbers, which probably represent tipis of historic tribes. On the mountains, sites are indicated by the presence of stone artifacts, flakes, and spalls.

HELLS MIDDEN

Hells Midden is a large stratified refuse deposit on the floor of Castle Park just below the junction of Hells Canyon and the Yampa Canyon. It is about fifty meters south of the river and some ten meters above the level of the river. The deposit has been built up beneath a rock ledge which is part of a terrace known locally as Hells Half Acre. Above the terrace, the slopes become progressively steeper until the cliffs of the canyon edge are reached.

The eastern portion of the midden appears to have been eroded away in former times by flood waters coming down Hells Canyon, so that now only vestiges of it remain. The western portion of the midden, though somewhat eroded, still contains an extensive mass of undisturbed debris. This section of the midden is nine meters from front to back, three to five meters high, and twenty-five meters long, with a total volume of at least six hundred cubic meters. The crest of the midden is directly beneath the lip of the overhanging ledge. A small irrigation ditch, dug in recent times, skirts the outer edge of the midden.

Scoggin first recognized the importance of Hells Midden and conducted test excavations in 1940. Burgh made further tests in 1947. Their report has the following, in part, to say about the site (pp. 26-29):

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.

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 . . . a trench . . . 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.

. . . the crest of the midden is directly beneath the lip of the 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.

Future excavations 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. . . . 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 (*sc. Mantle's Cave*).

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.

The 1947 testing revealed clearly defined strata differentiated by certain characteristics of the deposits, and by typological distinctions and presence or absence of artifacts. No pottery was encountered in either the 1940 or 1947 diggings, but the workers realized their sampling was limited and made no assumptions as to its absence. However, it was assumed that Hells Midden had accumulated by the throwing of village refuse from Hells Half Acre, the terrace above the midden. The inhabitants of a village on Hells Half Acre would have found it quite convenient to dispose of their debris by simply throwing it over the edge of the terrace. Burgh and Scoggin felt that, although the terrace above the midden showed no superficial trace of dwellings, modern plowing and cultivation might have destroyed such remains.

Therefore, it was expected that the 1948 party would be able to determine the presence or absence of pottery, to solve the riddle of the circumstance of residence at Hells Midden, and also to provide information of the type outlined by Burgh and Scoggin above. The 1948 excavation proved the presence of pottery in association with a Fremont type of culture in the upper levels of the midden. Evidence for the assumption that Hells Midden grew up as a result of the occupation of the shelter below the rock ledge rather than from debris cast away by occupants of a village on the terrace also was obtained. No indications of residence were

found on Hells Half Acre. Series of artifacts were recovered in sufficient abundance for a comparative study of the various levels, and it is hoped that the chronology so established will assist in placing other sites in the vicinity in their proper relative position. Charcoal was encountered only in very small fragments, none sufficiently large for tree-ring dating. Charred foodstuffs and textiles were recovered from the upper levels in small quantities.

The 1949 testing of the midden substantiated beliefs determined earlier, and added considerably to the amount of cultural material available for analysis and interpretation.

CHAPTER II

EXCAVATIONS

THE 1948 SEASON

The surface of Hells Midden prior to excavation was overgrown with grass, sagebrush, and several small trees, but the fact that it was an aboriginal refuse heap was apparent from the presence of bone fragments, stone chips and artifacts, and ash and fine charcoal on its surface and along the cut made by the encircling irrigation ditch.

The area to be excavated was laid out on a north-south axis so as to extend from the rock ledge to the irrigation ditch at the outer edge of the mound, and the grass and sagebrush were cleared from the zone. The trench was located so as to cut through the crest of the midden, because it was believed that there the deepest refuse would be encountered. The trench excavated was two meters in width and, to facilitate better horizontal control in locating features and specimens encountered, was divided into two units, each one meter wide, called Trench I and Trench II, respectively. Each trench was divided into sections one meter square and designated by letters, Section A being adjacent to the rock ledge. As work progressed in depth, it was necessary to add sections to the trenches because of the sloping outer face of the midden. Limits of the trenches and sections were marked by metal surveyor's pins driven into the ground.

The small test trench dug by Burgh and back-filled in 1947 was included in our excavations because it was thought that we could determine the natural levels of the midden in the sides of this old trench and extend them in our work. The back-filled material from Burgh's trench was simply removed as our larger trench progressed in depth. As is evident, we originally planned to peel off the natural layers of Hells Midden in the reverse order of their accumulation; but, after removing three of these natural levels, we found the record of deposition so indistinct that it was necessary to change to arbitrary levels of 30 cm. each for the remainder of the trenching.

We were fortunate in being able to keep the west face of the trench vertical throughout the excavations, so that at the end of the season it was possible to see a complete cross-section of the midden. To assist in drawing cross-sections of the vertical face, large spikes painted red were driven into the face at meter intervals.

Dirt was removed from the trenches in meter squares, such as Trench I, Section A; Trench I, Section B; and so on; and by either natural or arbitrary levels as explained above. Artifacts and features were located by their position within

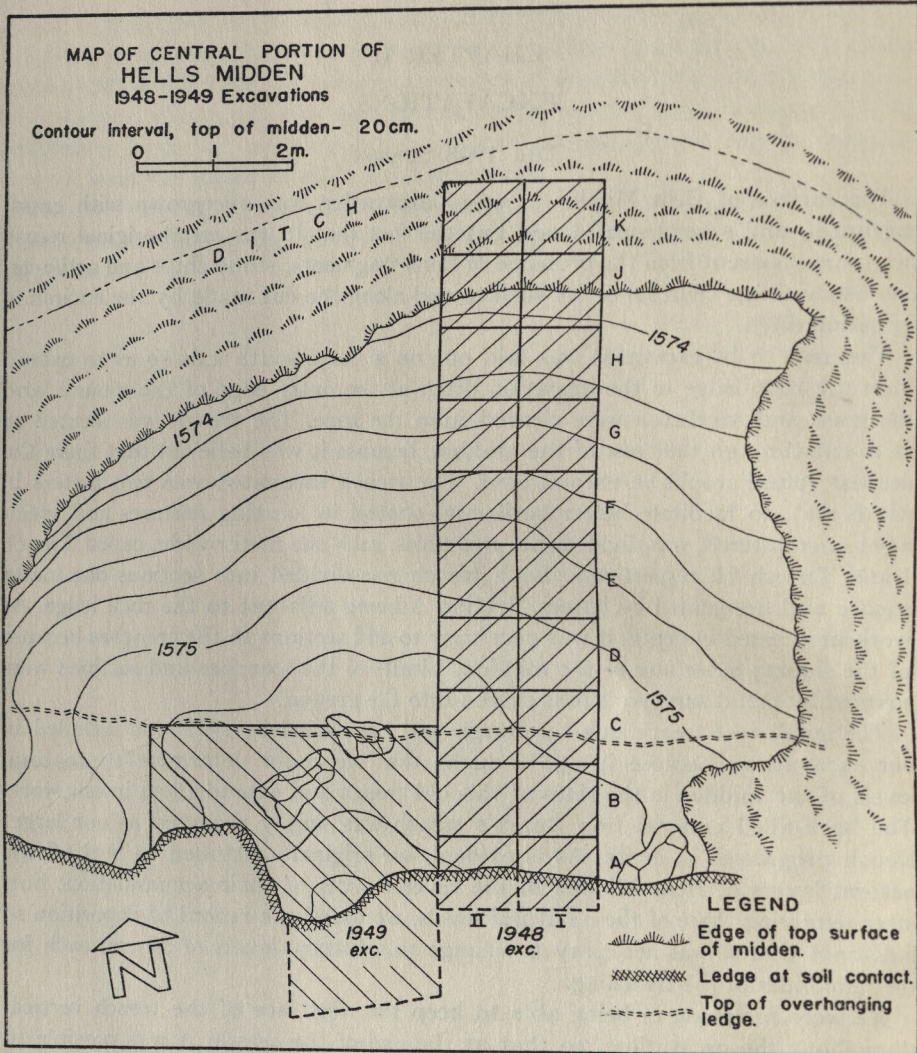


FIG. 2. Map of Central Portion of Hells Midden, showing 1948 and 1949 excavations

a particular trench, section, and level. The metric system was used in making all measurements. As is normally the case, picks, shovels, and, where necessary, trowels, brushes, bellows, and other delicate tools, were employed during the digging.

Students attempted to find each artifact *in situ*, but if some specimen was missed by the digger, it was recovered by the screener who screened dirt from each unit of the trench separately. The digger, after carefully working over a particular section of the trench, placed the dirt in a wheelbarrow. The wheelbarrow was wheeled across the irrigation ditch and dumped directly onto the screen. Then the dirt was sifted through the screen in order to recover every bit of cultural material from the debris.

A topographic map of the midden was made prior to the excavations. Photographs were taken before, during, and after the work.

THE 1949 SEASON

During the second season's work in Hells Midden, directed by Mr. Herbert W. Dick, the same general excavation techniques as were described above were employed. The principal difference in method was that dirt was removed in arbitrary levels of 12 inches (approximately 30 cm.) from the surface down to the bottom of the trench. No attempt was made to follow natural levels, a system which did not prove satisfactory in 1948. However, in order to standardize this report, the 1948 system of designating levels will be followed. The material from the 1949 excavation has been carefully fitted into the levels as they had been designated in 1948. This adjustment is made as a matter of simplification, so that the reader will not be confused by two sets of levels.

The area chosen for excavation in the summer of 1949 adjoined the west side of the 1948 trench at Sections A, B, and half of C, and extended along the face of the sandstone cliff a distance of 12 feet (approximately 3.7 meters) as shown in Figure 2.

CHAPTER III

STRATIGRAPHY

The stratigraphy of Hells Midden, as described in this report, was first determined by the 1948 excavations, when a cross-section of the midden was laid bare, and then checked for accurateness by the 1949 excavation, when a section of the midden along the face of the cliff was excavated (Figure 2). The drawing of the west face of the 1948 trench (Figure 3) will assist the reader in understanding the nature of the midden deposits.

The profile through Hells Midden reveals clearly defined, compacted strata beneath the overhanging rock shelter, but the outer side of the midden, beyond the crest of the overhanging ledge, has a looser texture and does not present as distinct a stratigraphic picture. Evidence of rodent activity was not noticed in the excavation. A brief account of the materials and deposits found in each level follows.

Level 1. 0 to .5 meters. The surface of the midden was covered with a growth of grass, weeds, and sagebrush. Below the surface there was a mixture of sand, organic material, and loam interlaced with the roots of plants growing on the midden surface. In this level there were a few large slabs of sandstone which had fallen from the overhanging ledge. In fact, such pieces of sandstone were found in all levels of this midden, especially under the ledge. Most of the sand in the level was yellow and represented disintegrated material from the sandstone cliff and ledge. In a few places there were striations of white sand and red clay which probably were formed by wind-blown sand and puddles of mud left after rains, respectively. There were a few bits of charcoal, a few artifacts, and some stone flakes and bone splinters in this level. It is assumed that this upper stratum accumulated after the abandonment of the shelter by aborigines. Growth of this level would have been due mainly to the washing of material from Hells Half Acre (accounting for the small amount of aboriginal cultural material), the disintegration of the ledge, and the deposition of wind- and water-borne materials against the cliff.

This stratum was punctuated by a thin occupation level which appeared at a depth of 10 cm. at the midden crest and almost on the surface at the back of the rock shelter. This material is assignable to one Pat Lynch, the first settler of the canyons in modern times, and dates back to the 1880's. Pat Lynch led a hermit's existence in this remote area for many years before it was homesteaded. He camped in caves and rock shelters, and he carved his name and depictions of sailing ships in many of the panels of Indian petroglyphs in the canyons. The rock shelter of Hells Midden was one of his camping spots and contained a thin layer

1 2 3 4 5 6 7 8 9 10 11 12

HELLS MIDDEN
WEST FACE OF TRENCH
1948

WYCK LEVEL (c.1866)

HUMUS

DITCH

LEGEND

	Sand		Clay
	Coarse Red Sand		Gravel
	Red Sand		Charcoal
	Ash		Clay
	Rock		Clay
	Coarse Tan Sand		Clay

Hells Midden, 1948 Trench

of his camp refuse—ashes, charcoal, fragments of pages of an old newspaper and a copy of *Judge* (articles in the newspaper were dated 1886; *Judge* magazine was first published in 1881), several buttons, the top of a boot, a knife blade, a piece of lead probably used in making bullets, a grocery list written on the back of a coffee-can label, and seventeen brass cartridge cases. Fifteen of the cartridge cases were for the .45-70 rifle, which was very popular at that time, and the other two were for a .45 caliber pistol. Pat Lynch apparently reloaded his own shells with black powder and primers, and cast his own bullets. The crimp or removable primer was invented in 1881.

Level 2. .5 to 1.2 meters. The next 70 cm. of the midden was a very dark deposit containing a great deal of granular charcoal and ash. Several horizontal lenses of hard-packed, or fire-hardened, dirt appeared in this level. They may be fragments of shelter floors, or simply portions of occupation areas hardened by camp fires and by the movements of people upon those surfaces.

Level 3. 1.2 to 1.7 meters. This level consisted of light-colored sand, several areas of hard-packed sand and clay, and large lenses of charcoal and ash. Six such lenses of charcoal and ash appeared to have been small cists, or fireplaces. The edges of one were reddened and hard-baked by fire. This deposit probably represents a period during which the shelter was occupied periodically and is quite typical of a considerable portion of the midden. The lenses of charcoal and the hard-packed layers may be assignable to periods of occupation, and the sand and small flecks of charcoal attributed to periods of nonoccupation, when wind-blown sand and debris were being deposited. Several fire-blackened stones and small charred sticks were found adjacent to lenses of charcoal. The sticks were too small for tree-ring dating.

Level 4. 1.7 to 2.0 meters. The material in this level consisted mainly of yellow sandy loam containing flecks of charcoal, bits of ash, and small charred sticks. Two of the cists, or fireplaces, mentioned in Level 3 extended into the upper part of this level. In addition there were two well-defined hearths in this level. One was rock lined and had a compact deposit of charcoal and ash. Several hard-packed clay or dirt layers may represent occupation levels. Several such areas were red and appeared to be fire-hardened.

Level 5. 2.0 to 2.3 meters. This level contained material similar to that of Level 4. The same sandy loam with flecks of charcoal continued. Ash lenses, some suggestive of shallow cists, and hard-packed areas, representing floors or occupation levels, were superimposed. A considerable number of water-worn rocks were found in Section E.

Level 6. 2.3 to 2.6 meters. A dark yellow sand containing ash and charcoal flecks made up the bulk of this level. Sections A and B contained a profusion of charcoal and ash and several superimposed fire-hardened areas of clay. Several

thin lenses of yellow silt appeared to have been water-laid. Levels 4, 5, 6 may represent seasonal occupation of the shelter.

Level 7. 2.6 to 2.9 meters. This 30 cm. level contained a great deal of yellow sand; some was mixed with ash and large flecks of charcoal. In Sections A and B there were two layers of water-deposited silt 10 cm. apart. Each was 1.5 cm. thick. In Section H a gravel lens ran east-west across the trench. Several small lenses of fine charcoal and one fire-hardened area were encountered. This appears principally to be a nonoccupation level.

Level 8. 2.9 to 3.2 meters. Considerably more ash and charcoal appeared in this level than in the level above. Generally speaking, the level contained a series of sterile levels of wind- and water-deposited yellow sand and gravel, alternating with layers of ash and charcoal. Periodic occupation is implied.

Level 9. 3.2 to 3.5 meters. This level consisted almost entirely of water- and wind-deposited yellow sand and fine gravel. Under the rock shelter the sand was striated, and the silt occurred in thin layers, one above the other. There were a few flakes of fine charcoal in the deposit, occurring rarely in thin lenses. It is believed that this level represents a period of nonoccupation.

Level 10. 3.5 to 3.8 meters. In this level there again appeared a large amount of ash and charcoal bits. There were several large lenses of fire-darkened earth and charcoal covered by layers of gray ash. The southern half of the level contained a thin layer of water-laid red sand. This level probably represents another period of occupation in the midden.

Level 11. 3.8 to 4.1 meters. The greater portion of this level was composed of naturally deposited sand and fine gravel. Two large sandstone rocks were encountered in Sections B and C. A layer of red sand occurred in Sections G and H. At the very bottom of this level a lens of charcoal and ash appeared in Sections C and D. Other than this, there were but very few small lenses of charcoal in this deposit. Nonoccupation is presumed for most of this level.

Level 12. 4.1 to 4.4 meters. Charcoal and ash were abundant in this level. In Sections A and B the face of the cliff was encountered. Only Sections A, B, C, D, E, and half of F were excavated. This excavation was limited in order to facilitate removal of dirt from the then deep, narrow trench. Most of this level consists of cultural material.

Level 13. 4.4 to 4.7 meters. The upper part of this level had a continuation of the heavy charcoal and ash deposit found in Level 12 and represents the lowest occurrence of a cultural stratum. This material stopped abruptly, except along the cliff face, and was replaced by a coarse tan sand in the lower part of the level. The excavation of this and succeeding lower levels extended from the face of the cliff, Sections B and C, out to the southern half of Section F.

Level 14. 4.7 to 5.0 meters. Materials in this level consisted entirely of naturally

Periodic
Occupation
Non
Occupation
etc.

deposited coarse tan sand, with the exception of a scattering of large charcoal flecks deposited adjacent to the cliff wall. These bits of charcoal appear to have filtered down through the sand and to have been deposited against the cliff. A nonoccupation level.

Level 15. 5.0 to 5.3 meters. The coarse tan sand encountered in Level 14 continued in the upper portion of this level; then the color of the sand changed to a red. No charcoal nor ash was found in this level. It appeared to be completely void of any evidence of occupation by man.

Below Level 10, only one classifiable artifact, a stone ball from Level 13, was recovered. Despite the lack of artifacts, stone flakes and charcoal were quite abundant in Level 12 and in the upper part of Level 13. Cultural material, therefore, was found to exist in the midden to a depth of 4.55 m. from its crest.

The strata of the midden suggest a periodic occupation of the shelter rather than a continuous period of living beneath the overhanging rock ledge. There is a rather clear-cut alternation of what appear to be cultural and natural levels in that portion of the midden that is sheltered by the ledge. The strata of the outer edge of the midden are fairly thoroughly mixed, probably because of the action of wind and water, and the movements of human occupants over the ground. The term *cultural levels* is applied to those levels that contained a great deal of charcoal, ash, and hard-packed areas of clay or dirt. The natural levels are so named because they contained layers of water-laid silt and a great deal of sand and dirt, much of which appears to be water- or wind-deposited.

Even to approximate the amount of time represented by the natural and cultural levels in the midden is difficult. One scale for judging the rate of deposition is presented by the natural level that is present between the uppermost aboriginal occupation and the thin stratum of refuse left by Pat Lynch. The ultimate aboriginal use of Hells Midden was by a people possessing the Fremont type of culture, which has a terminal date of approximately 800 A.D. in this region. Pat Lynch used the shelter in the 1880's; so there was a period of about 1000 years during which the natural deposit found between these two periods of occupation could have been formed. The natural level measures 50 cm. in thickness; thus a rate of deposition of twenty years per centimeter may be postulated for this stratum. If this rate of deposition were employed to date all of the natural levels of the midden, a period of over 4000 years would have been necessary for the accumulation of the natural levels alone. In addition, time would have to be allowed for the building up of the cultural levels.

Another dating scale might be established by considering the depth of the horticultural, or Fremont, remains which included two cultural strata and one natural stratum. This culture is generally assigned to the period between 400 and 800 A.D. in northwestern Colorado. If the Fremont culture in Hells Midden,

which consisted of about one meter of material, represents such a 400-year span of time, then a rate of deposition of four years per centimeter is suggested. This scale would place the earliest cultural level in the midden at approximately 2000 years earlier than the Fremont culture, or about 1500 B.C.

The writer does not necessarily assume that either of the foregoing time scales is correct, but feels that the latter, which would date the earliest culture in the midden about 1500 B.C., may give a fair approximation.

Of course, it is realized that all of the natural strata in the midden did not accumulate at the same rate. The rate of deposition most certainly varied from time to time, and it is likely that floods in Hells Canyon and run-off from Hells Half Acre could add to, or remove from, the midden several centimeters of deposits in a very short time. Flood-water deposits most possibly would have occurred in the lower levels of the midden only, but material carried by waters running off Hells Half Acre is still being deposited on the midden.

Likewise the thickness of cultural levels is no indication of their age. The number of inhabitants of the shelter probably varied throughout the history of its occupation. The amount of discarded artifacts in each level grew larger as successively higher levels were analysed, and may indicate a progressively larger population. But it also points to the possession, by the occupants of the shelter, of an ever larger kit of tools.

Because of the above-mentioned uncertainties, no attempt is made to establish an absolute chronology for the hunting-gathering stages in the midden; only a relative chronology as determined by the stratigraphic position of artifacts is suggested. However, the hunting-gathering stages do precede the horticultural stage, identified with the Fremont culture, and hence would have a terminal date of approximately 400 A.D. (Burgh and Scoggin, 1948, p. 89.) A beginning date of about 1500 B.C., as indicated above, is merely a suggestion.

CHAPTER IV
ABORIGINAL CULTURE

FLAKED STONE

Projectile Point: miniature. Figure 4. Stemmed point formed by pressure flaking. Base usually rounded, but in a few cases square. Shoulders more frequently straight, but some specimens are barbed. Edges convex, straight, or, where carefully retouched, serrated. Some points, made from curved flakes, are slightly warped or spoon-shaped. Length: 2.5 to 5.0 cm. Greatest width: 1.2 to 1.5 cm. Thickness: .2 to .3 cm. Distribution: Levels 2, 3, and 5; greatest occurrence in Level 2.

Triangular Blank: miniature. Figure 5. Thin triangular blanks associated with miniature projectile points and with corner-notched, round-based projectile points. Base rounded or square. Formed by pressure flaking. Length: 2.5 to 4.0 cm. Greatest width: 1.2 to 2.0 cm. Thickness: .2 to .3 cm. Distribution: Levels 1, 2, 3, and 4; greatest occurrence in Level 2. These specimens may represent blanks used for fashioning the miniature, or corner-notched, rounded-base projectile points. They are of the correct size and shape to have been so used. Or, they may represent a triangular type of projectile point which was hafted without the aid of a stem or notches.

Projectile Point or Knife: stemmed; rounded base. Figure 6. Formed from an ovoid or triangular blank. Notches broad and irregular. Edges straight or convex, and of varying length. Shoulders usually rounded. Pressure flaking which seldom shows good workmanship. Length: 3.5 to 8.0 cm. Greatest width: 2.0 to 2.7 cm. Thickness: averages .7 cm. Distribution: Levels 2, 3, and 5; greatest occurrence in Level 2. The longer specimens may have been employed as knives rather than as projectile points.

Projectile Point: triangular; corner-notched; rounded base. Figure 7. Formed from ovoid blank. Edges convex, straight, or serrated. Barbs sharp and slightly recurved. Thin in section, finely flaked, and symmetrical. Length 3.0 to 4.2 cm. Greatest width: 1.3 to 2.0 cm. Thickness: averages .2 cm. Distribution: Levels 2 and 3.

Projectile Point: triangular; corner-notched; straight or concave base. Figure 8. Formed from thin triangular blank. Notches deep. Edges straight or convex. Barbs rounded or slightly pointed. Length: 2.4 to 3.0 cm. Greatest width: 1.5 to 2.0 cm. Thickness: averages .3 cm. Distribution: Levels 3 and 4.

Projectile Point: side-notched; straight or concave base. Figure 9. Formed from a blank approximately triangular in shape. Notches fairly far down on the edges of



FIG. 4. Projectile Points: miniature. Natural size



FIG. 5. Triangular Blank: miniature. Natural size

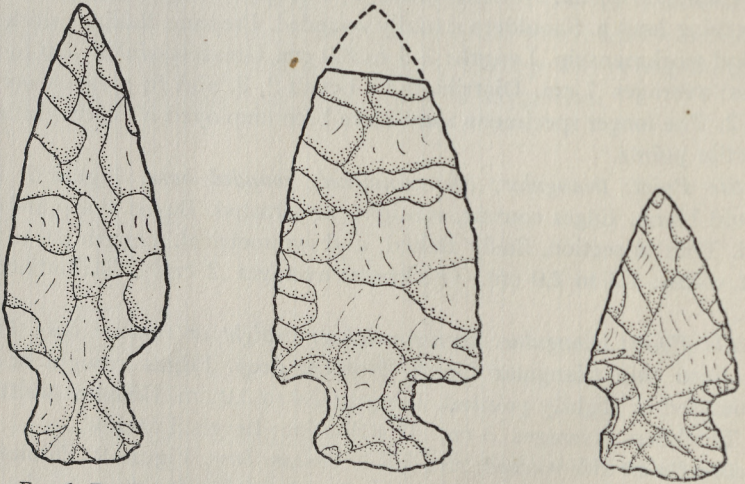


FIG. 6. Projectile Points or Knives: stemmed; rounded base. Natural size

the point, causing the basal section of the point to be quite long. The edges of the basal part of the point are parallel. The base may be straight or slightly concave.

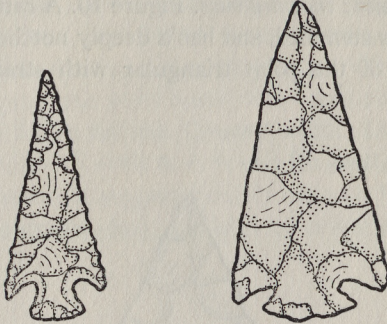


FIG. 7. Projectile Points: triangular; corner-notched; rounded base. Natural size



FIG. 8. Projectile Point: triangular; corner-notched; straight or concave base. Natural size

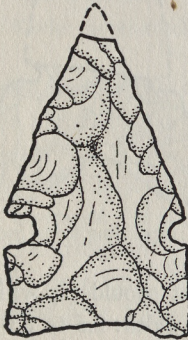


FIG. 9. Projectile Point: side-notched; straight or concave base. Natural size

Length: 4.0 to 4.5 cm. Greatest width: 2.0 to 2.5 cm. Thickness: averages .4 cm.
Distribution: Levels 4 and 5. This point somewhat resembles the side-notched,

concave-base point described by Burgh and Scoggin (p. 47), but it is not as consistent in having a deeply arched base or in having notches as nearly at the midpoint of the edges.

Projectile Point: stemmed; indented base. Figure 10. A rather thick point formed by pressure flaking. It is stemmed, and has a deeply notched base. Edges of stem usually parallel. Body of the point triangular with straight or convex edges.

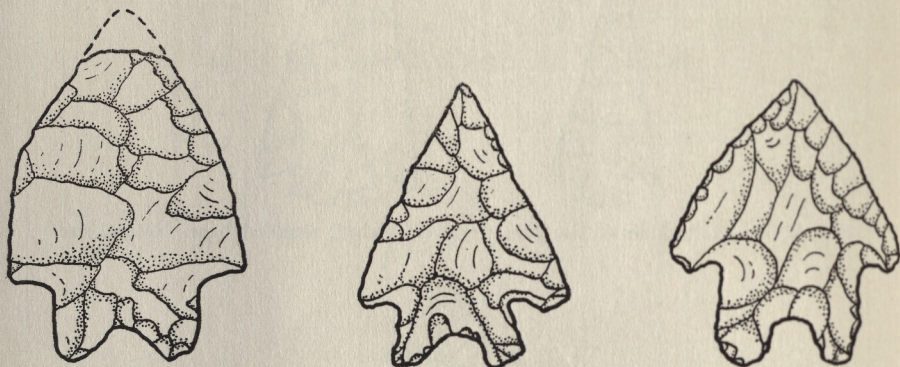


FIG. 10. Projectile Points: stemmed; indented base. Natural size

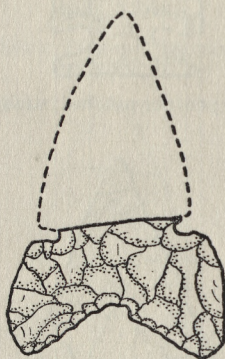


FIG. 11. Projectile Point: expanding stem; indented base. Natural size

Some specimens exhibit straight shoulders, while others have rounded barbs. Length: 3.7 to 4.2 cm. Greatest width: 2.5 to 3.0 cm. Thickness: averages .5 cm. Distribution: Levels 4 and 5.

Projectile Point: expanding stem; indented base. Figure 11. This type of point might be better described as "rabbit-eared". It has side notches and a broad, expanding stem with a V-shaped indentation in the base, causing the stem to

appear like a pair of rabbit ears. Only fragmentary specimens were recovered, but the body was probably triangular. Approximate length: 4.5 cm. Greatest width: 2.6 cm. Thickness: averages .3 cm. Distribution: Levels 5, 6, and 7.

Projectile Point or Knife: corner-notched; thin base. Figure 12. A symmetrical blade with thin straight base and shallow corner notches. Edges of the blade are parallel for a considerable distance; then they taper rather abruptly to a point. Length: no complete specimens were found, but, when reconstructed, they probably would range from 5.0 to 6.0 cm. Greatest width: 2.0 to 3.0 cm. Thickness: averages .3 cm. Distribution: Levels 6, 8, 9, and 10; greatest occurrence in Levels 8 and 9. Shape and size would suggest possible use as a hafted knife. This point may be akin to the corner-notched, straight- or concave-base point which was

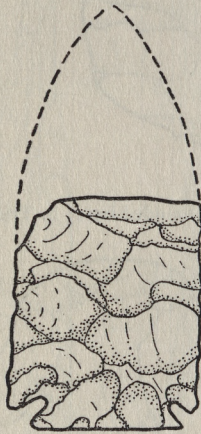


FIG. 12. Projectile Point or Knife: corner-notched; thin base. Natural size

found in Levels 3 and 4. The bases and notches on these two types of points are very similar. The blades, however, differ a great deal in length.

Knife: bifacial; triangular; rounded base. Figure 13, a. A heavy blade, apparently made by percussion flaking. Base broad in proportion to length. Usually found in fragmentary condition. Length: averages 7.0 cm. Greatest width: averages 4.5 cm. Thickness: averages .8 cm. Distribution: Levels 1 to 10. A cache of seven such knives, all made of quartzite, was found in Level 3.

Knife: bifacial; triangular; straight base. Figure 13, b. Thinner blade than preceding type, with a narrow base in proportion to length. Percussion flaked. Length: averages 6.0 cm. Greatest width: averages 2.5 cm. Thickness: averages .5 cm. Distribution: Levels 1 to 10. The two types of bifacial knives, this one and the one described above, form the largest group of artifacts from the midden.

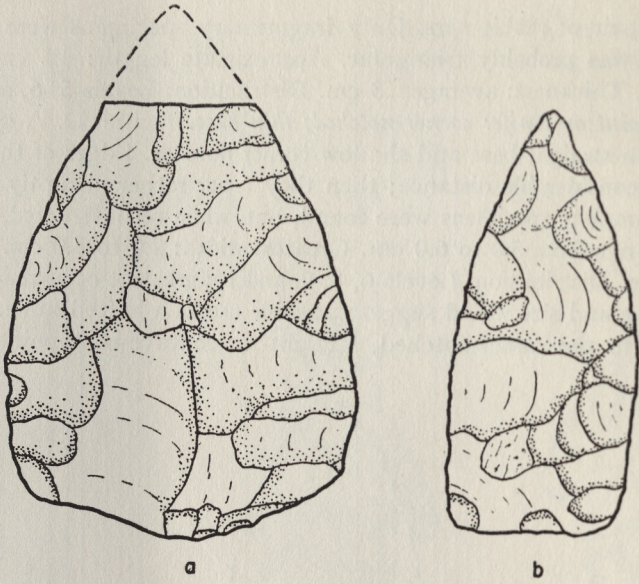


FIG. 13. Knife: bifacial. a. Triangular; rounded base; b. Triangular; straight base. Natural size

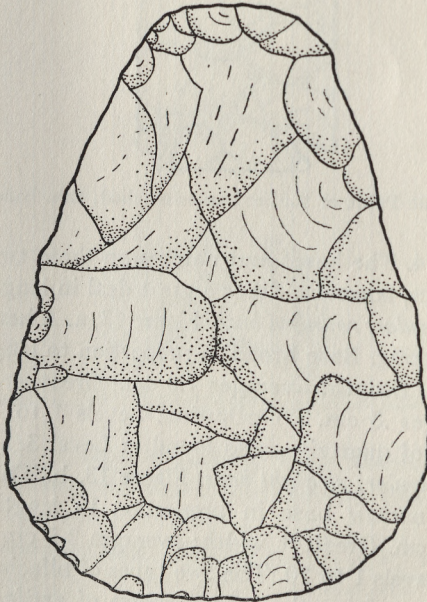


FIG. 14. Chopper. Natural size

They seem to be related, one type appearing a bit more skilfully chipped than the other. Possibly the style with the flat base may have been hafted, while the round base type may have been employed unhafted. Their distribution is similar.

Chopper. Figure 14. Large ovoid artifact made from a stone core by percussion flaking. Some specimens show all-over flaking while others have flaking confined to one surface only. Length: averages 8.5 cm. Greatest width: averages 5.5 cm. Thickness: averages 2.0 cm. Distribution: Levels 2, 3, and 4. A cache of six flaked stones found in Level 4 of the midden contained three large choppers of this type and three large unworked cores.



FIG. 15. Drill: convex; flake. Top and side views. Natural size

Drill: convex; flake. Figure 15. Made by removing a long curved flake from a core by percussion flaking. Secondary flaking, probably by pressure, employed on the convex side to form sharp edges and a point at one end. This implement may also have served as a scraper, but the pointed end indicates that it was used primarily as a drill. Length: 8.0 cm. Greatest width: 1.7 cm. Thickness: 1.0 cm. Distribution: Level 2.

Drill: expanded base. Figure 16. This type of drill was probably employed unhafted. It has an expanded head to be gripped with thumb and fingers. Head may be wing-shaped, or may consist of a T-shaped enlargement. Shaft is slender and

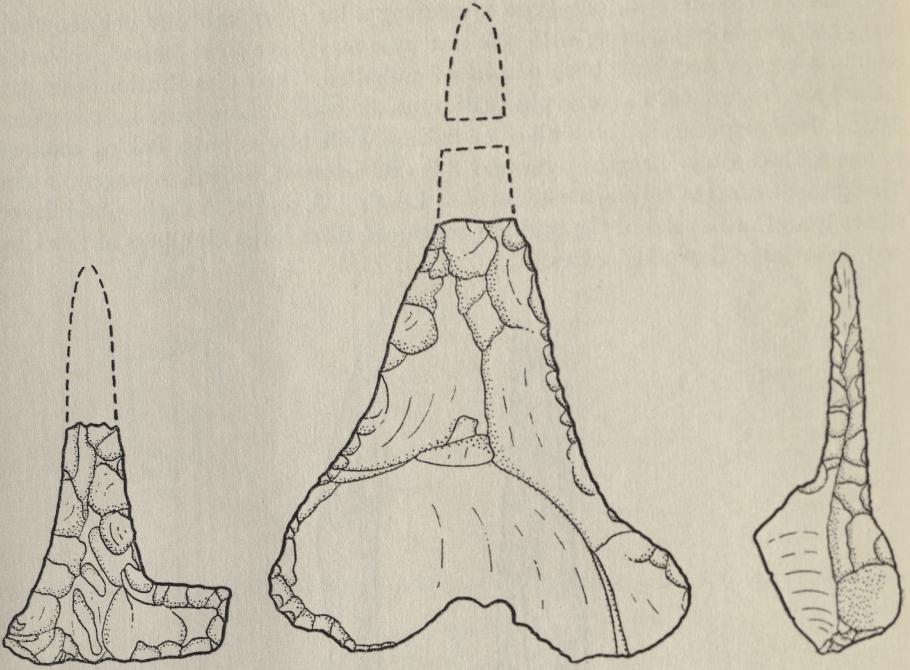


FIG. 16. Drills: expanded base. Natural size

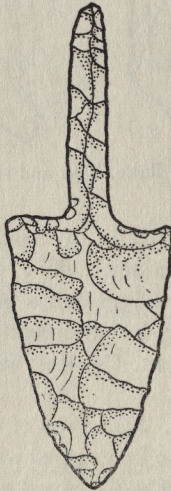


FIG. 17. Drill: expanded base. Base worked into triangular blade. Natural size

in almost all cases broken. Length: 5.5 to 9.0 cm. Distribution: Levels 1, 2, 3, 5, 6, and 8; greatest occurrence in Level 3. One specimen of this type has the base worked into a triangular blade (Fig. 17). It is doubtful if this artifact could have served as a projectile point, since the slender drill shaft would have been a very weak hafting device.

Drill: core. Figure 18. A heavy drill made from a leaf-shaped core. All-over flaking, probably by percussion. Usually has a diamond-shaped cross-section. Presumably hafted for use. Length: 5.9 to 7.3 cm. Greatest width: 2.0 to 2.6 cm. Thickness: 1.1 to 1.3 cm. Distribution: Levels 2, 3, and 4; greatest occurrence in Level 2.



FIG. 18. Drill: core. Natural size

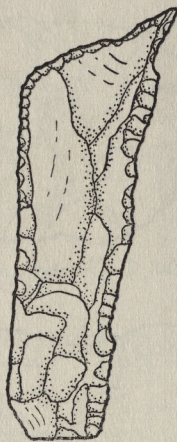


FIG. 19. Graver. Natural size

Graver. Figure 19. Made from a long rectangular flake removed from a core by percussion. One surface of the flake sharpened by pressure chipping along both edges. A small, sharp point has been fashioned at one corner of the implement. Length: 5.5 cm. Greatest width: 1.9 cm. Thickness: .4 cm. Distribution: Level 2.

Scraper: end; snub-nosed. Figure 20. Manufactured from an oval or pear-shaped flake that had been removed from a core by percussion. The lower, flat, or gently curved, surface represents the plane of cleavage. The upper, rounded surface, which has been retouched, has a hump toward the forward edge. The forward edge is usually well chipped and presents a sharp, angular working surface. Length: averages 4.2 cm. Greatest width: averages 3.4 cm. Thickness: averages 1.0 cm. Distribution: Levels 2 and 3.

Scraper: side; bifacial. Figure 21. Fashioned from an oval flake or small core and retouched on both surfaces. Unlike the snub-nosed scraper, this type usually has an all-around working edge. Length: averages 3.8 cm. Width: averages 3.0

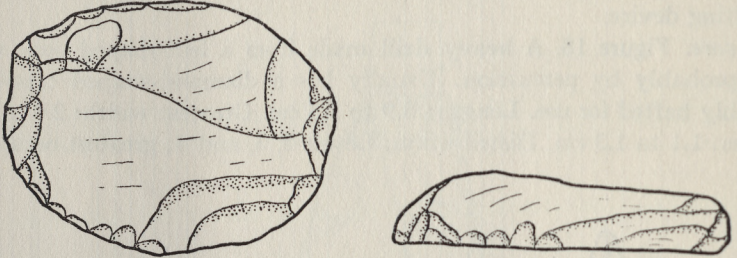


FIG. 20. Scraper: end; snub-nosed. Top and side views. Natural size



FIG. 21. Scraper: side; bifacial. Top and side views. Natural size

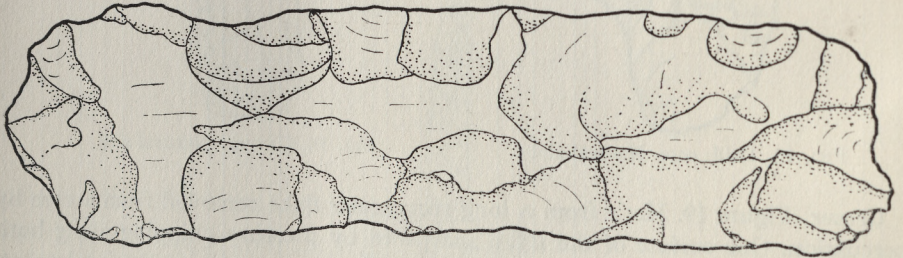


FIG. 22. Scraper: side; rectangular. Natural size

cm. Thickness: averages 1.4 cm. Distribution: Levels 2, 3, and 4; greatest occurrence in Levels 2 and 3.

Scraper: side; rectangular. Figure 22. A large rectangular scraper resembling the modern spokeshave type of tool. It has been chipped on both surfaces, and the ends have been rounded. A worker could have used it as a two-handed scraper

either by pushing it or by drawing it toward his body. Length: 10.2 cm. Greatest width: 3.4 cm. Thickness: 1.7 cm. Distribution: Level 3.

Scraper: side; circular. Figure 23. A variety of side scraper made from a circular piece of stone. Some specimens show retouching on only one surface; others have secondary chipping on both surfaces. Diameter: averages 5.0 cm. Thickness: averages 1.7 cm. Distribution: Levels 3, 7, and 8.

Saw. Figure 24. A thin piece of rectangular shale or slate with chipping along one edge resembling the teeth of a saw. Length: 15.0 cm. Width: 2.5 cm. Thick-

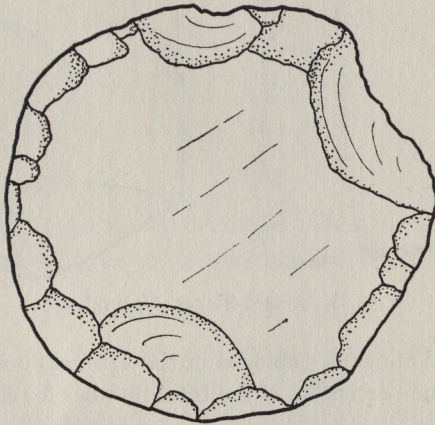


FIG. 23. Scraper: side; circular. Natural size



FIG. 24. Saw. One-half natural size

ness: .6 cm. Distribution: Level 7. This artifact makes a fairly efficient cutting implement.

Utilized Flakes. Figure 25. Many flakes of various shapes and sizes show a bit of retouching to enable them to be employed as cutting and scraping tools. They usually show just enough secondary flaking to bevel the edges and to prevent the quick dulling that takes place when the thin edges of a raw flake are utilized. Retouching is usually confined to one surface, and just to the very edges of that surface. In some examples only a small area is retouched; in others almost the entire edge shows beveling. Distribution: Levels 1 to 10.

IDENTIFICATION OF MATERIALS USED FOR FLAKED ARTIFACTS

Mr. William Fisher, graduate student of geology at the University of Colorado, has identified the materials used in the Hells Midden artifacts. The following

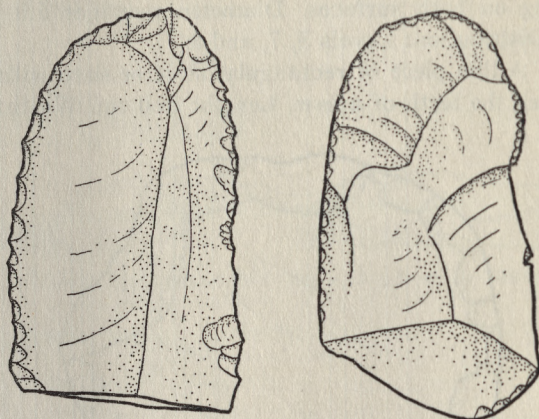


FIG. 25. Utilized Flakes. Natural size

table lists the types of minerals employed in the artifacts from Levels 2 and 3 of the 1948 trench and the percentage of the total number for each type.

Mineralogical Identification of Artifacts from Levels 2 and 3, 1948

Mineral	Percentage
Red and yellow jasper	36.4
Quartzite	17.0
Flint	14.5
Chert	8.6
Yellow jasper with manganese dendrites	5.5
Chalcedony	4.3
Red jasper with manganese dendrites	3.6
Cherty jasper	3.6
Cherty flint	2.5
Impure flint	1.3
Brown jasper with manganese dendrites	.7
Fine-grained sandstone	.4
Shale	.4
Granite	.4
Obsidian	.4
Opal	.4

STONE CHIPS

During the 1949 season, the stone flakes, or chips, from each level were counted and classified by Mr. Dick. It is interesting to note the large number of rejects

and flakes that were present in the midden and to realize how much stone chipping must have been accomplished in the rock shelter in order to produce such a profusion of flakes.

Total Number of Stone Chips by Level, 1949

Level 1.....	17
Level 2.....	1794
Level 3.....	1640
Level 4.....	1137
Level 5.....	1071
Level 6.....	903
Level 7.....	419
Level 8.....	111
Level 9.....	54
Level 10.....	19
Total.....	<hr/> 7165

Red and yellow jasper were the favorite materials in each level. Flakes of these materials made up over fifty percent of the total number of flakes in each stratum.

GROUND AND PECKED STONE

Metate. Figure 26. Two types of metates were found in Hells Midden and on the terrace, Hells Half Acre, just above the midden. One type is made from a sandstone slab and has a roughly oval-shaped depression, or milling surface, made by pecking the face of the stone. The mano, or handstone, was probably moved in a rotary manner on this basin type of metate in order to retain the oval-shaped depression. Only one complete specimen of this style was recovered. Length: 44 cm. Width: 26.5 cm. Thickness: 2 cm. Distribution: Levels 2 and 3.

The second type of metate has a trough-shaped milling surface. The trough had been pecked into a flat surface of a small sandstone boulder or slab. In the milling process, the mano was moved in an axial direction on the trough metate. One example of a metate of this style had been made from an oval boulder weighing about 150 pounds. Another specimen, which was fragmentary, had been prepared from a slab. The measurements of this slab metate follow. Length: 28 cm. Width: 26.5 cm. Thickness: 9 cm. Depth of milling depression: 2 cm. Distribution: Level 2.

The milling surfaces of both types of metates were no doubt refinished from time to time whenever the grinding surface became too smooth to pulverize grains or seeds efficiently.

Metates were found only in Levels 2 and 3 of the midden, but it is doubtful whether this is a true indication of their distribution since manos were found as deep as Level 7, and normally the two artifacts occur together.

Mano. Figure 27. An oval-shaped mano, or handstone, which probably was

propelled by one hand, was the dominant type found in Hells Midden. Normally they were made of small water-worn cobbles or rocks of coarse, hard, well-cemented red sandstone, and had been dressed on several surfaces. Twenty-four such manos, fragmentary and complete, were recovered from the midden, and one specimen was found on the terrace above the midden.

Half of the manos have two grinding, or working, surfaces; the others have

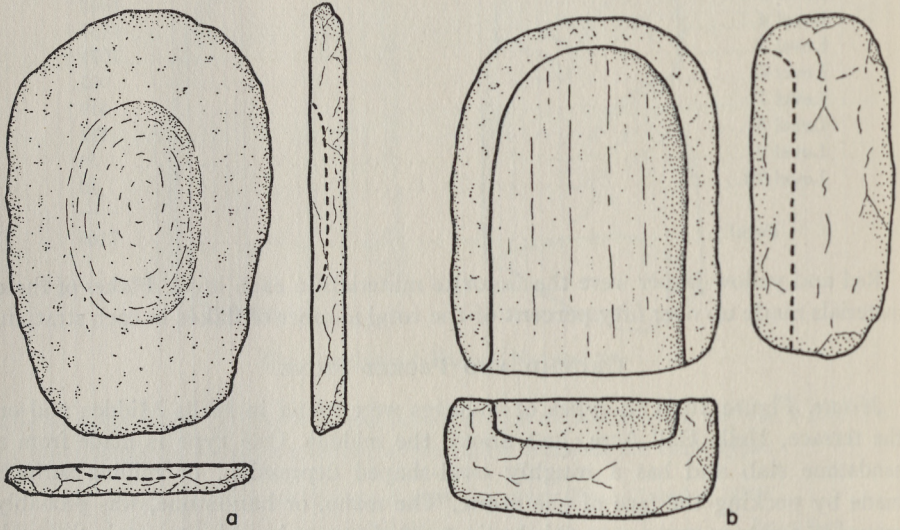


FIG. 26. Metates. a, Basin; b, Trough. Top, side, and end views shown. One-eighth natural size

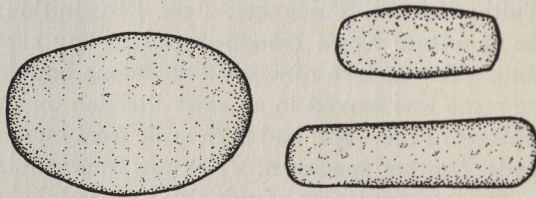


FIG. 27. Mano. Top, end, and side views shown. One-fourth natural size

but a single grinding surface. One style has two facets on the grinding surface. It is conjectured that the manos with two facets on the working surface probably were employed on a trough-type metate, the two facets resulting from a back and forth movement of the mano. The type with a flat or rounded working surface could have been moved in a rotary manner on a basin metate. Measurements of a typical mano follow. Length: 12.0 cm. Width: 7.5 cm. Thickness: 5 cm. Distribution: Levels 2, 3, 4, 6, and 7; greatest occurrence in Level 2.

Five manos were found in a cache in Level 6 of the trench. They all had been fashioned from sandstone by pecking. These specimens were almost identical in size and shape, with the exception that only one of them shows evidence of having been used on a metate. The mano that had been put to use shows considerable wear on two grinding surfaces; the others had been well shaped by pecking, but the grinding surfaces are unworn.

One fragmentary oval-shaped mano, found in Level 2, was considerably larger than the others. It measured 16 cm. long, 12 cm. wide, and 7 cm. thick. It is likely that a mano of this size may have required two hands for manipulation. It had been shaped by pecking and shows evidence of a good deal of use on the two working surfaces.

Pecking Tool. Two fragments of elongated, ground sandstone artifacts were collected. They are almost cylindrical in shape, with pointed ends which are battered as though the implement had been used for pecking other stones. Reconstructed length: 18 cm. Width: 6 cm. Thickness: 5 cm. Distribution: Level 3. Such an implement could be used very well for dressing the surfaces of metates and for fashioning manos.

Stone Ball. Three balls of hard sandstone were found. One was coated with a thick layer of carbon and apparently had been in a fire, whether purposely or not cannot be stated. All had been shaped by a pecking process. Diameter: 5.2 to 7.5 cm. Distribution: Levels 2, 3, and 13. The stone ball from Level 13 was the most deeply buried artifact recovered from the midden.

Hammerstone. Water-worn cobbles were used as pounding tools. All projecting facets are battered. Length: 6.9 to 11.4 cm. Width: 3.2 to 6.6 cm. Thickness: 4.5 to 7.3 cm. Distribution: Level 2.

BONE AND HORN

Bone and horn artifacts were encountered from the surface down to Level 7. Awls, bone tubes, notched bones, pendants, a rectangular piece of bone, and a horn chisel are included in the collection. A total of forty-five classifiable specimens were found. The greatest frequency of bone artifacts occurred in Level 2. Other bone fragments, altered by splitting, polishing, and cutting, and portions of bones probably discarded during the artifact manufacturing process were present in considerable numbers. Several of these fragments show very clearly the grooving and breaking technique of cutting.

Awls. Figure 28. Twenty-eight specimens of this type were obtained. They range in length from 6.6 cm. to 12.5 cm. Twenty-five of the awls were made from slivers of mammal bones (Fig. 28 a, b, c); the other three have a portion of the distal joint retained as a head or grip (Fig. 28 d). Some specimens have a gradual taper from the head to the point, while others exhibit a short, sharp, highly polished point. Distribution: Levels 1, 2, 3, 4, 5, and 6; greatest concentration in Level 2.

Bone Tubes. Eight bird-bone tubes and one mammal-bone tube were found in the midden. Those made of bird bone range in size from 4.0 cm. in length and 1.6 cm. in diameter to .8 cm. in length and .5 cm. in diameter. Several of these specimens show a scoring and breaking technique of cutting, and one has a groove about its center. The one mammal-bone tube measures 6.4 cm. in length and 2.0 cm. in diameter, and is tapered at each end. They probably served as beads. Distribution: Levels 1, 2, and 3.

Notched Bone. From Level 2 a fragment of a notched deer scapula was recovered.

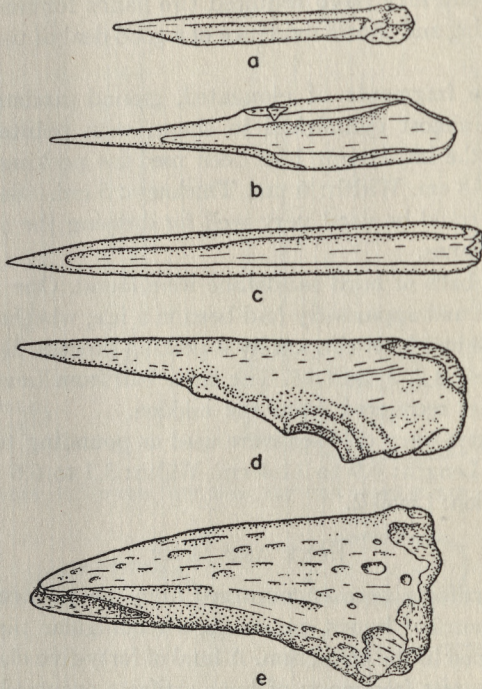


FIG. 28. Bone and Horn Artifacts: a,b,c,d, awls; e, horn chisel. One-half natural size

This is a portion of a type of artifact described by Burgh and Scoggin (p. 64). The shoulder blade was modified by breaking away the thin triangular plate to leave a jagged edge projecting along the spine. The neck of the scapula served as a handle. In this form it was probably used for processing mammal tendons into sinew by being scraped back and forth over the strands of sinew. Levels 3 and 7 yielded small fragments of similarly notched bone. The one from Level 3 may be a portion of a scapula, but the example from Level 7 is made from a splinter of a large mammal bone. Distribution: Levels 2, 3, and 7.

Pendants. Figure 29. During the 1948 season, one fourth of a bone pendant was found in Level 5; the following season another fourth of the same pendant was recovered. The second fragment came from the area immediately adjacent to the scene of the first find but at a slightly greater depth (Level 7). The two pieces fit together to form the upper half of a thin rectangular pendant. When complete, it would have measured approximately 6.5 cm. long, 6.0 cm. wide, and .3 cm. thick. Both surfaces are very flat and show shallow striations, probably caused by the shaping process. The upper edge has eight small notches, and there is a drilled suspension hole adjacent to the upper edge (Fig. 29 b). A second pendant was obtained in an unfinished state. It is a rectangular piece of fire-blackened bone that had been worked quite thin by abrading. Its edges are very smooth. The suspension hole was never completed, although there are drill marks

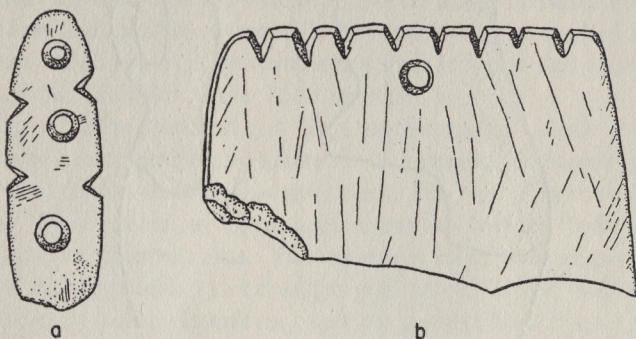


FIG. 29. Bone Pendants. Natural size

on each surface of the specimen. It measures 6.6 cm. long, 3.2 cm. wide, and .3 cm. thick. A third bone object also appears to have been used as a pendant. It is a thin oval piece of bone with three perforations through its surface and two notches on each edge (Fig. 29 a). It measures 4.0 cm. long, 1.4 cm. wide, and is .2 cm. in thickness. Distribution: Levels 1, 2, 5, and 7.

Rectangular Fragment of Bone. One rectangular piece of bone with rounded edges, measuring 5.3 cm. long, 1.0 cm. wide, and .4 cm. thick, was obtained in Level 1. It may have been intended to be a gaming piece, although there are no markings on the polished surface, or it might represent an unfinished pendant.

Horn Chisel. Figure 28. The only artifact made from horn was a chisel formed from a mountain-sheep horn. The point of the horn had been ground flat, giving it a chisel-like edge. The base of the horn was retained as a grip. Length: 10.5 cm. Width at base: 5.0 cm. Distribution: Level 1.

POTTERY

Sherds from Hells Midden were not numerous. A total of forty were removed from Level 2 and the upper portion of Level 3. Of this number, twenty-three

sherds belong to the same vessel, which is reconstructed in Figure 30. All sherds recovered are portions of culinary vessels. They are dark gray, are unslipped, and show striations on the surface due to the smoothing technique. Many of the sherds are covered on the exterior with carbon and ash, presumably from cooking fires. To judge from the partially restored vessel and from other sherds, the characteristic vessel was a round-bottomed, flaring-rimmed pot with a handle connecting the body and the neck. Wall thickness varies from .3 to .5 cm. These sherds compare in all respects with those from Mantle's Cave, Barn Cave, and Marigolds Cave described by Burgh and Scoggin (p. 66).

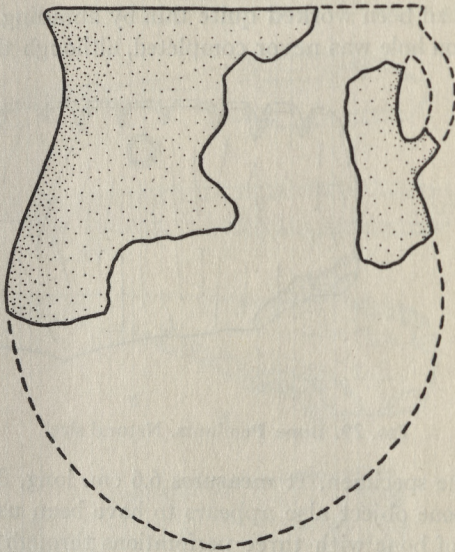


FIG. 30. Pottery. Reconstructed vessel. One-fourth natural size

Miss Anna O. Shepard, of the Ceramic Laboratory, Carnegie Institution of Washington, has prepared a technological note on the pottery from Hells Midden and has compared sherds from the midden with some from Marigolds Cave. The culture of Marigolds Cave is of the Fremont type. Miss Shepard's report follows:

"Four sherds, one from Hells Midden and three from Marigolds Cave, were examined with the binocular microscope and in powder in refractive liquids with the petrographic microscope. This is sufficient to identify the mineralogical composition but does not give a quantitative definition of content. When more pottery from this general area is found, it may be desirable to prepare thin sections and make detailed analyses. For the present, the following notes will permit recognition of related pastes.

"Cat. No. 16-4 Hells Midden

A blackish paste with abundant medium to coarse angular grains of calcite and very rare rounded grains of quartz. (Terms for grain size are defined as follows: Fine—under 0.25 mm. in diam.; Medium—0.25 to 0.5 mm. in diam.; Coarse—0.5 to 1.0 mm. in diam.) The smaller calcite grains are crystalline and show numerous cleavage faces. Some of the larger particles are composed of crystalline grains embedded in a matrix of cryptocrystalline calcite.

"Cat. No. 9-64 Marigolds Cave

A dark gray paste containing calcite grains which are mainly coarse. This paste varies in texture from the above but shows the same mixture of crystalline and cryptocrystalline calcite. A large area on the interior of the sherd is spalled as when calcined calcite forces off flakes of paste by expansion on hydration. No calcined material is observable on the spalled surface, but it may have been removed by weathering since it is soft and powdery.

"Cat. No. 9-54 Marigolds Cave (two sherds)

A brown paste containing a high percentage of calcite and in addition numerous quartz grains and particles of hematite, scattered grains of magnetite and biotite including some books. The calcite is varied in color and texture. Some grains are clear and crystalline, others dark gray to nearly black and cryptocrystalline. The quartz is clear and angular. One quartz crystal with pyramidal termination was noted. These two sherds are distinguished by polished surfaces, and the paste differs from that of the two rough-surfaced sherds in character of calcite as well as in variety and proportion of other minerals.

In order to compare the clay base of the Hells Midden sherds with 9-65 from Marigolds Cave, fragments were refired in air to 700°C. in order to remove the carbon and obtain the fully oxidized colors. They are both made from a red-firing clay and have approximately the same color at the temperature used. The paste of the Hells Midden sherd turned to a uniform light brown (Munsell-5 YR 5/6), and the Marigolds Cave sherd matches it on the outer half of the wall but on the inner half where less fully oxidized is dusky yellowish brown (8 YR 6/6). (For an explanation of this system of color designation see Shepard, A. O., 1948.) The surface of the first is light brown (7.5 YR 6/4) and of the second light yellow brown (9 YR 6/4). Powder from the two fragments examined microscopically in refractive liquids is indistinguishable. It is brown and birefringent and contains a scattering of fine crystals of calcite.

"These tests indicate that the same kind of clay as well as the same variety of calcite temper was used for both pieces of pottery. This fact alone is of course not sufficient to establish the contemporaneity of the two deposits in which the sherds occur, since the same clay and temper might be used over a long period of time.

It would be necessary to locate the source of the pottery and ascertain its time span in order to use these data in support of an argument of relative age of the two deposits. It can only be said now that the sherds give no reason for postulating a time difference. Also, if they are intrusives, the improbability of a significant difference in age is increased since this would necessitate stability of trade relations as well as of methods of manufacture.

"The source of the pottery and the origin in this area of the custom of tempering with calcite are questions of some interest. No example of calcite temper from the Pueblo areas has yet come to my attention, although calcite is sometimes found associated with other tempering materials, particularly as the cement in sandstone and intermixed with ground basalt. In the latter case it is sometimes prominent and may have occurred as an alteration product. Also, calcareous clays are not uncommon. It is unlikely that potters would choose calcite unless resources were limited, because it has the serious disadvantage of limiting firing temperature, which more than offsets the advantage of ease of pulverization. Even though a ware is normally fired at low temperatures there are likely to be occasional accidental hot blasts which will result in pitted or finely-spalled areas. Consequently, the use of calcite where there is a choice of more suitable materials may indicate a firmly-established custom which originated in a locality of limited resources.

"The two varieties of calcite-tempered paste may come from different localities. The fact that the sherds differ in surface finish lends support to this suggestion, but with only three sherds we cannot be certain that either the rough-finished or the polished ware was uniform in paste. It is pointless to speculate regarding origin at present, but in future work throughout this area the analysis and comparison of paste will be important."

TEXTILES

Level 2 of the midden yielded six very small fragments of cloth. They appear to be fragments of a single piece of material. Three of these specimens have been studied by Mrs. Kent, of the Valley School, Ligonier, Pennsylvania, who has kindly prepared the following notes and conjectures regarding them.

"The threads are single-ply Z-spun. That is, the fibers spiral downward from right to left following the center-line of the letter Z. This is the typical manner in which prehistoric cotton was spun. Warps are natural color, wefts black. Both warps and wefts number about 60-64 per inch (23-25 per cm.). This is exceptionally fine in comparison to prehistoric (cotton) textiles as a whole.

"The weave is a diagonal twill, over-3, under-1, rhythm. (Fig. 31) A weft passes over three warps, under one, over three, and so on. The next weft is inserted with the same rhythm, but set over one warp to the right or left."

In the realm of conjecture, Mrs. Kent's statements may be summarized as follows:

1. It is difficult to say definitely what method of manufacture was used for these fragments, since they are so small and lack selvages. The material could be either loom-woven or braided. If this twill had been produced on a loom, four controls would have been necessary—three heddles and a shed rod. In a process of braiding, all threads would have been secured at a single point and intertwined downward from that point.

2. Twill-woven cloth is second only to plain weave in frequency of occurrence in Pueblo III Anasazi sites. Indications are that this weave was practiced as soon as the loom and cotton were introduced among the Anasazi, c. 700 A.D. or earlier. This assumption is based on the facts that twill cloth is so widespread by Pueblo III and that certain twills appear to be direct descendants from Basket Maker twined-woven bags. If the pieces are thought of as loom weaves, Mrs. Kent believes that they must be trade pieces from the Four Corners area (the area com-

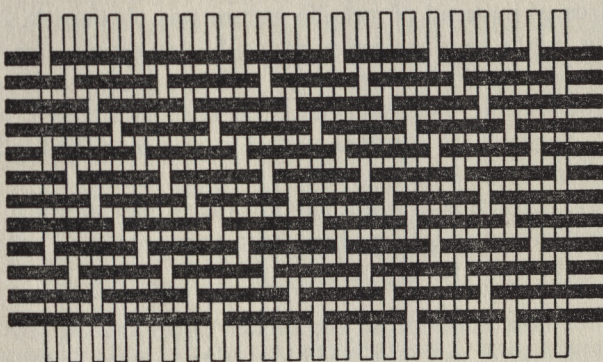


FIG. 31. Diagram of Weave of Twilled Cloth. Greatly magnified

prising the common state corners of Utah, Arizona, Colorado, and New Mexico). She doubts that the use of the loom and heddles extended as far north as northern Colorado, although it may have been possible.

3. The fine twilling of the Hells Midden specimens could have been accomplished by a braiding technique, such as is believed to have been the method of manufacture employed in the tubular twill bags found in Sunflower Cave, Arizona (Kidder and Guernsey, 1919, p. 149). Morris and Burgh (1941, p. 20) point out that the early Anasazi were very proficient at braiding as shown by their twilled ring baskets.

4. Twilling as a decorative form has been used by the Anasazi from Basket Maker II down to the present. The rhythms, and effects produced thereby, are the same whether worked out in basketry, braiding, or loom weaving.

5. These cloth fragments from Hells Midden may furnish evidence that twill-weave cloth was produced by the Anasazi (the Fremont Culture shows a close

affinity to the earlier phases of the Anasazi Culture) before they learned the use of the loom, heddles, and cotton, or that fibers other than cotton were used in conjunction with the loom.

Dr. Howard J. Dittmer, of the University of New Mexico's Biology Department, attempted to identify the material used in making the cloth. He was able to state that the fiber employed definitely is not cotton but he could not make a positive identification.

The very fine thread employed in the cloth from Hells Midden (thread count of 23-25 per cm.) would imply that the fiber was spun with a spindle whorl rather than with the fingers. Evidence adding credence to this belief was obtained in Marigolds Cave in 1948, when a small coiled basketry disc attached to a slender stick was found. This item in all probability served as a spindle whorl.

MISCELLANEOUS ITEMS

A small piece of material of metallic nature was obtained in Level 2. It was thought that it might be of meteoritic origin, but an examination by Dr. Lincoln La Paz, of the Meteoritic Institute of the University of New Mexico, showed it to be a piece of iron ore, mainly hematite. It may have been a prehistoric "collector's item", since such a specimen probably was considered quite unusual by the inhabitants of Castle Park.

Level 5 of the midden produced a lump of black mineral which appears to be asphalt or gilsonite and which may have been employed as an adhesive.

FOODSTUFFS

A study of the numerous burned and broken bones and the few plant remains from Hells Midden gives us a fairly good idea of the economy of the people.

A preliminary identification of mammal remains made by comparison with known material in the University of Colorado Museum revealed the following genera:

Order Lagomorpha

Family Leporidae

Genus *Sylvilagus* Cottontail Rabbit

Order Rodentia

Family Sciuridae

Genus *Marmota* Marmot

Cynomys Prairie Dog

Family Castoridae

Genus *Castor* Beaver

Family Cricetidae

Genus *Neotoma* Wood Rat

- Order Carnivora
 - Family Canidae
 - Genus *Vulpes* Red Fox
- Order Artiodactyla
 - Family Cervidae
 - Genus *Odocoileus* Deer
 - Family Bovidae
 - Genus *Bison* Bison
 - Ovis* Mountain Sheep

Many mammal bones remain unidentified, as do bones of birds and fishes. Fish bones were quite numerous in the midden, indicating a rather strong reliance upon fish, presumably from the Yampa River, as an item of diet. Of the mammal remains, the rodents were most abundantly represented.

There appeared to be no significance in a stratigraphic arrangement of the mammal remains. Such items were found in all levels containing cultural material.

Evidence for but one food plant, corn, was found in our testing. Fragments of four charred corn cobs were found in Levels 2 and 3. They were not complete enough to give much information, but Dr. Edgar Anderson, of the Missouri Botanical Garden, has been kind enough to analyze three of the specimens. His report follows:

"The material consisted of fragments of three ears. One of them was not complete enough to indicate the row number of the ear. None of them gave any indication of the nature of the base of the ear or the shank on which it was borne. All three were completely charred and, in addition, had been somewhat worn down either before or after charring.

"Cat. No. 6610, ear fragment: Cob kernel width, 4 mm; cob kernel thickness, 3 mm.

"Cat. No. 6611: Ten-rowed; mid-cob width 9 mm. in one direction, 10 in the other; cob kernel width, 3 mm; cob kernel thickness, 3 mm.

"Cat. No. 6612: 12-rowed; mid-cob width 14 mm. in one direction, 12 in the other; cob kernel width, 4 mm.; cob kernel thickness, 3 mm.

"All three specimens represent a very small kernalled and a very small cobbled type of maize. Since they are from a rubbish heap, we have no means of knowing whether they came from representative ears of the variety that was being grown or whether they are small "nubbins" from a large sort. Since all three are very much alike on the whole, the latter supposition is the more likely. If so, they represent a small and presumably primitive variety of maize. There is, of course, no means of knowing whether this was the only variety grown by these people."

SUMMARY OF ABORIGINAL CULTURE

The analysis of the items of material culture from Hells Midden reveals several significant points. It is apparent that a horticultural stage of culture is present in Levels 2 and 3 and that below Level 3 a series of hunting-gathering stages is to be found.

The horticultural stage is characterized by the following elements:

- Miniature projectile point
- Miniature triangular blank
- Stemmed, rounded-base projectile point
- Corner-notched, rounded-base projectile point
- Corner-notched, straight-base projectile point
- Bifacial knife (also found in all lower levels)
- Hammerstone
- Smoothing pebble
- Bifacial scraper
- One-hand mano (also found in lower levels)
- Trough and basin metates
- Pecking tool
- Expanded-base drill (also found in all lower levels)
- Core drill
- Graver
- Bone awl (also found in lower levels)
- Bone tube
- Notched bone (also found in lower levels)
- Bone pendant (also found in lower levels)
- Horn chisel
- Pottery
- Textiles
- Corn

This stage shows the continued use of a number of traits present in earlier times, but also many culture elements appeared for the first time during this period. Of particular importance is the presence of pottery, textiles, and corn.

The hunting-gathering culture has been arbitrarily divided into three stages. These divisions are based mainly upon typological changes in projectile points, and may or may not be valid. Stratigraphically, however, they appear to be significant.

Upper hunting-gathering stage, Levels 4 and 5; characteristic elements:

- (Miniature) projectile point (in small numbers)
- (Miniature) triangular blank (in small numbers)

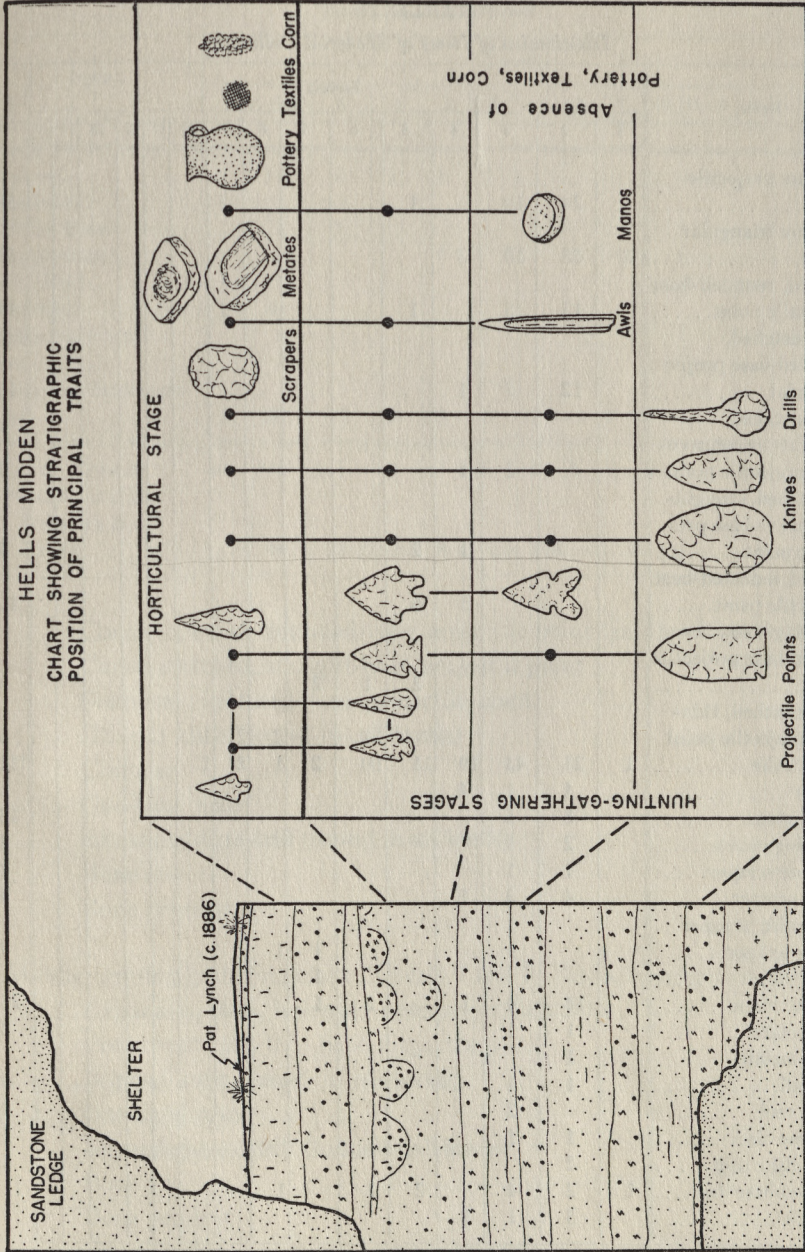


FIG. 32. Chart of Distribution of Principal Traits in Hells Midden. The evolution of traits out of early stages is suggested by the connecting lines; a dot indicates presence, but no appreciable change from an earlier type.

TABLE I—Continued

Items	Levels															Item Totals
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Graver.....		1														1
Bone awl.....	1	14	4	2	5	2										28
Bone tube.....	1	5	3													9
Notched bone.....		1	1				1									3
Bone pendant.....	1	1			1		1									4
Horn chisel.....	1															1
Potsherd.....	1	39														40
Textile fragment.....		6														6
Corn cob.....		3														3
Unclassified stone arti- fact.....	1	30	33	19	16	5	1		1							106
LEVEL TOTALS.....	10	246	141	58	47	25	10	5	5	2			1			550
PERCENTAGE OF ITEMS IN EACH LEVEL.....	1.8	44.7	25.6	10.5	8.6	4.6	1.8	.9	.9	.4			.2			100.0

Corner-notched, rounded-base projectile point (in small numbers)

Corner-notched, straight-base projectile point

Stemmed, indented-base projectile point

Bifacial knife (found in all levels)

Chopper

One-hand mano

Expanded-base drill (found in all levels)

Bone awl

Bone pendant

Middle hunting-gathering stage, Levels 6 and 7; characteristic elements:

Expanding-stem, indented-base projectile points

Corner-notched, thin-base projectile point

Bifacial knife (found in all levels)

One-hand mano

Expanded-base drill (found in all levels)

Bone awl

Bone pendant

Lower hunting-gathering stage, Levels 8 to 11; characteristic elements:
Corner-notched thin-base projectile point
Bifacial knife (found in all levels)
Expanded-base drill (found in all levels)

Table 1 shows the distribution of all items of material culture, and Figure 32 presents in graphic form the occurrence of principal traits.

CHAPTER V

RESIDENCE AT HELLS MIDDEN

As has been pointed out in the Introduction of this report, it was generally believed, prior to the 1948 season, that Hells Midden was formed by a group of people living on Hells Half Acre who threw their camp refuse over the side of the nearby ledge, thus forming a large stratified refuse heap. However, excavations did not substantiate this theory. During the summer of 1948, extensive exploratory trenches were dug on Hells Half Acre in hopes of locating habitation remains, but all such attempts were fruitless.

A few artifacts were recovered on Hells Half Acre, but no evidence for habitations of any type was found. It seems logical to believe that the former presence of even semi-permanent types of dwellings would have been found in such clues as fireplaces or hearths and hard-packed or fire-darkened floor areas. The several artifacts found on Hells Half Acre do point to an occasional use of the area by occupants of the rock shelter. During certain seasons of the year it might have been more comfortable for certain tasks, such as the milling of corn or the chipping of stone tools, to be accomplished on this terrace above the shelter.

The first suggestion that Hells Midden might have been formed by people who inhabited the rock shelter was found in the lower portion of Level 3. At that point, in Sections A and B of Trench I, a poorly defined hearth, or firepit, surrounded by fragments of hard-packed dirt floor was encountered. The hearth contained ash and small bits of charcoal and was outlined, in part, by six stones. The largest section of the floor extended from the hearth back toward the cliff in Section A and was approximately 60 cm. square. Three smaller fragments of the floor were found on the outer side of the hearth in Section B. The floor adjacent to the hearth was reddish and appeared fire-baked. At a distance from the hearth, the floor consisted of consolidated dirt, ash, and charcoal, 1.0 to 2.0 cm. in thickness. In Trench II, at approximately the same level, and in Sections A and B, another hearth containing much charcoal was found. The series of cists that were just west of this area (see cross-section, Figure 3) occurred on the same level. Therefore, it is suggested that the hearths, floors, and cists may have been contemporaneous.

A series of what appeared to be occupational levels continued from the lower part of Level 3 through Levels 4, 5, and 6 and were particularly discernible in Sections A and B, where they were afforded protection by the rock shelter.

In Level 4, there was another rock-outlined hearth, containing ash and charcoal, and adjacent to it were several small bits of hard-packed floor. Two ash-and-charcoal-filled pits were found in this level. One was oval shaped, measuring 70 cm. on its long axis and 12 cm. in depth. The other was circular, 40 cm. in diameter

and 10 cm. deep. As the sides of these pits were not fire-reddened, it is suggested that they served as storage cists rather than as hearths. After they were used as cists, they had been filled with camp refuse. Two superimposed occupation levels, each consisting of several fragments of hard-packed dirt, occurred in Level 4.

Level 5 contained additional stratified occupation levels, as evidenced by two hearths and two layers of floor fragments. The lower occupation area in this level had a hard-packed area measuring almost two meters square.

Level 6 contained more occupation levels. Another large area of hard-packed dirt and ash was revealed. It was covered with a layer of fine charcoal, 12 cm. in thickness. Several places on the floor had been charred and colored by fire, as though campfires had been built on its surface.

Below Level 6, no well-defined floor areas were encountered; however, the alternate deposition of layers of charcoal and ash and layers of wind- and water-laid materials speaks for a periodic occupation of the shelter.

No evidence was found to suggest that any sort of habitations had been constructed in the rock shelter. There were no rock outlines to suggest foundations, no post holes, and no decayed logs. The only type of structure that might have been built, and which would have left no archaeological remains, would have been a simple pole-and-brush hut erected against the back wall of the shelter. The possibility of the use of such a structure is not ruled out. However, it appears more likely that the inhabitants of the shelter depended upon the rock ledge above them for protection from the elements and built their campfires on the floor of the shelter. Owing to the performance of camp duties about the fires and to the fact that it was necessary to crowd around the fires for warmth, the areas adjacent to the hearths were packed hard, creating floors or occupation levels. Storage cists were dug into the floors of the shelter.

Camp refuse was conveniently thrown about their campfires and gradually accumulated to a height requiring the establishment of a new occupation level.

CHAPTER VI

OBSERVATIONS

Burgh and Scoggin (p. 85) have concluded that the culture found in Mantle's Cave and in other cave sites in Castle Park is identical with the Fremont culture, first defined in east-central Utah. The following lists of cultural similarities make it apparent that the material from the horticultural stage of Hells Midden is similar to that from Mantle's Cave and to that of the Fremont culture, although we lack the evidence of perishable material which was so prevalent in cave sites.

The following culture traits are found both in the horticultural stage at Hells Midden and in Mantle's Cave. The references are to text figures in this report. (Also see Burgh and Scoggin, 1948.)

- Miniature projectile point: Fig. 4
- Stemmed, rounded-base projectile point: Fig. 6
- Corner-notched, rounded-base projectile point: Fig. 7
- Corner-notched, straight-base projectile point: Fig. 8
- Bifacial knife: Fig. 13
- Chopper: Fig. 14
- One-hand mano: Fig. 27
- Basin metate: Fig. 26
- Expanded-base drill: Fig. 16
- Bone awl: Fig. 28
- Pottery (gray ware, undecorated): Fig. 30
- Bone tube
- Notched bone
- Stone ball
- Corn

The following culture traits are found both in the horticultural stage at Hells Midden and in the Fremont culture. The references are to text figures in this report. (Also see Morss, 1931.)

- Miniature projectile point: Fig. 4
- Miniature triangular blank: Fig. 5
- Corner-notched, rounded-base projectile point: Fig. 7
- Bifacial knife: Fig. 13
- Bifacial scraper: Fig. 21
- One-hand mano: Fig. 27
- Metate: Fig. 26
- Expanded-base drill: Fig. 16
- Bone awl: Fig. 28

Bone pendant: Fig. 29

Pottery (gray ware, undecorated): Fig. 30

Bone tube

Stone ball

Corn

Therefore, we can classify the horticultural stage in the midden, Levels 2 and 3, as Fremont culture and assume that it dates somewhere between 400 and 800 A.D.—the dates generally assigned that culture in northwestern Colorado.

A post from a Fremont-culture house in Marigolds Cave recently has been tentatively dated by Edmund Schulman, of the Laboratory of Tree-Ring Research, University of Arizona. (Schulman, 1950, pp. 18-19). He estimates a cutting date of A.D. 750 \pm 50 for the timber, which is entirely in harmony with the archaeological evidence. The dated specimen was collected by Mr. Burgh in 1948. (Burgh, 1950, pp. 19-20)

One significant Fremont-culture trait lacking in collections from Mantle's Cave and Hells Midden—the unfired clay figurine—has been found in Marigolds Cave and in Rat Midden.

The hunting-gathering stages, so named primarily because of their lack of pottery and corn, had been presumed to be present in Castle Park (Burgh and Scoggin, 1948, p. 89), but definite evidence for their presence did not appear until Hells Midden had been tested. Below Level 3 of the midden there was a complete absence of pottery, textiles, and corn. The only artifacts recovered were of stone and bone. Undoubtedly items of perishable nature were also made at that time, but we were not fortunate enough to uncover any of them. Both hunting and gathering are postulated since, in all but the lowest stage, there were both projectile points, implying hunting, and manos, connoting the preparation of roots, seeds, or grains.

The division of the hunting-gathering culture into three stages is entirely arbitrary, and is based mainly upon the typology of projectile points. The stemmed, indented-base point (Figure 10) is the most characteristic element of the upper stage; the expanding-stem, indented-base point (Figure 11) is the hallmark of the middle stage; and the corner-notched, thin-base point or knife (Figure 12) is the diagnostic element for the lower stage.

A comparison of the Hells Midden lithic material, mentioned in the preceding paragraph, with known lithic industries reveals several typological similarities, but in no case is the evidence sufficient to establish definite relationships with any of these industries at present. However, the typological affinities will be pointed out.

The stemmed, indented-base point has the same general form as the Type 3 Pinto projectile point (Rogers, 1939, p. 54, pl. 13; Campbell and Campbell, 1935,

p. 44, pl. 13); however, none of the Hells Midden specimens are serrated. Also, it appears that the specimens from the midden exhibit better workmanship than do the Pinto points. The Pinto points are believed by some archaeologists to belong to the Pinto-Gypsum complex now recognized in the Mohave Desert of California, in southern Arizona, and in central New Mexico. The estimated age of these points is very controversial at present and ranges from greater than 9000 years old to as little as between 3000 and 2000 years old. (See Wormington, 1949, pp. 78-83 for a discussion of Pinto points.) It might also be pointed out that the same general shape occurs in the Pedernales indented-base point which is characteristic of the Round Rock focus of central Texas (Kelley, 1947, pp. 99-104, pl. X). This Texas point may have been used as much as 6000 or 4000 years ago and persisted in use as late as 1500 A.D.

The expanding-stem, indented-base point shows some similarity to a type of point listed as an atypical projectile point of the Amargosa Industry of the Mohave Desert (Rogers, 1939, p. 69, pl. 20). This similarity is based only upon a comparison of the basal portion of the Hells Midden specimens with the Amargosa points, since no complete examples of this type were taken from the midden. The Amargosa Industry is believed to post-date the Pinto-Gypsum complex.

It should be pointed out that the stratigraphic position of the stemmed, indented-base points and the expanding-stem, indented-base points in Hells Midden is just the opposite of that postulated by Rogers for the Pinto-Gypsum complex and the Amargosa Industry (Rogers, 1939, pl. 21).

The corner-notched, thin-base projectile point or knife is a generalized type that is difficult to compare with any particular industry or complex. It has a very widespread distribution.

The bifacial knife in its two forms, oval and triangular, appears to have been the basic tool of the occupants of Hells Midden throughout its history. It was found in all levels.

Attention also should be called to the occurrence of notched or serrated ribs and scapulae, similar to notched implements from Hells Midden, in Levels 2, 3, and 4 of Deadman Cave near Salt Lake City, Utah. Elmer R. Smith (1941, pp. 35, 42) estimates that strata bearing these tools in Deadman Cave possibly represent a time range of 2000 B.C. to 1000 A.D. Burgh and Scoggin (1948, pp. 64-65) discuss the widespread distribution of these notched implements in the territory of early and "generalized" Basket Maker cave remains.

In Chapter III, which dealt with stratigraphy, some of the problems connected with estimating the age of the pre-Fremont culture in the midden were pointed out. No attempt will be made by the author to establish dates for the three hunting-gathering stages. However, an estimated date of approximately 1000 to 1500 B.C. is suggested for the earliest cultural material in the midden. This estimate is

based on the depth of material in the midden, on some similarities of the lithic material to certain projectile points in the Pinto-Gypsum complex, and to a large extent on conjecture. Additional archaeological research in the area may alter this estimated age.

It was hoped that Hells Midden would yield some human skeletal remains to assist in determining the racial identity of the ancient inhabitants, but not a single bit of evidence of this type came to light. Skeletal material from Castle Park is still practically unknown, and the question of burial practices remains to be answered.

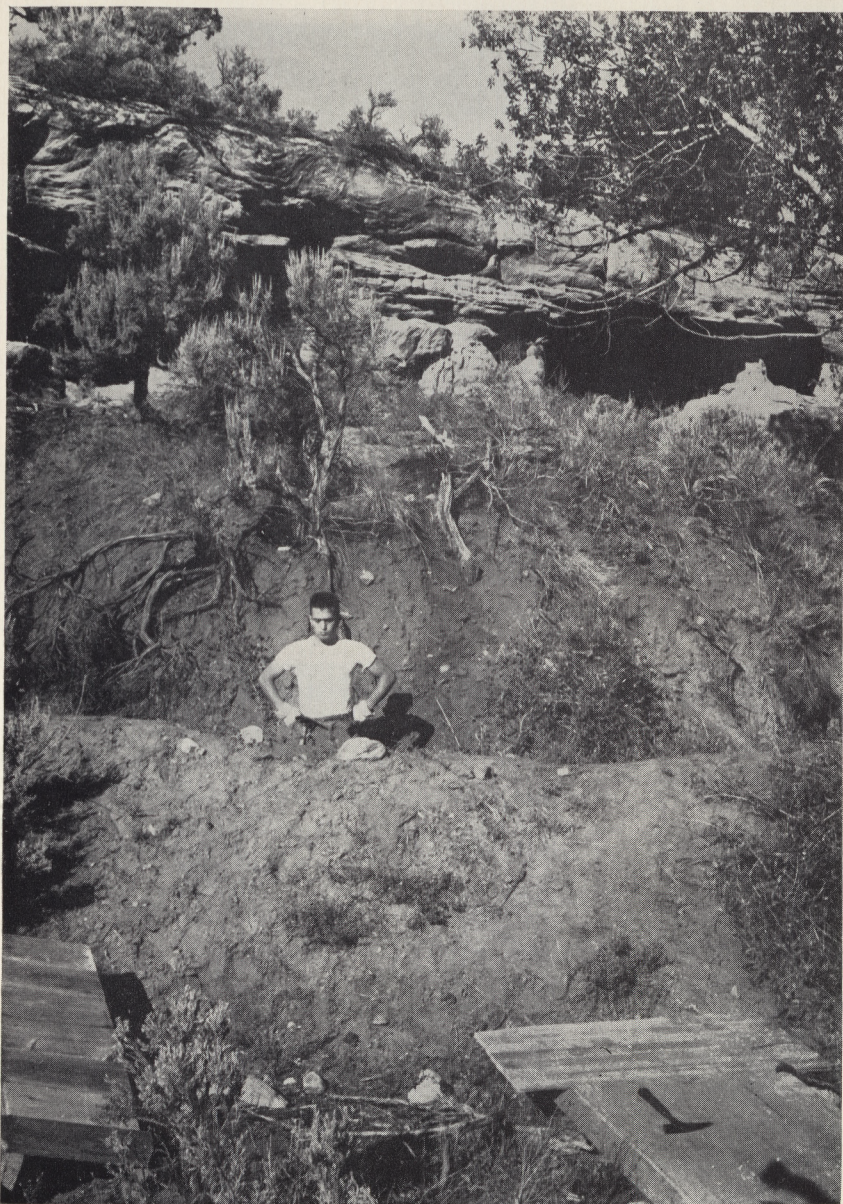
BIBLIOGRAPHY

- BURGH, ROBERT F.
 1950 "A Fremont Basket Maker House in Dinosaur National Monument." *Tree-Ring Bulletin*, 16: No. 3, 19-20.
- BURGH, ROBERT F. AND CHARLES R. SCOGGIN
 1948 "The Archaeology of Castle Park, Dinosaur National Monument." *University of Colorado Studies, Series in Anthropology*, No. 2.
- CAMPBELL, ELIZABETH W. CROZER AND WILLIAM H. CAMPBELL
 1935 "The Pinto Basin Site." *Southwest Museum Papers*, No. 9.
- KELLEY, J. CHARLES
 1947 "The Cultural Affiliations and Chronological Position of the Clear Creek Focus." *American Antiquity*, 13: No. 2, 97-109.
- KIDDER, A. V. AND S. J. GUERNSEY
 1919 "Archaeological Explorations in Northeastern Arizona." *Bureau of American Ethnology, Bulletin* 65.
- 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 Institution of Washington, Publication* 533.
- MORSS, NOEL
 1931 "The Ancient Culture of the Fremont River in Utah." *Papers Peabody Museum of American Archaeology and Ethnology*, 12: No. 3.
- ROGERS, MALCOLM J.
 1939 "Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas." *San Diego Museum Papers*, No. 3.
- SCHULMAN, EDMUND
 1950 "A Dated Beam from Dinosaur National Monument." *Tree-Ring Bulletin*, 16: No. 3, 18-19.
- SHEPARD, ANNA O.
 1948 "Plumbate, a Mesoamerican Trade Ware." *Carnegie Institution of Washington, Publication*, 573.
- SMITH, ELMER R.
 1941 "The Archaeology of Deadman Cave, Utah." *Bulletin of the University of Utah*, 32: No. 4.
- WORMINGTON, H. M.
 1949 "Ancient Man in North America." *Denver Museum of Natural History, Popular Series*, No. 4.



General view showing Hells Midden, left of the figure and below the rock ledge, and Hells Half Acre above the ledge. View looking west.

PLATE 2



Central portion of Hells Midden before excavation, looking south. Figure is standing in irrigation ditch that encircles the midden.

PLATE 3

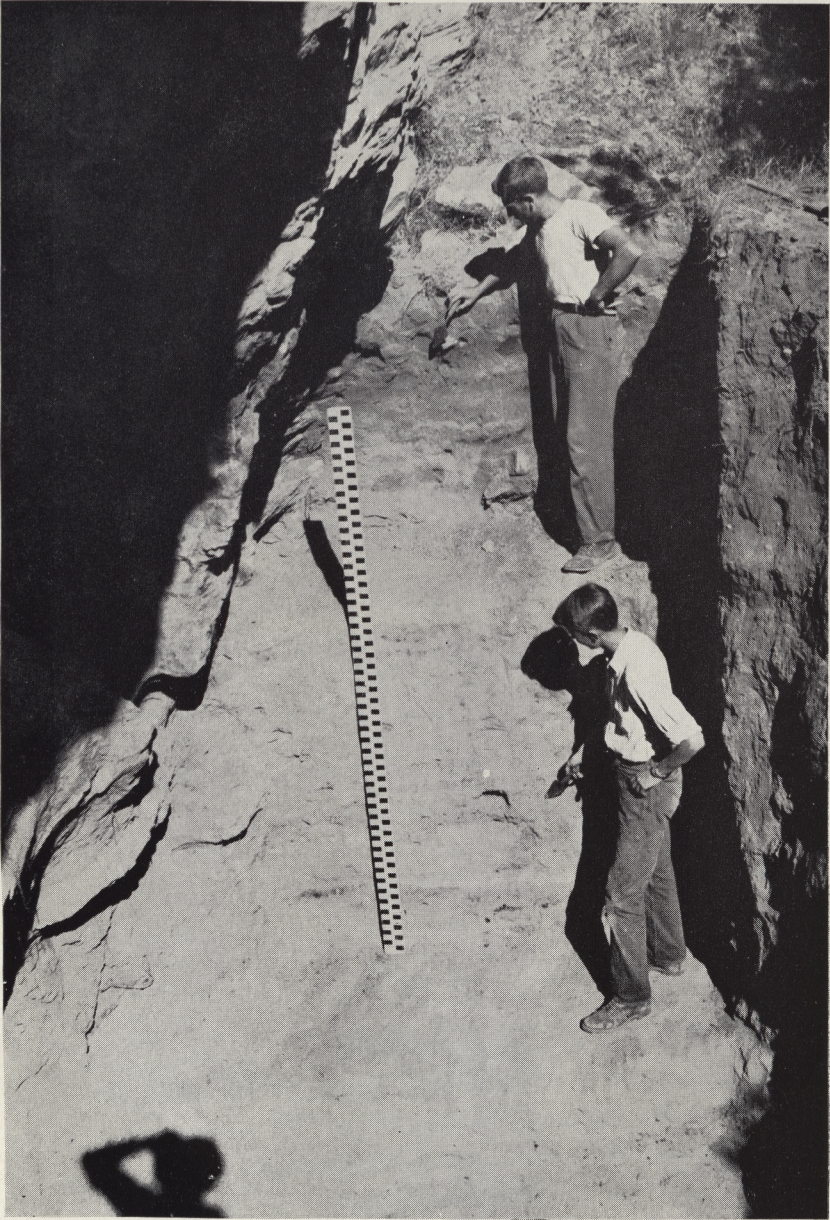


A. West face of 1948 trench, during excavation



B. 1948 trench during excavation, looking south

PLATE 4



1949 trench during excavation, looking west

PLATE 5



A. Cache of manos found in Level 6, 1948. Average length 12 cms



B. Cross-sections of two of the cists, or fireplaces, found in Level 3 of the 1948 excavations

