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Title of Thesis/Dissertation:

THE CULTURE HISTORY OF CANYON DEL MUERTO, ARIZONA:

BASKETMAKER II - PUEBLO I

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ABSTRACT

A culture history of Canyon del Muerto, Arizona is presented, based on the thorough analysis of field notes made during the excavations of 10 multicomponent dry cave sites, and on artifacts recovered from 3 of these sites. Sherds collected from the surface of all 10 sites are also considered. The sites were excavated by the late Earl H. Morris between 1923 and 1932 for the American Museum of Natural History, the Carnegie Institution of Washington, and the University of Colorado Museum. The artifacts analyzed are those recovered for the University of Colorado Museum in 1924 and 1963.

The analysis of the field notes and artifacts indicates that the rockshelters of Canyon del Muerto were utilized or occupied continuously from the Basketmaker II period through the Pueblo III period. The developmental periods seen elsewhere in the Anasazi Southwest are present in local form, with the majority of external cultural influences derived from the Western Anasazi region. Local phases of the Basketmaker II and III cultural periods may have continued into later times than in other localities, perhaps as a result of the favorable agricultural environment and ready access to a variety of resources.
ACKNOWLEDGEMENTS

Many people have contributed to the production of this thesis. The original excavation and research were performed by the late Dr. Earl H. Morris. That it is possible to work effectively with his primary data six decades after it was gathered attests to the consummate skill and care that he brought to every phase of his work. Dr. Morris's contributions to the study of the prehistory of the Southwest approach the legendary, and it has been a rare privilege and a very great pleasure to work with this material.

A debt of gratitude is owed to Dr. Joe Ben Wheat, Curator Emeritus of the University of Colorado Museum. Dr. Wheat has long been concerned with placing into the public record the enormous body of information gathered by Morris and given into the care of the University of Colorado Museum. It is primarily through his direction that the majority of the Morris collections, including the Canyon del Muerto collection, have been analyzed and described. Dr. Wheat placed every museum facility at my disposal during my stay in Boulder; beyond this, he gave freely of time, information, and expertise while allowing me a free hand in analysis and interpretation.

My thanks also go to others at the University of Colorado. I am particularly grateful to Dr. Ann Lane Hedlund, formerly of the University of Colorado Museum and now Curator at the Millicent Rogers Museum in Taos, New Mexico, for setting up work space, for arranging access to the collection, for help and information, and
finally, for being a friend. Ms. Dianne Leonard filled these roles in the following years. Ms. Priscilla Ellwood was of the greatest help with the archives and in the ceramic section of the museum. I would also like to thank the volunteer staff for their help in locating artifacts and comparative material from other collections, and for the many informative discussions. Dr. James Hester kindly provided on-campus office space. Patricia Robinson made the very fine drawings of artifacts in 1963.

Staff at the American Museum of Natural History screened their archives for field sketches and maps made by Dr. Morris at the time of excavation, and sent photocopies of each drawing. These were invaluable in the interpretation of the field notes, and many appear as figures in the thesis.

Dr. Roy Carlson described the majority of the artifacts in the early 1960s. Although most artifacts were reanalyzed by myself, his notes provided a valuable cross-check. I am doubly grateful to Dr. Carlson; first for his suggestion that I take on this project, and second, for his openhandedness in providing his own research material. Finally, I wish to thank him for arranging sources of financial help during nearly every semester of thesis work.

The staff and faculty of the Department of Archaeology at Simon Fraser University have been unfailingly helpful. Recently, Professor Philip Hobler gave practical help in the production of the photographs. More importantly, however, he was always willing to provide discussion and encouragement when I needed it most. I am also grateful to Dr. Richard Shutler, Jr. for urging me to
The work would have been impossible without the understanding and aid of family and friends. Richard Quirolo photographed the artifacts in 1883, typed the preliminary pages of the thesis, and handled the printout of the final draft. Margot Mengel helped with additional photography in 1984. Madeline Molliet deciphered the word processing program and typed most of the original draft. Last but not least, Joshua Quirolo encouraged me to keep going when things got tough.
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THE CULTURE HISTORY

OF

CANYON DEL MUERTO, ARIZONA:

BASKETMAKER II - PUEBLO I
CHAPTER I
INTRODUCTION

The archaeology of the Anasazi region of the North American Southwest has been more intensively studied than that of any other part of the continent. Cultural historical investigations carried out during the first half of this century produced detailed descriptions of material culture and reconstructed the general outline of cultural sequences. Yet despite nearly a century of research, our understanding of the process of culture growth and development in the region is incomplete. While the nature and ordering of sequences proposed in the Pecos Classification (Kidder 1927) and later modifications (Roberts 1935) continue to be upheld, it was clear even in early studies (e.g. Kluckhohn and Reiter 1939) that considerable subregional variation exists in the rate and timing of the developmental stages within the sequence. The identification of causal factors behind this subregional variation should be amenable to processual studies. However, prior to such studies the nature and timing of subregional sequences must be documented through cultural historical reconstruction. The purpose of this thesis is the reconstruction of the culture history of one such subregion, Canyon del Muerto, Arizona.

Study of the field records and analysis of archaeological data recovered by Earl H. Morris during excavations in the dry caves of this canyon between 1923 and 1932 constitute the data base for this thesis. Because of the nature of the data, the reconstruc-
tion is partial: the temporal focus is on the Basketmaker II, Basketmaker III and Pueblo I periods, with limited consideration of later periods; and reconstructions of prehistoric lifeways are based only on data obtained from rockshelters. Nevertheless, it is my thesis that reconstruction of chronology and lifeways is possible even with incomplete data.

History and nature of the data

Earl Morris first came to Canyon del Muerto in the spring of 1923 as a member of the Third Bernheimer Expedition (Lister and Lister 1968: 111). Although assured by the expedition guide, John Wetherill, that the canyons contained sites of great richness, Morris had expected little more than spectacular scenery and hopelessly looted rockshelters. He found instead that although a certain amount of digging had taken place "...the bulk of each ruin is untouched. Never have I seen such opportunities for stratigraphic observations. Every cave offers great promise..." (Morris 1923 in Lister and Lister 1968). He immediately applied to the American Museum of Natural History for permits and funding. These were granted, and in the late summer of 1923 Morris began excavations at Mummy Cave, Canyon del Muerto, with the stated research goals of performing stratigraphic excavations in a multi-period site, and securing collections of perishable and non-perishable artifacts "for a delimitation and comparison of the material culture of the successive time periods" (Morris 1923 in Lister and Lister 1968: 113).

Morris spent six field seasons in Canyon del Muerto, conducting excavations for the American Museum of Natural History
in 1923, 1924, 1927 and 1929, for the Carnegie Institution of Washington in 1925 and 1932, and for the University of Colorado Museum in 1924. The field records and artifacts from each excavation were deposited at the sponsoring institution, where they remain largely intact. In addition to the material derived from its 1924 excavations, the University of Colorado Museum received as a bequest after Morris's death in 1956, a lifetime's accumulation of field records, including copies of the del Muerto field notes, sketches and photographs from all three sponsoring institutions and covering all six field seasons. The University of Colorado's Earl Morris Collection thus holds the most complete record available of this pioneer work in Canyon del Muerto.

Although a number of professional and popular papers on particular Canyon del Muerto sites and artifact classes were produced by Morris and others (Morris 1925, 1927, 1936, 1938, 1941, 1944; E. A. Morris 1959) and information from the excavations was incorporated into other works (Morris 1939; Morris and Burgh 1941; Amsden 1949), a thorough analysis of the entire body of information has never been made. R. L. Carlson began such a project at the University of Colorado Museum in 1963; his notes have become an addition to the Earl Morris Collection at that institution. Through the courtesy of Dr. Carlson and Dr. Joe Ben Wheat, Curator of Anthropology at the UCM, I was given access to the Canyon del Muerto portion of the Earl Morris Collection in 1983, and it is on the information contained in this collection that the thesis is based.

Much of the thesis is of necessity descriptive. Only by thorough description of sites, architecture and artifacts and
their context can a usable comparative record be made.

Particular attention is focussed on the field records and artifacts from the University of Colorado Museum excavations of 1924 and the American Museum of Natural History field records of 1923 and 1924. The records of the Carnegie Institution and American Museum expeditions for the years between 1925 and 1932, a major portion of which concern stabilization and reconstruction of Mummy Cave Tower in Canyon del Muerto (Morris 1938) and White House in Canyon de Chelly, have been treated selectively to include excavation and survey data.

The field notes, particularly those from the American Museum of Natural History excavations, are detailed and informative. Particular attention was paid to architectural features: their methods of construction; horizontal associations; stratigraphic and superpositional relationships; artifacts associated with features or present but unassociated. Disturbance was noted and sources of disturbance were identified where possible. In some cases, non-modified but culturally informative material was sampled or described, and quantities were estimated.

The state of preservation of perishable artifacts is excellent, and their quantity is truly astounding. While many of the artifacts might be considered to be of the spectacular variety, there is no indication whatsoever that the unusual or beautiful was sought out by the excavator; features and artifacts were recorded as encountered in the process of excavation.

Certain kinds of data are not present. These fall into four general categories.

(1) Data that were not collected because they were not
recognized as important sources of cultural information. Included in this category are unmodified animal bone and lithic waste, although these were sometimes noted.

(2) Data for which the techniques of analysis had not yet been developed or had not yet been applied to archaeological problems: pollen samples, soil samples, materials upon which to calculate radiometric dates.

(3) Heavy ground stone artifacts were left in the field because of the difficulty of transporting them; both their morphology and their frequency are undescribed. Very fragile or fragmentary artifacts were occasionally noted but not recovered, particularly if intact examples of the same kind of artifact had already been recovered.

(4) Some information has literally become lost. Although the field notes are complete, several site maps and sketches have not been located. A small number of artifacts from the University of Colorado Museum were dispersed to other institutions many years ago and are not available for study at this time.

Political and geographic setting

Canyon del Muerto is the northern branch of the canyon system collectively called Canyon de Chelly. It is located in northeastern Arizona immediately to the east of the town of Chinle, just off State Highway 63 near the center of the Navajo Indian Reservation (Fig. 1). As much for its outstanding scenery as for its cultural value, and in no small part due to the efforts of Earl Morris, Canyon de Chelly was declared a National Monument in 1931. The Monument lies wholly within the Navajo Reservation
Fig. 1. Map of the northern Southwest showing geographic and political features mentioned in the text.
and is administered by the National Parks Service as a joint-use area with the Navajo Nation, under the United States Department of the Interior (Lister and Lister 1983: 89).

For the protection of the cultural and natural resources of the canyons, for the privacy of those Navajo who live there, and for the safety of the visitor to this beautiful but naturally hazardous area, access to the canyon floor is controlled. The Navajo, some of whose homes and small farms dot the inner canyon, are free to travel in and out as they wish. Except at a single self-guided trail to White House Ruin, other visitors must travel the canyons with an approved guide. Access to the rockshelters is prohibited, but the serious researcher may make special arrangements regarding access through the United States Department of the Interior.

The Canyon de Chelly system is a massive steep-walled incision into the northwestern flank of the Defiance Uplift at the eastern margin of the Black Mesa Region of the Colorado Plateau (Baars 1972: 113; Comeaux 1981: 10) (Figs. 2, 3). The canyon rim cross cuts the Uplift, rising in elevation from 1769m above sea level at the canyon mouth in the Chinle Valley to the west, to 2286m above sea level at the canyon heads near the crest of the Defiance Plateau to the east. Westward across the Chinle Valley is the Black Mesa Plateau, and southward, along the western margin of the Defiance Plateau, is Beautiful Valley. Below Canyon de Chelly, the escarpment of the Defiance Plateau extends southward to the Puerco River. To the east and northeast are the Tunicha and Lukachuki Mountains of the Chuska Range.

The canyon system was formed by the cutting action of streams
1. Mummy Cave
2. Tseahatso
3. T. C. 1
4. T. C. 2
5. E. T. C. 3
6. Pictograph Cave
7. Cave 4
8. Battle Cove
9. Antelope House
10. White House
11. Tse-Ta’ a

Fig. 2. Map of Canyon del Muerto showing sites and features mentioned in the text.
Fig. 3. Above, aerial view of Canyon de Chelly, looking east. Photograph by Charles Lindbergh, 1929. Below, East Trail Canyon from the rim above Pictograph Cave.
flowing westward toward the Chinle Wash during the formation of the Defiance Uplift at the end of the Cretaceous. Seasonal streams still flow through the canyon, carrying runoff from the better watered highlands to the east through tributaries that converge as the De Chelly Wash. The De Chelly Wash empties, as throughout the history of the canyons, into the Chinle Wash, itself a north-flowing tributary of the San Juan River. The canyon is deepest cut near Spider Rock in Canyon de Chelly proper. There, Permian aged Cutler Redbeds are exposed below 240 vertical metres of red-orange, cross-bedded De Chelly Sandstone, capped by the relatively thin, disconformous Shinarump Conglomerate (Baars 1972: 112).

Canyons other than those of the De Chelly system are similarly cut into the Uplift, the most notable being Yellowstone Canyon, Tsedahtso Canyon and Bihlinie Canyon to the north, Slim Canyon and Sheepdip Canyon to the northwest, and Three Turkey and Little White House Canyons to the south. These take their beginnings lower on the Uplift, and although they are sizable canyons, none approach the depth or extent of the De Chelly system; from their junction, Canyon de Chelly extends some 30km to the east and Canyon del Muerto some 40km to the northeast, but like a coastline the canyons twist and turn so that the actual distance travelled can be many kilometres greater. At the canyon mouth on the Chinle Wash, the canyon floor is about 150m wide; farther up the canyon it varies in width from less than 90m to as much as 800m where major branch canyons enter (Mindeleff 1897: 86). Where runoff is slow, particularly in coves and side canyon entries, alluvial terraces have built up on the canyon floor.
Evidence from the remains of canyon floor pueblos now partially washed away (Steen 1966: 6) and from a stratigraphic cut made by Morris in 1929 indicates that the floor of the canyons experienced different degrees and patterns of alluviation in the past. While climatic variation is probably the major agent in changing patterns of erosion and deposition, cultural factors such as overgrazing in the recent past and the position and size of village sites in the more remote past have had some effect. Steen has noted that at Tse-Ta'a in Canyon de Chelly, Basketmaker II pithouses had been cut into alluvium that at that time was 1.2m deep; by Pueblo III the alluvium was 2.7m deep and "much of this was trash and filth attendant on the people who lived there" (1966: 7). At Tse-Ta'a, and presumably throughout the canyons, deposition since the abandonment of the canyon as a major Anasazi habitation area is primarily colluvium. A comparison of photographs taken in the 1920s and 1963, and personal observation in 1983 indicate that the alluvium of the canyon floor is currently being cut; the arroyo at the mouth of East Trail Canyon is today about 3m deeper than in 1929.

Rockshelters, often called caves, are a common feature in the cliff walls. The De Chelly Sandstone is the fossil remnant of a great crossbedded dune field composed of deep deposits of mud and sand from the Permian seabeds, and of clastic outpourings from the ancestral Rockies (Rahm 1974: 62-63, 120). It is a natural aquifer. Where seepage has occurred between strata, the lower bed has in some cases been differentially weathered away to form a more or less horizontal slot in the exposed face of the cliff. The unsupported upper beds spall, enlarging the opening; the
result is a rockshelter that may range in size from a niche suitable for shading a snake or lizard, or a cache of corn in a mud and stone granery, to a great arcing chamber in which a village could be, and sometimes was, built.

Foot trails leading from floor to rim are scattered through the canyons. Most of these are at the heads of side canyons. Some are still used by the Navajo, as they were used by the Anasazi, to gain the rim without going the long way around through the canyon mouth. Some of the ancient trails have become impassable, but hand and foot holds cut into the sandstone attest to their use in the past.

Environment

Canyon de Chelly lies in the Upper Sonoran Life Zone. Sharp differences in altitude, moisture availability and soil formation between rim and floor have created very different environments between these areas, and the environment of the rim is not static but rather a series of intergraded ecotones as altitude increases from west to east. Rim vegetation may be described throughout as pinon-juniper woodland, but at lower elevations near the Chinle Valley, sparse woodland intergrades with scrub grass and sage flats. At higher altitudes to the east, rim vegetation is somewhat more dense, and in particularly favored areas near the crest of the Defiance Plateau Ponderosa pines appear. According to studies carried out during the Antelope House Project, arboreal cover on the rim is about 10%, dominated by Juniperus osteospermum (Fall et al. 1981: 298). While pinon pine and juniper are the dominant woody species, other plants are common on the rim,
particularly near the canyon edge where fractures in the caprock provide catchment for soil and water. Personal observations of plants on the rim opposite Mummy Cave include scrub oak, mountain mahogany, cliff rose, ephedra, several varieties of prickly pear cactus, narrow and broad leafed yucca, scrub grasses and a great number of flowering plants.

Despite temperature extremes and aridity, the water table lies only a few feet below the floor of the inner canyon, and here the plant life is more typical of the Lower than the Upper Sonoran Life Zone (Supplee et al. 1971: 26). Several distinct plant communities are present (Fall et al. 1981: 298). Willow and cottonwood trees, present in prehistoric times and reintroduced into the region during the historic period; tamarisk and russian olive, exotics introduced by the Spanish; and reeds, beeplant, amaranths, chenopods, horsetail and portulaca grow in well-watered stretches of the canyons, sometimes forming lush stands. On the talus slopes, snakeweed, rabbitbrush, prickly pear, narrowleaf yucca and a few juniper find a foothold among the rubble of fallen stone and debris. Low shrubs and grasses grow on alluvial terraces along the stream bed.

Animal life is typical of the Plateau: lizards, snakes, packrats, ground squirrels, cottontail rabbit, jack rabbit, deer, occasional bobcats, foxes, badgers, porcupines and skunks (Supplee et al. 1971: 29). Although no longer found in or near the canyons, pronghorn antelope are reported to have been common on the flats near Chinle until the turn of the century (Morris 1930: 8). Fish and freshwater shellfish are absent.

Weather records kept by the National Park Service at Chinle
report an average annual precipitation of 22.5cm, with wet seasons from late winter to early spring and late summer to early fall. Runoff from the Chuskas flows through the Wash in spring and early summer. Summer temperatures at Chinle range from 20 to 40°C and winter temperatures from -11 to 40°C. Because of the heat-holding properties of the sandstone walls, summer temperatures within the canyons are somewhat higher than those recorded at Chinle. Conversely, winter temperatures are somewhat lower because the canyons form a sink for cold air. Although among the lowest in the state of Arizona, evaporation and evapotranspiration rates are high. Average pan evaporation is around 180cm per year, and average annual potential evapotranspiration is about 48cm (Comeaux 1981: 36-38, Maps 2.5, 2.6).

History of investigations: military, geographic, and archaeological

The history of investigations in Canyon del Muerto is closely linked to the history of the Spanish and American occupations of the Southwest. Prior to the subjection of the Navajo in 1868, virtually all investigation of the canyons was made from a military perspective, with emphasis on the fortress-like aspects of the topography; after 1868 scientific and semiscientific expeditions explored the geography and archaeology of the region. Although the Spanish were aware of the canyons somewhat earlier, since they are named in a 1754 report as one of several population centres and a particular stronghold of the Navajo (Grant 1978: 82), the earliest evidence of the actual observance of Canyon de Chelly by a European is its placement on a map
prepared by the cartographers of the Dominguez-Escalante Expedition in 1776 (Lister and Lister 1983: 82; Simmons 1979: 192, Fig.6). Only a single party is known to have traversed the canyon during the Spanish occupation of the Southwest. The passage of Lt. Antonio Narbona and his troops on July 17, 1805, was by both Spanish and Navajo accounts violent and bloody; it is commemorated by the name given one of the Canyon del Muerto rockshelter sites not examined in this report: Massacre Cave.

Following the Mexican War of 1849, much of what is now thought of as the American Southwest was ceded from Mexico to the United States under the Treaty of Guadelupe Hildago (Eggan 1979: 224). Bands of Navajo and other "wild tribes" ignored this change in alien government and continued to harry the farms and villages of the Rio Grande drainage, withdrawing to the north and west between raids.

In July of 1849 the first United States Indian Agent for New Mexico, James S. Calhoun, and Brevet Lieutenant Colonel J.M. Washington led an exploration party of 175 U.S. soldiers and 300 New Mexico Volunteers into the heart of the Navajo territory. Their purpose was to make treaties where possible, war where necessary, and to completely map and describe the country (Grant 1978: 88-106; Eggan and Pandy 1979: 474). A crew of specialist observers, including Richard and Edward Kern and Lt. James Simpson, accompanied the army. On August 30, having travelled through the Chuska Mountains and westward along the north rim of Canyon del Muerto, they came to the mouth of Canyon de Chelly and travelled 13.5 km up Canyon de Chelly to Wild Cherry Canyon (Supplee et al. 1971: 21). As a result of the expedition, Lt.
Simpson produced the first scientific description of the geology and landforms of the canyons, and Edward Kern produced a detailed map. These were published by the United States Congress in 1850 (Mindeleff 1897; Simpson 1850).

The following years were a time of American expansion. Considerable popular and professional interest in the territory acquired as a result of the Mexican War was generated, and during the last quarter of the 19th century several scientific expeditions were sent out to explore, map, describe and assess the western lands.

An exploration party led by Lt. G.M. Wheeler for the United States Geological Survey passed through the region in 1873. Working along the rim, the party made a partial survey of the geology and archaeology of the canyons; the results of the de Chelly portion of the reconnaissance appear in a volume devoted to the archaeology of the regions surveyed (Wheeler 1879).

In 1879 Col. James S. Stevenson led a Southwestern Expedition for the newly created Bureau of Ethnology (Stevenson 1883; Grant 1978: 132, 133). Stevenson visited a number of extant pueblos, collecting ethnographic material, and also explored a part of Canyon de Chelly where he collected 21 pieces of prehistoric pottery; these are illustrated in the Second Annual Report of the Bureau of American Ethnography.

Stevenson returned in 1882 as the leader of the Smithsonian Institution Expedition to Canyon del Muerto (Lister and Lister 1983: 93). The party, the first with specifically archaeological goals, camped near Tseahatso Cave in Canyon del Muerto and explored about 24 km of that canyon. 140 ruins were located, one
of which the party named Mummy Cave after two naturally dessicated bodies that had weathered out of a cist in the talus below the cave opening. The northern major canyon was also named for these bodies: *Canyon de los Muertos*, the Canyon of the Dead; until that time both north and south branches went under the name Canyon de Chelly (Steen 1966: 4). Although attention was concentrated on Canyon del Muerto, the group also explored Canyon de Chelly as far as Monument Canyon. Specimens collected by the Stevenson expeditions were deposited at the Smithsonian Institution, and a brief account of the second expedition was published by the Bureau of American Ethnology (Powell 1886). A portion of the information collected during the second expedition is incorporated in Cosmos Mindeleff's survey of the Pueblo architecture of Canyon de Chelly (1897).

Cosmos Mindeleff spent several field seasons surveying the masonry ruins (Grant 1978: 134-135). 70 sites in Canyon de Chelly and 29 in Canyon del Muerto were located and mapped, and an area map showing stream bed, arable land, talus and rim for nearly the whole of Canyon de Chelly and for the lower reaches of Canyon del Muerto was produced (Mindeleff 1897: pl.XLIII). Although Mindeleff's interpretations of the origin and function of many of the architectural features have since been judged to be erroneous, the descriptive and pictorial record that he produced is the most complete and useful body of information that has yet been published on the masonry architecture of the canyons.

The coming of the railway to Santa Fe in 1880 and to Gallup in 1881 considerably eased the difficulties of travel into the region. A number of private individuals made exploratory or
excavation trips into the Canyons during the last decades of the 19th century, and a few of these produced popular articles which generated still further interest (e.g., Bickford 1890; Peet 1899; Pruudden 1903).

The amateur archaeologist Frederick Monson, who was probably in the canyons during at least a part of the time of Mindeleff's architectural survey, made a number of trips into de Chelly and del Muerto during the 1890s, taking thousands of photographs of archaeological sites and of the Navajo living in the inner canyon (Grant 1978). Monson excavated extensively in the caves, collecting hundreds of artifacts. A private museum was built in San Francisco to house the massive collection; the entire museum, with artifacts, glass plate negatives and photographs, was destroyed in the earthquake of 1903. Of this large and important collection only a small number of photographic prints remain.

In 1902 Samuel Day built a large trading post near the mouth of Canyon de Chelly, and in 1903 was appointed Custodian of the canyons by the Department of the Interior. Day and his son Charles dug extensively in the rockshelters, setting up a thriving business in antiquities. In 1906 the Days sold a large and important collection containing many Basketmaker artifacts to the Brooklyn Museum of Natural History. This collection, which is still occasionally placed on public display, was examined by Morris prior to his excavations. The Days also sold a collection containing late pre- and protohistoric kachina masks and religious paraphernalia recovered from Beehive Ruin. This material was later identified by J.W. Fewkes as the property of the Asa Clan of the Hopi (Fewkes 1906: 664-670).
In 1923 Earl Morris began work in Canyon del Muerto. His excavations, the most extensive ever undertaken in the canyon, are described in the following chapters. Others, some of whom worked with Morris, conducted additional investigations during these years.

Alfred V. Kidder was principal investigator for the Carnegie Institution Expedition to the canyons in 1925, while Morris, in recognition of his reconstruction of the Temple of the Warriors in Yucatan, was placed in charge of the stabilization and restoration of Mummy Cave Tower and White House Ruin. At the end of the 1925 field season, Kidder withdrew from the project in favor of Morris; his unpublished field notes are included in the University of Colorado Canyon del Muerto collection.

Ann Axtell Morris spent at least a part of every field season as a member of the Morris crew. In 1929 she began to systematically record and copy the abundant rock art of Canyon del Muerto. Her actual-sized reproductions of pictographs and petroglyphs were displayed at the American Museum of Natural History, and a museum leaflet on the rock art of the Southwest is based on her work (Morris 1930). Ann Morris's popular account of the life of an archaeologist, Digging in the Southwest, appeared in 1933; the book, a lively combination of day to day adventures and the contemporary theory of southwestern prehistory, deals extensively with her years of experience in Canyon del Muerto (Morris 1933; 1978).

During these years the technique of dendrochronology was first applied to the archaeology of the Southwest. Earl Morris collected numerous beam samples for A. E. Douglass, the astronomer
who developed the theory and methods of tree-ring dating, and for
Harold S. Gladwin, whose methods of calculation were somewhat
different from those of Douglass. Gladwin, a member of the 1925
Carnegie Expedition, returned to Canyon de Chelly in 1932 with a
party from Gila Pueblo in order to collect beam samples and
potsherds with the goal of assigning absolute dates to floating
chronologies derived from changes in ceramic styles (Grant 1978:
145-146). In 1940 and 1941, Gila Pueblo sent Deric O'Bryan to
Canyon del Muerto to collect additional beam samples. One sample
from Mummy Cave proved to be the oldest specimen that had been
recovered up to that time, with the innermost ring at 59 B.C., and
a cutting date of A.D. 295 by the Gila Pueblo method or A.D. 306
by the Douglass-University of Arizona method.

In 1946 David DeHarport, then a graduate student at Harvard
University, began an intensive archaeological survey of the
southern major branch canyon, Canyon de Chelly. The survey
extended through six field seasons and resulted in a 1600 page
dissertation on the archaeology of the canyon. The dissertation
has not been published, but two short preliminary reports have
appeared, the second of which contains the first published
description of a Basketmaker III pithouse from de Chelly
(DeHarport 1951, 1953).

The salvage excavation of Tse-Ta'a, Canyon de Chelly, an open
site in danger of destruction by stream action, was begun by
Charles Steen in 1949. Excavations continued through 1950,
revealing habitation structures of Basketmaker III through Pueblo
III age, with a possible Basketmaker II occupation (Steen 1966).
Two Basketmaker III pithouses were excavated and described,
bringing the number of published descriptions of these structures to three.

Between 1969 and 1975, Campbell Grant made a survey and photographic record of the rock art of Canyon de Chelly, of part of del Muerto, and of the major tributary canyons in the system (Grant 1978). The majority of the rock art ranges in age from Basketmaker II through Pueblo IV; examples of protohistoric and historic Hopi, Navajo, Ute, Spanish and American rock art were also recorded.

The majority of the surveys, stabilization projects and excavations in Canyon del Muerto during the past 40 years were conducted or contracted by the National Parks Service. The reports are largely unpublished, but a summary of archaeological investigation in the Monument has recently been published (Macdonald 1976) and copies of unpublished reports are on file at the Western Archaeological Center at Tucson, Arizona.

The most recent major investigation of the archaeology of Canyon del Muerto is the problem oriented, multidisciplinary Antelope House Project conducted by Donald Morris between 1970 and 1973 (Morris 1986). The Antelope House report focusses on the Pueblo I through the Pueblo III periods, barely overlapping the developmental periods investigated in this thesis. A number of short reports on specific aspects of the investigations at Antelope House have appeared (Kiva 41, whole volume; Fall et al. 1981). These reports, all of which utilize techniques developed since Earl Morris's excavations, provide a useful adjunct to the information contained in the records of the investigations conducted by Earl H. Morris between 1923 and 1932.
CHAPTER II
FIELDWORK

Nine major sites in Canyon del Muerto and its tributaries were excavated between 1923 and 1932. The following site descriptions are taken nearly verbatim from the field notes, with minor changes in verb tense and with conversion from English to metric measurement. In a few cases, the nature of the site setting is not described in the field notes and other sources are utilized. Site and feature plans, except where noted, are based on sketches made by Morris at the time of excavation.

Several small rockshelters in Tseyakin Canyon examined by members of the Carnegie Institution Expedition in 1925 are not described. These rockshelters were occupied during the Pueblo period, and an examination of the field notes indicates that no additional information would be yielded by their inclusion.

MUMMY CAVE

Mummy Cave is 16km up canyon from the junction of Canyons de Chelly and del Muerto, just above the mouth of Tseyakin Canyon (Fig. 2). The large, double alcoved rockshelter is centered in a U-shaped promentory that juts southward into Canyon del Muerto (Fig. 4). The rockshelter floor is 30m above the watercourse, and its roof is 145m below the rimrock. A talus of broken stone, cultural refuse and ashy sand runs down below the righthand alcove; access to Mummy Cave is solely by climbing this 45° slope. A thin, stratified talus of stone, earth and cultural refuse
Fig. 4. Above, Mummy Cave, Canyon del Muerto. Below, east talus, Mummy Cave. Remains of the room and cist cluster are at center right. Photographs courtesy of the University of Colorado Museum.
clings to the steep cliff wall below the lefthand alcove. Both alcoves and most of the talus are protected from direct precipitation by the overhanging cliff, and preservation of perishable remains is excellent.

Pueblo II-III masonry structures are present in both chambers of the cave. The smaller, western alcove contains 14 ground level rooms, and the other at least 50 rooms and 2 kivas (Grant 1978: 263). Masonry walls and storage structures are present in both areas. A natural stone buttress separates the alcoves, and in front of this a line of 7 contiguous masonry rooms culminates at the east end in a spectacular 3 story tower. A path along the line of tower and rooms, aboriginally widened by a now fallen retaining wall, provides the only means of access to the west alcove.

Evidence of Basketmaker utilization visible prior to excavation consists of the upper portions of slab cists, rooms, and weathered out burials in the east talus (Fig. 4b). Other than possible rock art motifs, no surface evidence of early occupation is present within the shelter.

Because the goal of research at Mummy Cave was stated by Morris to be an elucidation of the pre-Puebloan occupation of the rockshelter, excavations were concentrated in the talus slopes.

A 30m trench was cut from a point just inside the rainshadow at the south edge of the east talus, following the slope of the underlying bedrock (A. Morris 1978: 154). No written description of the trench appears in the field notes, but a field sketch provided by the American Museum of Natural History indicates that the slope had been terraced by means of stone, brush and log
Fig. 5. Talus Trench, east talus of Mummy Cave, 1923.  

a, one of several log and stone retaining walls midway along the line of the trench.  
b, dotted line marks lowest point of the trench, coinciding with the moisture line. Four Basketmaker II burials were against the bedrock and stone rubble at the base of the trench.
retaining walls (Fig. 5). The burials of 15 Basketmaker II and III individuals were recovered from the talus trench.

Prior to excavation the upper edges of standing slabs were visible among the stones and debris at the east side of the slope above the talus trench. A stratified series of 5 superposed slab rooms surrounded on the uphill side by 31 slab and mud cists was excavated (Fig. 6). The rooms and cists are stepped up the slope with the rear parts of their bases on bedrock and the forward parts on levelled earth held back by retaining walls. The uppermost room, Room 1, had burned while in use. Neck banded pottery directly on the floor beneath burned roof fall indicates use during the Pueblo I period.

During excavations in 1924 and 1925 two groups of at least 4 similar rooms and associated cists were observed immediately upslope and to the west of the 1923 room and cist cluster. Two of these rooms had burned while in use; Basketmaker III pottery was in situ beneath roof fall in both.

The slope below the lefthand alcove of Mummy Cave is too steep for artificial terracing and habitation. Prehistoric use as a burial area is indicated by three undisturbed Basketmaker III burials excavated from the thin, stratified refuse in 1929.

CAVE NO. 1

The location of Cave No. 1 was not recorded, but published works (Morris 1925, 1936; A. Morris 1978) suggest that the rockshelter is very near Mummy Cave. Cave No. 1 may be Atlatl Cave (CDM 214), a rockshelter just east of Mummy Cave at the same
Fig. 6. Above, room and cist cluster, east talus of Mummy Cave, 1923. Field sketch by Earl Morris, courtesy of the American Museum of Natural History.
level above the canyon floor. Grant (1978: 264) examined Atlatl Cave and noted that the architecture suggests Basketmaker III-Pueblo I occupation, and that at least two pithouses are present. This is in general accord with the information in the field notes.

Cave No. 1 is roughly west facing and at least 67m long. Depth from the rear wall to the edge of the talus ranges from 6.0-12.2m. The cave is overhung by the cliff throughout its length, and most of the floor is protected from direct precipitation. However, the cave opening is such that the drip runs down the inner walls, and near these the fill has been wet.

The natural floor of Cave No. 1 is outward sloping. Sandstone blocks spalled from the roof before, during and after occupation lie in and on the natural and cultural fill. From a point about 20m north of the southern extremity of the cave the present surface rises 2m in the next 14m, then slopes downward 4.5-6m in the next 33m.

**Stratigraphy**

An idealized stratigraphy may be built up from information in the field notes. It should be noted that while the ordering of the strata is constant, not every stratum is equally distributed throughout the site. It is assumed that variability in the depth and extent of deposits is due in part to cultural effects - the duration, intensity and nature of use and reuse of a particular area - and in part to the mechanical effects of a naturally sloping cave floor. Large stone blocks present within the fill would have affected both choice of activity areas and the ultimate
distribution of sediments and debris.

The soil and organic contents of all strata appear to be almost entirely the product of human activity. Packrats and other rodents may have supplied a certain amount of organic matter, but the contents of their sometimes massive nests appear most often to consist of material removed from cultural contexts. The major non-cultural agent of deposition is stone wastage from the roof and walls of the shelter. A small amount of windblown dust is present, but there is no evidence of water-laid deposits at any level.

**Stratum 1:** in every part of the cave that was excavated to bedrock, the natural red sandstone of the floor is overlaid by a cultural layer consisting of ashy sand, charcoal and vegetable refuse. Within this matrix are shaped slabs, slab-lined cists, mud walls, and the burials of individuals with undeformed skulls. No sherds, fired or unfired, are present in Stratum 1. The deposit is considered to be of Basketmaker II age.

Depth of deposit is variable, ranging from "a mere film to a foot thick" in Areas 30 and 31, to "18 inches to 4 feet deep" in Area 32 at the rear of the cave (Fig. 7).

**Stratum 2:** the matrix of Stratum 2 is similar to that of Stratum 1: ash, sand, charcoal and vegetable refuse. Within Stratum 2 are slab and mud walled rooms with fallen log and mud superstructures. Fired pottery vessels, some with fugitive red wash, are present in some of the rooms and extramural cists. A group of unfired clay female figurines was beneath the roof fall of a single ruined house, and unfired, basket-molded mud sherds are occasionally present in the fill. Depth is variable, but
Fig. 7. Ground plan of Cave No. 1, Canyon del Muerto. Field sketch by Earl Morris, courtesy of the American Museum of Natural History.
averages about 60cm. Stratum 2 is considered to be Basketmaker III-Pueblo I in age.

**Stratum 3:** the matrix of Stratum 3 is clods and ashy sand containing charcoal, reeds, corn husks and cobs, and other vegetable debris. Turkey dung, not noted in Strata 1 and 2, is present in large, discontinuous layers 5-15cm in depth. Shaped building stone, masonry walls and rooms, Mesa Verde style black on white sherds, corrugated sherds, and burials of individuals with artificially deformed skulls are present. Depth of deposit was not recorded. The stratum is considered to be Pueblo III in age on the basis of the described artifacts, but may contain deposits of Pueblo II age.

**Stratum 4:** a hard crust of sheep dung 5-30cm thick covers nearly every level space within the cave. A Navajo sheep pen is at the rear of the cave, and a few charcoal drawings in Navajo style are present on the walls and boulders. Two caches, one containing clothing dating to the late nineteenth or early twentieth century, and one containing a milk pan and a metal pail, are the only artifacts and features noted in or on Stratum 4. Features and artifactual content of Stratum 4 relate to the use of the cave as a sheep shelter during the historic period.

**Excavations**

No grid or other artificial method of area designation was established. Excavation units were the features encountered as excavation progressed. Areas between features were tested and notation was made of any special characteristics. All architectural features described in Chapter III are shown in Fig. 7, but a number of burials are beyond the limits of the site plan.
TSEAHATSO

Tseahatso (CDM 155), also known as Big Cave and Screen Cave, is 5km down canyon from Mummy Cave in an alcove in the north wall of Canyon del Muerto (Figs. 2, 8). It is the largest rockshelter in the Canyon de Chelly region, measuring about 450m along the curve of the floor, and from 23-45m in depth from the edge of the cliff to the rear wall. The floor of Tseahatso is 23m above the canyon and 155m below the rim. The maximum height of the roof is 80m above the shelter floor. Access to the cave is by an easy walk over a talus of stones, earth and cultural debris.

The south-facing opening admits sun at all seasons. The overhanging cliff deflects precipitation, and the interior of the shelter is entirely dry.

The surface of the rockshelter floor is irregular. Depth of cultural deposit is variable, and bedrock or sterile earth was reached only rarely in the course of excavation.

The remains of most, if not all, cultural periods represented were visible at the surface prior to excavation. The entire length of Tseahatso is "a maze of slab cists and the bases of pole and mud structures" (Field Notes 1924). While many of the slab lined cists had been robbed or otherwise disturbed, many of those that were undisturbed contained burials of Basketmaker II and III age. The pole and mud structures were not excavated, but are said to be similar to those excavated at Mummy Cave, 1923, which suggests that they are of Basketmaker III-Pueblo I age (Morris 1978: 196). Three small masonry roomblocks with turkey pens near the cliff wall at the central part of the rockshelter are a surprisingly meagre representation of Pueblo II-III utilization of
Fig. 8. Tseahatso, Canyon del Muerto. Above, aerial view, 1929. Photograph by Charles Lindbergh. Below, view from the canyon floor. Photographs courtesy of the University of Colorado Museum.
what would appear to be an ideal habitation site. A hard crust of sheep dung overlying much of the cave floor reflects the most recent use of the rockshelter as a sheep corral.

Excavations were made in 1923, 1924 and 1925. Fieldwork for the University of Colorado Museum in 1924 was a direct continuation of work for the American Museum of Natural History during the previous year.

Four parts of Tseahatso were examined: a deep, low ceilinged recess near the west end of the cave (Western Recess); a broad area across the front of the west end of Tseahatso, beginning about 15m in front of a line of fallen roof blocks that marks the northern limit of the Western Recess; part of the higher, central area; and a segment of the lower, west end. Field notes and published sources suggest that substantial portions of Tseahatso remain untested (Morris 1924; Kidder, Unpublished Field Notes, 1925; A. Morris 1978).

**Western Recess:** a stratigraphic section was cut at the western end of the Western Recess. From the field notes (1923):

Along the cliff there were 2-3 inches [5-8cm] of sheep dung and sand, then 8-14 inches [20-36cm] of chaff from corn tassels, and refuse and turkey dung, and beneath this a slab floor [Slab Floor 1]. Lying on this floor was a feather box, one of the finest caches imaginable. Beneath the feather box, extending 10 ft [3m] from cliff, 8-12 inches [20-30cm] below the slab floor, another floor, mostly of mud. The structure of which it was a part had been burned [Room 1]. On this floor were a mortar, several manos, and rubbing stones. Below the lower floor was 2 feet [61cm] of sand and small stones containing some charcoal. Below this was a cist 6 and one half feet [1.98m] long, 3 feet [91cm] deep, and apparently about 5 feet [1.52m] east to west [Cist 8]. The fill was of large stones and loose sand. About a foot above the floor there was a jumbled mass of bones which covered the area of the eastern two-thirds of the pit and apparently extended the rest of the way across. The bodies had been dug up, either in this cist or elsewhere, much force had been exerted in many cases, for most of the large bones had been
broken.

The recess is filled with cists and pits in which burials had been made. The majority of the burials had been made during the Basketmaker II period, and the remainder during Basketmaker III-Pueblo I. There is no evidence of later Pueblo utilization of this part of Tseahatso beyond a few sherds at the surface. No habitation structures other than Room 1 (Stratigraphic Section) were noted.

Area in front of the Western Recess: the slope at the front of the western part of Tseahatso had been terraced by means of cribwork retaining walls similar to those found in the Mummy Cave talus. At least one slab room and a slab floored walking surface are present; Basketmaker III rubbish with no admixture of later material fills and overlies these features. Basketmaker II and III burials had been made in the area.

East central area: masonry rooms and a kiva are toward the rear of the cave in the east central area. Several Pueblo burials were excavated. Ceramic inclusions suggest Pueblo II to early Pueblo III utilization of this area.

No masonry structures are in the area east of the rooms and kiva, but several Pueblo II-III burials were located. Slab cists are 60-120cm below the present surface, and the upper edge of the walls of a slab room were just below the surface. Contents of intact cists indicate Basketmaker III use. After abandonment the slab room had been divided into four cists, and burials of Basketmaker III age had been made in 3 of these. Other Basketmaker burials were in pits and cists within the area.

East end: an undescribed masonry structure stands at the west
edge of a low bench at the east end of Tseahatso. Here deposits are soft and dusty, containing only little early Pueblo III cultural material. East of the masonry structure, between two bedrock outcrops, is a cluster of slab cists. Those that were undisturbed contained late Basketmaker II and Basketmaker III artifacts. The formal burial of an eagle had been made in one of these.

TRAIL CANYON CAVE 1

About 8km below Mummy Cave two side canyons branch from the main canyon, the shorter extending to the west-northwest and the longer to the east-southeast. Trails to the rim run through both, hence the names West and East Trail Canyons. In the north wall of West Trail Canyon are two rockshelters. The larger, Trail Canyon Cave 1, is nearest to the canyon mouth.

Trail Canyon Cave 1 is about 120m long. The pitch of the floor is very steep, and most of the central part of the shelter is unsuitable for occupation. Three areas of cultural remains are present: the southeast end; a level area in the central portion; and the northwest extremity of the rockshelter. Pictographs cover the shelter walls; however, these are not described in the field notes.

The cave was excavated for the American Museum of Natural History in 1924.

Southeast end: the greater part of the triangular area at the southeast end of the cave is bare rock. Many footholds, axe grooves and a small circular pit are cut into the stone of the floor. It is unclear whether architectural features were ever
present in that part of the cave, but at the extreme southeastern end is an accumulation of earth and refuse. Here every bit of available space had been utilized in the building of slab and masonry structures (Fig. 9). Basketmaker II burials had been made in some of the slab cists; other slab cists may date to the Basketmaker III period. Masonry structures relate to the Pueblo II-III period. A few of these have seen secondary use as Navajo burial chambers, and a few Navajo masonry cists were constructed during the historic period.

Central area: at least two circular slab rooms are beneath surface levels of mixed Pueblo and Navajo refuse, and slab cists are exposed at the edge of the talus in front of the rooms. A row of largely demolished masonry rooms runs along the rear wall of the shelter. Several storage jars of late Pueblo and Navajo manufacture were recovered from caches in the central area.

West end: a small cluster of masonry rooms is present. Corrugated jars were cached between a masonry wall and the shelter wall. No excavations were made.

Morris (Field Notes 1924) evaluated the prehistoric utilization of Trail Canyon Cave 1 as being almost continuous; Basketmaker II is represented by the burial cists, Basketmaker III-Pueblo I by the circular slab houses in the central area, Pueblo II-III by the masonry structures and pottery caches throughout the shelter, and historic Navajo by the corn cists, burials, ceramics and sheep dung layers. The evaluation is upheld by the evidence of a sherd collection made by Carlson in 1963.
Fig. 9. Trail Canyon Cave 1. 1, Basketmaker II burials in slab cist. 2, cache of corrugated pots in slab cist. 3, cache of Navajo jars in reused slab cist. 4, Navajo burial. 5, masonry cist or room. 6, ash filled slab cist. 7, kiva.
TRAIL CANYON CAVE 2

Trail Canyon Cave 2 is in the north wall of West Trail Canyon, just beyond the sandstone point west of Trail Canyon Cave 1 (Fig. 2). The cliff below the shelter is nearly vertical, and access is possible only via a narrow ledge at the west end.

The shelter walls are bare of any form of rock art. From the field notes (1924): "There is not one pictograph or painting on the wall of the cave, whereas in Cave 1 in this canyon and in nearly all others in the del Muerto system, these are plentiful".

A mass of fallen stone is near the west end of the shelter floor. The area west of the rockfall had been wet and was not measured or excavated. The dry portion of the shelter east of the rockfall is about 46m long. This area was examined and excavated for the University of Colorado Museum in 1924.

West End: four masonry chambers are on and behind the jumble of stone at the west end of Cave 2. One had been remodelled by the Navajo as a corn cist. Farther west, where the shelter is wet, are the nearly weathered out remains of several more masonry rooms. None were investigated.

Dry Sector: east of the roof fall, fallen stone forms a natural rampart the length of the cave. Behind the line is a dry, sector shaped flat area 27m long and 6m deep. The entire area was excavated.

The matrix consists of cave earth mixed with grass, corn chaff and other vegetable refuse. No stratification is evident, but near the surface is a considerable admixture of rat droppings. The deposit averages 90cm in depth. A layer of very large stone blocks is beneath the fill and the deposit has sifted down into
cracks between stones for a distance of 1.5-1.8m to bedrock.

Burials had been made throughout the entire length of the area, but without exception these had been disturbed in prehistoric times. Scattered human remains and the ruins of slab cists were visible at the surface prior to excavation.

Morris considered the cultural remains in the dry portion of Cave 2 to be almost purely Basketmaker II in content. Examination of the artifacts and one nearly intact burial suggest heaviest use of the shelter during the Basketmaker II-III period, with minor use in later periods. A few painted sherds of styles ranging in age from Basketmaker III-Pueblo III were recovered from the surface in 1963; it was also noted that ceramic debris is scarce in Cave 2.

A number of artifacts were recovered from the general digging in 1924. These are described in Chapter V.

EAST TRAIL CANYON CAVE 3

East Trail Canyon cuts eastward into the mesa directly across from the mouth of West Trail Canyon. About 400m up canyon from the mouth of East Trail Canyon is an isolated pinnacle; East Trail Canyon Cave 3 is in the face of a shoulder jutting from the north wall about 400m beyond the pinnacle.

The protected portion of Cave 3 is about 68m in length and 28m in greatest depth. The maximum height of the shelter roof is 38m. During the formation of the shelter, roof fall heaped up in the central part of the floor, making this area at least 12m higher than the dry areas at the east and west ends of the
shelter.

The forward part of the floor is outward sloping. Considerable erosion has taken place since occupation, and only the rear sectors of three large chambers built at the front of the floor have survived (Fig. 10). What remains within Cave 3 is well preserved, since even where the shelter is deepest the forward slope of the talus begins a good 9m behind the line of drip.

Architectural and other features were visible prior to excavation. Slab-lined cists, intact and in ruins, are present over much of the cave floor. Slab and masonry chambers are visible at the surface at the front of the central and eastern areas. Lines of mud on the rear wall of the shelter indicate that slab rooms, some two stories high, once extended the length of the floor. A small cluster of masonry rooms and a kiva are to the west of center at the rear of the cave. The remains of a retaining wall that that one time increased the usable floor area is at the west end.

Pictographs representing humans, birds and animals cover the shelter walls. At the east end a group of human figures in brown stand above a line of bird figures in red. Handprints, the most common motif, were made both by pressing a paint covered hand to the rock and by outlining a spread hand with pigment. A Navajo planetarium is on the ceiling. Mud balls up to 4cm in diameter adhere to the high rock, and single or grouped black crosses appear. The planetarium has not been analyzed, but similar planetaria in Canyon de Chelly have been shown to correspond to constellations important in Navajo star lore.

Cave 3 was excavated for the American Museum of Natural
Fig. 10. East Trail Canyon Cave 3. Above, ground plan. Below, cross section at X - Y. 1, red cave earth, shredded vegetation. 2, refuse and vegetal material, no sherds. 3, vegetal refuse, mud and slabs, basket impressed mud sherds at bottom, a few Pueblo I sherds near top. 4, fallen cist walls, vegetal refuse, ashes, Pueblo I-III sherds. 5, sheep dung crust.
History in 1924. All features excavated or examined are shown in Fig. 10.

Utilization of the cave during the Basketmaker II period is indicated by a few burials. Both the 1924 excavations and the 1963 University of Colorado sherd collection suggest that utilization of the cave was heaviest during the Basketmaker III and Pueblo I periods, with less utilization during Pueblo II and very little during Pueblo III.

PICTOGRAPH CAVE (TWT-1)

A rockshelter high in the north wall of East Trail Canyon, just behind the promontory that separates East Trail Canyon and Canyon del Muerto, was called Pictograph Cave for the many greenish white and red pictographs that cover the shelter wall (Figs. 2, 11, 12b). The site has since been designated TWT-1, Twin Trails Ruin, to distinguish it from Pictograph Cave in Canyon de Chelly.

TWT-1 is the largest of several rockshelters in East Trail Canyon. The cave was not measured, but is relatively large and deep in comparison to other caves in this side canyon. It is 107m above the canyon floor, and access is by climbing up the talus (Grant 1978: 261). The rockshelter floor is uneven, but is not markedly outward sloping. The fill of the cave is shallow, apparently not more than 1m in depth. Stone blocks lie on the surface and within the fill.

Despite the shallow deposition of cultural material, architectural features visible prior to excavation suggest occupation during several cultural periods. Slab cists, some
Fig. 11. Pictograph Cave, Canyon del Muerto. **Above**, looking east from the central part of the cave. **Below**, looking west from the central part of the cave. Photographs courtesy of the University of Colorado Museum.
Fig. 12. Pictograph Cave. Above, slab cist near rear wall, Basketmaker II-III. Below, Anasazi pictographs at Pictograph Cave. Photographs courtesy of the University of Colorado Museum.
standing to a height of 1m above the surface, are visible in all but a triangular area formed by the cave wall and the southern margin of the floor at the east end of the shelter (Fig. 12a). An abundance of slab structures other than cists is indicated in the field notes, but with the exception of the brief description of a slab room in the central part of the shelter, the nature of these structures is undescribed. Two kivas, one with a painted band above the bench (Grant 1978: 262), several masonry rooms and standing walls, and a masonry stair connecting two levels are products of the Pueblo III period. A rough cairn against the shelter wall 1.5m west of Burial 1 contained a Navajo jar; the cairn may be of Navajo manufacture or a reused Pueblo structure.

Pictograph Cave was examined for the University of Colorado Museum in 1924. Considerable testing was done, but only a limited amount of full scale excavation was carried out. Late Basketmaker II and Basketmaker III burials had been made in crevices between large stones in the fill. Near one of these, in refuse but in association with each other, were two reed arrows and an atlatl dartshaft. The circular slab room had been abandoned and was refuse filled. A cache of wooden ceremonial staffs and arrows had subsequently been made against the floor; these artifacts appear to be of Pueblo II-III manufacture.

A surface collection of Basketmaker III, Pueblo I-Pueblo III, protohistoric and historic Pueblo, and Navajo potsherds was made in 1963. The majority of the sherds are Pueblo II and III textured ware; most of the remainder are black on white sherds of Basketmaker III-Pueblo III age.

The body of a Navajo infant in a cradleboard had been buried
in the shelter. The burial had been disturbed and thrown out on the surface. This was the only incident of recent pothunting noted in the Monument during the 1963 survey.

CANYON DEL MUERTO CAVE 4

Cave 4 is 600m up canyon from Massacre Cave in the lefthand wall of Canyon del Muerto when facing upstream (Fig. 2). The small cave, located in a recess where the canyon bends from west to northeast, faces approximately north and is always in shade.

The floor in the western and west central parts of Cave 4 is fairly level. Three nearly circular slab rooms have weathered out at the front of the cave. The mud plaster of one of these is tinted with a blue-green wash.

At the eastern end of the shelter, the floor slopes steeply downward. About 9m below the highest point in the eastern end, a retaining wall is built from the east wall of the rockshelter to a large stone block. The space behind the wall is filled with loose, unstratified stone rubble containing diffuse vegetable rubbish. This deposit forms a level area and expands the usable floor space at this end of the cave.

No masonry architecture is evident, suggesting that the use of Cave 4 during the later Pueblo periods was either minimal or specialized. Elaborate pictographs cover the shelter walls, but these are undescribed.

Cave 4 was excavated for the American Museum of Natural History in 1924. Several Basketmaker III burials and a cache of Basketmaker II-III textiles and pigments were located. Two other caches, one of corrugated pottery and the other of wooden and
feather ceremonial objects, relate to Pueblo II-III utilization of the cave.

**BATTLE COVE**

Battle Cove is in the south wall of Canyon del Muerto behind the thin promontory which juts out toward the center of the arc in which Antelope House stands (Fig. 2).

The west end of Battle Cove faces nearly east for about one-third of the length of the shelter. The floor is level from the shelter wall to the talus. On this floor, parallel to the wall and bedded on refuse of unrecorded depth, is a row of 6-8 masonry rooms.

The central third of Battle Cove consists of a sloping ledge which reaches upward from the level of the west end some 14-15m to the extreme depth of the overhang. This area offers no foothold for occupation.

The eastern part of Battle Cove faces nearly north. The floor slopes gradually upward toward a large mass of blocks at the extreme eastern end. A maze of unlined and slab lined cists fills the floor of the eastern third of the shelter.

The cave as a whole shows evidence of long occupation, containing architecture and other features assignable to all periods of the Anasazi cultural sequence. Handprints and other pictographs of all periods are rendered in yellow, two shades of red, brown, pink, white and green pigments.

Battle Cove was excavated for the American Museum of Natural History in 1929.

East End: under the rock fall at the extreme eastern end is a deposit of cultural refuse containing considerable vegetation but
few artifacts. At the west end of the rock fall this deposit is about 60cm deep. Beneath this, the fill is a water-laid adobe almost as hard as stone. Cists of forms unusual in Canyon del Muerto are dug into this deposit; these are unlined, the hard adobe mud forming the walls. Some are wide mouthed, while others are bottle necked. The cists are ramified and sometimes connected to one another. General cist fill is sandy earth containing oak leaves, chaff, corn debris, mud clods and stone.

Many of the cists contained human remains. While some of these are undisturbed burials of Basketmaker II or early Basketmaker III age, one cist contained a jumble of broken and crushed skeletal elements that had lain on the surface for some time before being swept, along with a number of Basketmaker II artifacts, into the cist. Adults, children and infants are represented. To Morris the condition of the bones suggested warfare (1939: 19). The interpretation was reinforced by the presence in a nearby cist of the undisturbed burial of an elderly female with undeformed skull and inclusions typical of the Basketmaker II period; the anomaly in the case is an arrowshaft that had penetrated between the ribs and skin of the left side.

Battle Cove is named for these remains. While the body of the old woman confirms, as Morris claims, that at some time during the Basketmaker II-early Basketmaker III period the atlatl using Basketmakers were in contact with people armed with bows and arrows, the broken bones may not relate to that incident, and may not in fact be the result of warfare at all. The bones are described as weathered and animal gnawed, which suggests the possibility that they were thrown out onto the surface during a
spell of prehistoric grave robbing and were subsequently scavenged by carnivores. The presence of perishable Basketmaker II artifacts among weathered bones suggests secondary association. A reexamination of the material would be of interest in view of first, the incidence of intergroup conflict during the Basketmaker period, and second, the source and timing of the introduction of the bow into the region.

North section at east end of cave: a number of Basketmaker II burials had been made along the line of the cave wall.

The top of a masonry cist is flush with the ground 5.6m south of a small cross cut into a stone outcrop at the extreme north end of Battle Cove. The cist is the well known Tomb of the Weaver, the spectacularly endowed and preserved burial place of a Pueblo III male (Morris 1948; A. Morris 1978: 218-224). The burial has been fully described and will not be reiterated here.

WATER LEVEL CAVE

Water Level Cave is in the north wall of the canyon about 1.6km below Antelope House (Fig. 2). Physical features of the shelter are not described in the field notes.

Although a masonry house, completely fallen by 1929, is at the back of the cave, most of the occupation of Water Level Cave predates the Pueblo III period. The focus of upbuilding of cultural debris is at the center of the shelter. At this point the uppermost deposit reflects the use of the cave by the Navajo as a sheep shelter. Immediately beneath this is a deposit containing Pueblo I sherds. Toward the margins of the floor this stratum dips downward, and above it are levels containing later
sherds. Cultural deposits at the margins of the floor are overlaid with a deposit of mud. At the west end this mud is 60cm thick.

Two stratigraphic sections were cut in the bank in front of the cave in 1929.

Stratigraphic Section 1 (Fig. 13a): width, 1.6m; horizontal thickness, 4cm; depth, approximately 3m.

Level 1: 23cm deep; composed of clods, reed roots and dry refuse; probably accumulated during trampling by sheep.

Level 2: 38-46cm deep. The upper half of the level is sand black with vegetable decay. The lower 18-23cm is composed of cleaner sand.

Level 3: 13cm at west end, 25cm at east end. The matrix is gray ashy earth.

Level 4: 19cm at west end, 10cm at east end. The matrix is gray ashy earth containing a few clods.

Level 5: 23-35cm. The matrix is gray ashy earth containing clods and coarse charcoal.

Level 6: 26cm at west end, 16cm at east end. The matrix is ashy sand with a stratum of clean sand at the center.

Level 7: 18cm at west end, 21cm at east end. A thin layer of sand at the top of the level is underlain by gray ashy earth.

Level 8: 20cm. The matrix is stratified, ashy earth containing bits of burned sandstone and charcoal.

Level 9: 18cm. The matrix is light colored ashy earth containing a lens of cleaner earth at top center and one piece of burned sandstone at the bottom of the level.

Level 10: 18-46cm. The matrix is ashy earth containing much
Fig. 13. Above, Stratigraphic Section 1, Water Level Cave, 1929. Below, Stratigraphic Section 2, Water Level Cave, 1929. Note standing water at base of cut. Photographs courtesy of the University of Colorado Museum.
finely divided charcoal. The burial of a small child was encountered at the center of the cut.

**Level 11**: 18cm. The matrix is ashy earth with charcoal scattered throughout.

**Level 12**: depth greater than 60cm. The matrix is homogenous ashy, sandy earth containing bits of charcoal and burned sandstone. No sherds are present. The level extended below the 1929 ground water level.

**Stratigraphic Section 2**: width not recorded; depth, 2.9m (Fig. 13b).

Upon clearing the cut it was decided that the levels were too badly mixed to merit sectioning. In general, the upper 90cm is composed of thin bands of refuse. The base of the inner arc of a small, carelessly made masonry circle, probably of Pueblo I age, is 76cm below the surface within this level. The wall of the structure is about 30cm high. Below and forward of this is a round slab-lined cist 90cm in diameter and 70cm high. The base of the cist is 1.7m below the surface. The cist had been roofed, and clods of roof mud were noted. The cist is similar to those found in Basketmaker III contexts in other sites in Canyon del Muerto.

No traces of Morris's stratigraphic cuts were evident in 1963. A third section was cut and cultural levels were identified. Sherds collected from each level are described in Chapter V.
Although not every feature is present in every site, architecture is generally similar throughout the rockshelters of Canyon del Muerto. The range of features reflects at least 11 centuries of utilization, occupation and reoccupation of spatially bounded sites by Basketmaker and Pueblo groups, overlaid by 250 or more years of utilization by the Navajo.

Classes of architectural features include retaining walls, cists, pithouse or pithouse-like slab rooms, and masonry buildings. Summary descriptions of each type include an estimation of the cultural period during which each was constructed and in use.

Retaining Walls

Retaining walls were built to increase the amount of level space in areas that would otherwise be too steep for habitation. Such walls were noted in the talus slopes of Mummy Cave, Tseahatso and Canyon del Muerto Cave 4. A similar wall expanded the level area at the front of Trail Canyon Cave 3. A retaining wall to the west of the room and cist clusters at the east side of the east talus of Mummy Cave was excavated in 1925. It is similar, if somewhat more massive, to those noted in other sites.

The base of the retaining wall excavated at Mummy Cave is stepped on a slight ledge in the bedrock beneath the loose material in the talus slope. A similar wall is shown in profile
in Fig. 14. Bands of dry laid stone are topped with short juniper, cottonwood and pinyon pine logs set at a slight upward angle parallel to the line of fall; each of the short logs is topped with a band of dry laid stones. Longer pinyon logs are laid transversely across the short logs and stones, and additional layers are stacked log cabin style across the face of the slope. Masses of sagebrush and corn leaves fill the spaces between and behind the longer logs; bundles of this material are tied to the back of the logs with withes. Stone slabs are laid on top of the brush to further hold it in place.

The triangular space between the top of the wall and slope is filled with unsorted debris swept in from higher in the talus. The fill is primarily red crumbly sand containing rocks, corn refuse and other vegetal debris. Neither potsherds nor turkey dung are present. Primary refuse deposits in front of the wall and on the terrace indicate that it was built and used during Basketmaker III, and contents of cists and rooms on the terrace suggest that the area remained in use through the Pueblo I period.

A considerable space in front and behind the wall was cleared, but its full extent is unknown. Width is at least 4.5m, and maximum height is greater than 3m. Given the length of time during which the terrace was in use, it is possible that additional layers of logs and stones were added to the wall from time to time. However, no evidence of stratification in the terrace fill is seen other than that of the superposed mud and slab rooms and walking surfaces in the uppermost metre of the deposit.
Fig. 14. Line of cut through Cists 16 and 17 and Rooms 2 and 3, Mummy Cave, 1923. Field sketch by Earl H. Morris, courtesy of the American Museum of Natural History.
A second retaining wall of dry laid masonry without incorporated timbers is west of the first wall. This is the only masonry retaining wall examined in the del Muerto sites. Stratified refuse on, behind and in front of the wall and terrace indicates use during Basketmaker III.

A log, brush and stone retaining wall similar to the one excavated at Mummy Cave is in the slope in front of the Western Recess at Tseahatso. Refuse deposited in a slab room and on a paved walking surface in the terrace suggests use during Basketmaker III.

At Trail Canyon Cave 3, the remains of a log, stone and mud retaining wall backed with brush is at the edge of the natural floor at the east end of the shelter. A circular slab walled room typical of the Basketmaker III-Pueblo I period is on the associated terrace.

The eastern end of the floor of Canyon del Muerto Cave 4 slopes steeply downward. A log, stone and brush retaining wall is built from the east wall of the cave to a large stone block in the talus about 9m below the highest part of the floor. The space behind the wall is filled with loose, unstratified stone rubble and diffuse vegetal debris. No artifacts or features relating to the wall were noted, but the presence of at least 3 circular slab rooms and the complete absence of masonry structures in Cave 4 indicate that use of the site was heaviest during the earlier periods of the Basketmaker-Pueblo sequence.
Cists

Cists were built and used during all cultural periods. The majority of those excavated between 1923 and 1932 were built during Basketmaker II and III. Some of these were reused during later periods.

Cist form and size are not standardized but instead appear to depend on the nature of the ground in which the cist is built. Cists in relatively soft deposits are fully slab lined, with cracks between slabs filled with mud containing abundant vegetal material (Fig. 15a). Shapes are generally symmetric: triangular, rectangular, lozenge shaped, oval. Other cists take advantage of the cave wall or the face of a natural boulder as one or more walls, with slabs and mud filling in the gaps; shapes of such cists are often irregular. Natural stone walls were sometimes battered and broken to increase the size of the enclosure. The majority of slab and mud cists were constructed during the Basketmaker II through Pueblo I periods, but such cists were in use during all periods from Basketmaker II through Pueblo III.

Unlined cists dug into the hardpan at Battle Cove were not found elsewhere in the canyon. These display unusual forms; many are multichambered, with narrow branches that sometimes connect with adjacent cists.

Several cists in the Mummy Cave talus and Cave No. 1 were roofed with a domed cribwork of slender timbers reinforced with stone slabs and covered with mud. The fallen remains of similar roofs were on the floor of cists in Trail Canyon Cave 3. Entry to one of the better preserved roofed cists in Mummy Cave was by a square hatchway worn smooth with long use (Cist 28, Fig. 6).
Fig. 15. Above, slab lined cist, Cave No. 1. Below, slab lined cist with masonry upper wall, Trail Canyon Cave 3. Photographs courtesy of the University of Colorado Museum.
slab hatch cover was in place when the cist was excavated. Cist contents and the contents of associated structures indicate use during the Basketmaker III and Pueblo I periods.

The method of flooring was not recorded in each case. In all described cists the most common construction is a floor of slabs or small stones sealed with mud, but floors of tamped earth and the surfaces of natural blocks are also present.

Some of the cists exhibit internal features. Mud steps or platforms are present in some of the larger slab cists (Fig. 16b), and pegs and slender rods, perhaps for hanging stored items, are occasional features. Three figures painted in black pigment on the upper part of the walls of a slab cist in Cave No. 1 are similar to rock art attributed to the Basketmaker III period (Fig. 16a).

The slab walls of several cists at Mummy Cave, Cave No. 1 and Trail Canyon Cave 3 are topped with bands of stones laid flat in mud (Fig. 15b). Some of these cists are roofed. Contents of intact slab-and-masonry cists indicate use during the Basketmaker III and Pueblo I periods. It is not clear whether these are remodelled from earlier structures, nor whether their construction was contemporary with purely slab cists. Similarities between these cists and slab and masonry rooms suggest that the structures are related.

A few masonry cists were examined. These are generally but not invariably square, and all were constructed during the Pueblo period. A few have been reused by the Navajo. Several dry laid and wet laid masonry cists constructed by the Navajo during the
Fig. 16. Internal features of cists. Above, figures in black pigment on mud-plastered wall of Cist 2, Cave No. 1. Below, mud step or shelf in Cist 9, Cave No. 1. Sketches by Earl Morris, courtesy of the American Museum of Natural History.
historic period as corn cists or cache places were examined but not otherwise disturbed.

Pithouses

Two forms of semisubterranean rooms or pithouses are present: circular to subrectangular mud, slab and pole rooms with a complex of internal features including hearths, radial partitions and storage facilities; and less internally complex circular rooms with slab walls topped with a band of masonry.

The first group may be subdivided into forms Morris called "pole and mud rooms" and "PreKivas" (Field Notes 1923, 1924; Morris 1936). While qualitative differences between the forms were apparent to the excavator, examination of the field notes suggests that more features are shared than are unique to either form. However, in order to preserve Morris's distinction between the rooms, they are described separately. Direct and associational dates indicate that pole and mud rooms and PreKivas were both in use during Basketmaker III, and that pole and mud rooms continued to be used during Pueblo I.

Circular slab rooms with masonry bands above the slabs are less well preserved and less completely described than pole and mud rooms and PreKivas. In other sites in the region, slab and masonry pithouses are generally assigned a Pueblo I age, but the contents of one such room that had burned while in use are typical of the Basketmaker III period.

Pole and mud rooms (Figs. 6, 17)

Location. The rooms are located on level areas within rockshelters and on artificial terraces in the slopes in front of the caves. None of those examined was preserved in entirety; the
Fig. 17. Left, Room 1, Mummy Cave talus. Right, Room 16, East Trail Canyon Cave 3, 1923. a, mud rimmed firepit. b, log and mud floor radials. Field sketches by Earl Morris, courtesy of the American Museum of Natural History.
forward edges of those on the terraces have slumped down the slope, and those in the caves have been disturbed by later occupation. Houses aligned along terraces are backed by groups of mud and slab cists. The arrangement of rooms and cists in the shelters is unclear. Features indicating orientation were poorly preserved, and no entryways were identified.

**Form.** The preserved portions of the houses are almost invariably circular. Exceptions were noted in houses in the talus where the slope of the bedrock occasionally formed part of the rear wall. Pole and mud rooms range from 7-11m in diameter.

**Floors.** A layer of mud is spread over a levelled surface. In several cases the base was the infilled and levelled ruins of an earlier, similar house.

**Walls.** The best preserved and best described pole and mud rooms are those in the room and cist cluster in the east talus of Mummy Cave, where rooms were built, refurbished, abandoned and built again on the same terrace (Fig. 6, 14). The walls of the older rooms are outward sloping rims 60-80cm in height, built of slabs and small stones coated with mud containing abundant vegetal shreds. The walls of more recent rooms are somewhat lower, from 10-60cm high, and are built almost entirely of mud reinforced with vegetal shreds and small stones. In each case the interface between floor and wall is a smooth curve with no break.

**Roofs.** The butts and impressions of radial roof poles are in the mud at the top of walls. The poles are set at 45° to 70° angles, extending upward so that their opposite ends rested on horizontal beams supported by upright floor posts. The central part of the roof was not preserved in any of the excavated rooms,
but fragments indicate that it was flat; in profile the room would have resembled a truncated pyramid. The upright floor posts on which the horizontal beams rested are typically 10-15cm in diameter, and are set in somewhat from the walls. No intact floors were located, but the pattern appears to have been 4 posts set in a rough rectangle, with occasional auxiliary support posts. Based on the angulation of roof poles and the position of floor posts, the maximum internal height of a pole and mud room was about 1.8m.

In a few cases the original roofing material is preserved. Spaces between radial roof poles are daubed full of mud, and 2-3cm thick concentric layers of reeds, or in one case juniper bark, are laid over the mud. The reed or bark layers are held in place by a meshwork of vertical sticks spaced 30-60cm apart, overlaid by horizontal sticks spaced 30-60cm apart. The sticks are lashed with yucca rope at each crossing. Over the sticks is a layer of mud reinforced with juniper bark, reed leaves and other shredded vegetation. The outer mud layer averages 4cm in thickness. In a single case, the finished roof was shingled with spruce or pine slabs 6cm thick and 45cm long.

**Entryways.** No entryways were identified. The rooms may have been entered through a roof hatchway or through wall openings. If the rooms on terraces were entered through a wall opening, then in each case the opening must have been oriented toward the downhill side of the talus, since rear walls are continuous.

**Internal features.** The presence of particular internal features appears to be variable. This may be due in part to preservation and in part to the degree of detail reported during
different field seasons. Internal features may include slab lined firepits, mud lined basins and slab cists set into the floor, and above floor slab and/or mud cists. Shelves had been suspended from the roof beams of a burned house in the Mummy Cave talus. Wall pockets and pegs for hanging are sometimes present. A low radial partition reaching from one wall toward the center of the room was noted in one room (Fig. 17). This partition was formed by setting a log on a mud base, then encasing it in additional mud. The height of the partition is 10cm, and width is 18-25cm.

No ashpits, deflectors or ventilators were located, and benches are absent.

Artifact assemblages from pole and mud rooms that had burned with their contents in place indicate that the rooms were used for general habitation, including food preparation and manufacture or storage of tools for use in daily life. Partitions suggest that portions of the rooms may have been set off for particular use, but not enough evidence is present to discuss the implications of such partitioning.

Occurrence in Canyon del Muerto: pole and mud rooms were observed in the east talus of Mummy Cave; in the Western Recess, the east central area, and on a terraced area in the talus at the west end of Tseahatso; in Trail Canyon Cave 3; in Pictograph Cave; and in Canyon del Muerto Cave 4.

PreKivas

Two well preserved PreKivas were excavated in Cave No. 1, and the ruins of others were noted at Areas 14 and 33 in the same cave (Figs. 7, 18, 19). The remains of a similar structure were observed in Trail Canyon Cave 3 (Fig. 20).
Fig. 18. PreKiva 1, Cave No. 1. a, firepit. b, ventilator. c, sipapu (?). d, slab walls. e, pole and mud partitions. f, roof posts. g, post hole. h, slab lined bin. i, mud lined bin. j, wall pocket. *Field sketch courtesy of the American Museum of Natural History.*
Fig. 19. PreKiva 2, Cave No. 1.  a, firepit.  b, sipapu (?).  c, slab walls.  d, pole and mud partitions.  e, roof posts.  f, upright poles.  Field sketch by Earl Morris, courtesy of the American Museum of Natural History.
Fig. 20. PreKiva, Trail Canyon Cave 3.  a, firepit.  b, floor posts.  c, mud radials.  d, slab walls.  e, mud lined basin.

Field sketch by Earl Morris, courtesy of the American Museum of Natural History.
Location. PreKivas in Cave No. 1 are on levelled trash areas or natural rock in the central part of the floor. They are built in a line along the long axis of the cave, but orientation of individual pithouses is not standardized. The PreKiva in Trail Canyon Cave 3 is among large stones at the forward edge of the shelter floor. While a number of cists are near each of the PreKivas, none can be shown to be definitely associated with the structures.

Form. Shapes are rounded to subrectangular. The intact rooms in Cave No. 1 are 4.5m east-west by 3.8m north-south and 4.6m east-west by 4.4m north-south. The remainder of the room at Area 14 is 5.2m in maximum dimension. The PreKiva in Trail Canyon Cave 3 was not measured but appears to be about the same size as PreKivas 1 and 2.

Walls. Housepit walls are faced with upright stone slabs filled and coated with mud. A few courses of dry laid masonry top the wall slabs of PreKiva 1. Wall height averages about 1m.

Roof. The pattern of roof posts is irregular, but in general posts are placed near or in the pithouse wall. This suggests that the profile of the finished PreKivas was somewhat different than that of pole and mud rooms. No roof timbers or poles were present in either of the intact rooms, but concentric bundles of reeds and clods of roof clay showing the imprint of roof poles lay directly on the floor. Burned and crushed remains of roof timbers and poles were against the floor of the structure at Area 14, but their original arrangement could not be determined.

Floors. Layers of mud are plastered over levelled refuse or earth. The level face of a large block or bedrock outcrop is
incorporated into the floor of PreKiva 1, and stone slabs are bedded in the floor mud of PreKiva 2. The western quadrant of PreKiva 1 is raised 46cm above the level of the rest of the floor. The platform is made of mud over heaped and levelled refuse, and is bounded by radial partitions.

**Partitions.** Walls of upright slabs bedded in mud run from the hearth to the northwest and southwest walls of PreKiva 1, setting off the raised western quadrant. The northwest partition is 1.4m high at the northwest end, and the southwest partition is 1.1m high at the southwest end. A third, lower partition made entirely of mud runs from the hearth to the north wall, and a similar partition runs from the hearth to the southeast wall. Set into the mud of the southeast partition are the bases of two upright posts, each 8cm in diameter. With the ties are set at each end of the mud ridge. These features suggest that a screen or other movable feature once formed part of the partition.

PreKiva 2 is divided into 4 irregular segments by low partitions of upright slabs bedded in and topped with mud. The south end of the west partition is about 1m high. Two upright sticks 2.5cm in diameter, the western a reused digging stick, are thrust into the mud of the floor 1m from the north end of the west partition. A cord passes under and around the sticks and the adjacent upright slab, lashing them together. A third stick at the center of the partition is similarly treated, but the eastern member of this pair is missing; a mud socket marks its place. The remaining partitions are low ridges of mud or small logs laid in mud beds.

The PreKiva at Area 14 had been partitioned with at least one
log and mud floor radial. Two partitions in the PreKiva in Trail Canyon Cave 3 are low ridges of mud without log cores or tops.

**Internal features. Hearth:** slab lined hearths are set slightly off center in PreKivas 1 and 2 and the PreKiva in Trail Canyon Cave 3. The hearth in Area 14 is a conical, mud lined basin with a raised rim. Hearths are round to D-shaped, and range from 60-75cm in diameter and 25-50cm in depth. No ash pits are present. **Ventilator and deflector:** an opening 28cm wide and 33cm high at the base of the west wall of PreKiva 1 may be a ventilator. The opening is framed with slabs, and a curved stick is set horizontally across the upper margin. A slab 15cm high and 33cm wide is set into the floor just inside the opening. A conical hole 10cm in diameter is pecked into the stone portion of the floor 60cm east of the firepit in a line with the ventilator. This feature, also present in PreKiva 2, suggests a sipapu. Ventilators and deflectors were not present or were not preserved in the other PreKivas. **Cists, bins and pockets:** a small slab lined cist, an above-floor mud and stone cist, and a small wall pocket are in PreKiva 1. A subfloor cist (not shown in Fig. 18) and a wall pocket are in the southwest corner of PreKiva 2. No features of this kind were observed in the remains of the other PreKivas.

**Entryways.** Walls in the intact PreKivas are continuous, indicating that entry was through a hatchway in the roof.

**Age.** The PreKiva at Area 14 had burned while in use. Contents sealed below burned roof debris include a number of chipped and ground stone tools, a ground stone pipe, bone awls, a wooden flute, coiled baskets, a twined bag, scallop toed sandals,
unfired mud vessels and figurines, 5 restorable fired Lino gray vessels containing shelled corn and herbs, a brown plainware bowl, and one whole and one partial black on white bowl. The inventory indicates that the room was occupied during Basketmaker III. No artifacts were recovered from the other PreKivas.

Beam samples taken from a room described as North PreKiva, Cave No. 1, in 1927 produced cutting dates of AD 701 and 787 (Douglass 1939: 34; Field Notes 1927). The North PreKiva appears to be the one at Area 14. These dates suggest that in Canyon del Muerto the Basketmaker III developmental period may have lasted well into the time generally assigned to Pueblo I.

Slab and masonry rooms

Circular slab lined rooms with bands of coarse masonry laid on the tops of the slabs were observed in Cave No. 1 and Trail Canyon Cave 3 (Fig. 21).

Location. The rooms are located toward the front of the level areas of the cave floors. No orientation was apparent. Masonry topped slab lined cists are behind and beside the rooms, and other slab and masonry cists are against the rear walls of the caves.

Form. No complete rooms were located. The arcs of the remaining walls suggest that the rooms were circular. Slab and masonry rooms are 7-10m in diameter and wall height ranges from 1-2.7m.

Walls. Housepits are lined with slabs and sealed and plastered with mud. Rough masonry is laid directly on the mud tops of the slab walls. A second course of slabs was set above the first in one room in Trail Canyon Cave 3.
Fig. 21. Slab and masonry room, Trail Canyon Cave 3. Photograph courtesy of the University of Colorado Museum.
Roof. No floor posts were present in the floor remnants, and the exact form of the roof in unknown. Layers of reeds and clods of clay in roof fall along the walls suggest that the roof covering was constructed in the same general way as that of preKivas and pole and mud rooms.

Floor. The rooms are floored with mud plastered over levelled debris. A room in Trail Canyon Cave 3 was refurbished by laying a new mud floor directly on burned roof fall, entirely within the structure.

Age. Artifacts sandwiched between the burned roof and the original floor of the refurbished room in Trail Canyon Cave 3 include scallop toed sandals, wooden implements, bone and antler implements, basket molded unfired mud sherds, a cord bail with fired pot lugs attached, and 6 flat, ovate, ground stone female figurines (Morris 1951). The nature of the assemblage indicates that the earlier use of the room was during the Basketmaker III period.

Masonry structures

Masonry rooms are present in every site examined, but their frequency varies considerably from site to site. Small room blocks such as those in Tseahatso may relate to the Pueblo II period. Larger architectural groupings such as the village at Mummy Cave are Pueblo III constructions. None of the masonry rooms or room blocks were investigated.

It has been noted that while most of the masonry architecture in Canyon del Muerto is similar to that of the Kayenta region, the architectural style of the line of rooms and tower at the front of Mummy Cave is typical of the Mesa Verde area (Morris 1941). The
rooms and tower were built late in the Puebloan occupation of the canyon, and it has been suggested that an actual migration from Mesa Verde took place, with the people settling in the canyons for a relatively brief period before final abandonment.
CHAPTER IV

BURIALS

169 burials were excavated between 1923 and 1932. The field notes indicate that burials excavated for the University of Colorado Museum are entirely similar in content and manner of burial to those excavated for the American Museum of Natural History and the Carnegie Institution. Only the burials excavated for the University of Colorado Museum are described. Artifacts accompanying burials are followed by their catalogue numbers; all such artifacts are described in Chapter V. Burials excavated for the American Museum of Natural History and the Carnegie Institution are not described.

Tseahatso

East Central Area

Burials 1 and 2: previous visitors to Tseahatso had dug over a sloping area in front of a two room masonry house. The bones of at least two adults were scattered in their back dirt at the west end of their diggings. Burials 1 and 2 were recovered from undisturbed earth beneath the backdirt.

Burial 1: infant, undisturbed (Fig. 22a). The body lay on the back in a natural position, about two-thirds extended with head to the east. The infant had been wrapped in a rabbit skin blanket (2400). The body rested on a fragment of a large plaited rush mat (2403) and was covered with two very small complete rush mats (2401, 2402). A strip of woven cotton cloth with each end
Fig. 22. Above, Burial 1, Tseahatso, the grave of a Pueblo II infant. Below, double child burial in an abandoned pithouse. Burials 6 and 7, Basketmaker II-III, Tseahatso, 1924. Photographs courtesy of the University of Colorado Museum.
sewn around a smooth stick (2404) lay lengthwise below the body; this and the mats are part of the infant's cradle. A large Chaco b/w olla sherd (2405) was at the front of the skull, and a long crook-shaped digging stick (2406) lay diagonally over the head. Depth below surface was not recorded.

Ceramic inclusions indicate the Pueblo II period.

Burial 2: small child, undisturbed. Burial 2 was 90cm west of Burial 1, 46cm below the surface. The body of a 3 year old child lay partly flexed on the back with head to the east. The body had been wrapped in a blanket made of fur and feather string (2588). Black and white cylindrical disc beads (2588a) were among the wrappings. The shrouded body lay on a plaited rush mat (2589). Broken and scattered over the body were parts of a cradle: a bark hood (2590), a woven cotton band fastened to two sticks (2593) and part of a plaited rush mat (2592). A small fingernail indented jar filled with squash seeds (2599), an incomplete gray plainware jar (2595) and a sherd from a redware bowl (2596) were between the cheek and the right shoulder. Lying on the breast was a rattle or toy made of black walnut shells strung on cords (2597). A cottonwood billet and several nondescript sticks lay above the body.

Ceramic inclusions indicate the Pueblo II-III period.

A previously undisturbed area next to the cliff wall at the west margin of the East Central Area was investigated. The burials of two children were in this undisturbed area.

Burial 3: the burial of a small child with an artificially deformed skull was just below the surface adjacent to the shelter wall. The body in its feather string shroud (2600) had been
disturbed by rodents, but had evidently lain on the back. A piece of cotton cloth (2601) was under the right shoulder.

Period of burial, Pueblo II-III.

**Burial 4:** the burial of a child with an undeformed skull was 76cm below the surface in a pit dug into corn chaff, 90cm west of Burial 3 and adjacent to the shelter wall. The body rested on the right side of the back with head to the west. A Kana'a b/w bowl (2602) was to the left of the skull, and a gray plainware jar (2603) was to the right of the skull. A sandy yellow residue in the bowl appears to be food.

Period of burial, Pueblo I.

A nearly circular slab room 3.3m in diameter and at least 90cm deep is about 23m west of Burials 3 and 4. The upper edges of the wall slabs are barely below the prehistoric surface. At the time of excavation the pithouse was partially covered by backdirt left by a previous excavator.

The pithouse had been divided into quadrants by radial slab partitions set at right angles to each other. It is not clear whether this was the result of remodelling or the original construction. Burials had been made in one quadrant (Burials 5-9).

**Burial 5:** the body of an infant wrapped in a perfectly preserved rabbit skin blanket (2605) lay in the northwest quadrant at a depth of 30cm. There were no grave inclusions.

**Burials 6 and 7:** the bodies of two children were 60cm above the floor in the southwest corner of the northeast quadrant (Fig. 22b). Burial 6, a small child, lay flexed on the back, parallel to the west wall with the head in the corner of the cist. The
body was wrapped in a fur string blanket (2606). There were no burial inclusions. Burial 7, a slightly larger child, was parallel to Burial 6 and in the same position. The body was wrapped in a fur string blanket (2607a) and lay on a mass of bunch grass and cleaned plant fiber. A coiled basket (2608) was beneath the skull, a second coiled basket (2609) was inverted over the skull, and a third coiled basket (2610) lay to the left of the skull. A gourd bottle with cord net (2611) was on the trunk. Within the fur string blanket the body was wrapped in cleaned yucca fiber. A bracelet of juniper berries and olivella shells (2607b) was wrapped 4 times around the left wrist.

Burials 8 and 9: in the southeast corner of the same quadrant, 30cm below Burials 6 and 7 and 30cm above the floor, were the bodies of two children. A very thin child lay with head to the south, flexed on the back with the knees raised (Burial 8). There were no wrappings or inclusions. Burial 9, the body of a somewhat larger child, was beside Burial 8. The body lay flexed on the right side of the back with knees raised. The head was to the south. The child was wrapped in a feather string blanket (2613). There were no inclusions.

The manner of burial of Burial 7 suggests the Basketmaker III-Pueblo I period. Burial 6 is probably contemporary with Burial 7. The lack of inclusions with Burials 8 and 9 precludes definite assignment of period of burial, but it is suggested that they were made during the same period as Burials 6 and 7.

Burial 10: the burial of a small baby in a fur string robe (2614b) was outside the burial quadrant but in the vicinity the pithouse wall. The body lay 60cm below the surface on a bed of
bunch grass laid on the natural cave floor. A string of thick shell disc beads and an olivella shell bead were among the wrappings (2614c).

The manner of burial and lack of ceramic inclusions indicates the Basketmaker II-III period.

**Burial 11** (Fig. 23): the burial of an adult with an artificially deformed skull had been made in a pit dug into cultural refuse immediately up slope from the pithouse in the direction of the shelter wall. The top of the burial was just below the surface. The body lay on the back with knees vertically elevated, right hand on the abdomen and left hand crossed over the lower chest. It had been wrapped in a feather string blanket. To the left of the skull were a small corrugated pitcher (2616), a Dogoszhi b/w pitcher (2617) and a yucca ring basket containing squash rind and seeds (2618) (Fig. 23b). A piece of plaited rush matting (2619) covered the remains and inclusions (Fig. 23a).

The ceramic inclusions are Pueblo II in age.

**Burial 12:** the body of an adult with an artificially deformed skull was 90cm west of Burial 11. The body was tightly flexed on the back with head to the east. It was wrapped in a feather string blanket (2620). A large sherd from a hatchured olla (2621) containing a wad of cornmeal was beside the body.

The burial is Pueblo II-III in age.

**Western Recess**

An undisturbed area at the eastern end of the Western Recess was examined. A large bowl shaped coiled basket (2622) was in the refuse at the edge of a burial cist excavated in 1923. This basket may have been part of the disturbed burial inclusions
Fig. 23. Burial 11, Tseahatso, 1924. Above, plaited mat covers the burial of a Pueblo III adult. Below, exposed burial after removal of mat. Photographs courtesy of the University of Colorado Museum.
Fig. 24. The partial unwrapping in the field of Burial 13, Tseahatso, 1924, an adult female of the Basketmaker II-III period. Photograph courtesy of the University of Colorado Museum.
scattered through the upper fill of the cist.

**Burial 13:** the burial of an elderly female with undeformed skull was in a slab lined cist adjacent to the burial cist excavated the previous year. The body lay on the back with the head to the west. The right hand rested against the chin and the left was on the trunk. The knees had been elevated, but the legs had been torn off and thrown down along the right side of the body when a slab floor was built over the lower cist fill. Baskets and any other immediately visible grave inclusions were probably removed at that time. The remains were wrapped in a feather string blanket (2624) that was not disturbed by the builders of the slab floor. Morris has described the partial unwrapping of the body in the field: "on the left wrist of the body is a magnificent cuff of 200 olivella shells and a turquoise pendant (2363), a unique find among archaeological material from the southwest" (1925: 291, 298) (Fig. 24). Carlson (pers. comm) completed the unwrapping of the body in 1963. A woven band (2624a) and 7 skeins and rolls of various cordages and braid (2624b-h) accompanied the burial within the shroud.

The loss of burial inclusions to prehistoric grave robbers prevents secure age assignment. The position of the body below the slab floor and presence in the Western Recess suggest that the burial was made during Basketmaker II.

**Burial 14:** an oval, slab lined cist is adjacent to the cist containing Burial 13 in the direction of the shelter wall. A slab floor was laid over the lower cist fill 25cm above the mud plaster of the original floor.

The material between the original floor and the later slab
floor is a mass of fluff from feather string blankets and other burial objects, all badly rodent disturbed. A few of the larger bones of an adult and a child and many coiled basket sherds indicate that burials had been made in the cist prior to the building of Slab Floor 2. Among the identifiable objects are the proximal end of an atlatl (2626), 3 fragmentary atlatl dartshafts (2627/840-850), two female figurines carved from corn pith, both wearing aprons (2628, 2629), the flap of a polychrome twined apron (2630), 6 turquoise pendants and many shell beads (2631).

The atlatl fragments suggest the Basketmaker II period; the corn pith figurines and twined apron flap suggest the Basketmaker III period. The question of whether these were associated prior to the building of the slab floor is open, but the deposit did not have the appearance of debris swept into the cist to level the floor. It is suggested that these are the remains of late Basketmaker II-early Basketmaker III burials made prior to the building of the slab floor.

**Burial 15:** the burial of an adult was at the eastern edge of the small recess west of the Stratigraphic Section made in 1923. The burial was in a natural cranny between large stones 1.5m below the surface. The body lay on the back with head to the southwest. The knees were elevated, with cords tied around the thighs and ankles to hold the tightly flexed legs in place. The body was wrapped in a feather string blanket and surrounded by a small amount of juniper bark. A small carrying basket was inverted over the skull. To the left of the skull was part of a twined bag (2632) and on the breast was a long slender hide bag containing 3 smaller hide bags (2633). Sandals were in place on the feet.
The manner of burial, particularly the inclusion of sandals on the feet and the juniper bark bed, suggest Basketmaker II. The small carrying basket suggests that the burial was made late in the period.

Burials 16A and 16B - the Chief's Grave (Morris 1925: 292-293, 299; A. Morris 1978: 205-206): the rockshelter wall forms the northern margin of an extremely irregular cist. The remaining walls are made of upright slabs sealed with mud (Fig. 25a). According to Ann Morris (1978: 205) the cist is partitioned from a slab room; this is not in accord with the field notes.

A slab floor 31cm below the top of the slab walls completely sealed the contents of the lower part of the cist. Immediately beneath it were masses of bunch grass and juniper bark. The grass and bark layer was unburnt at its interface with the stone floor, but 10-25cm below this the vegetal material at the edge of the cist showed signs of charring. Evidence of burning became more marked below this point.

Several centimeters below the first evidence of burning was Burial 16A, the body of an adult lying on the left side of the back with the head pointing away from the shelter wall (Fig. 26). The left hand lay across the abdomen, just below the sternum, and the right hand was over the groin. The elevated knees had been torn away when the slab floor was constructed.

A partially charred coiled basket tray (2407) was inverted over the skull. The calcined skull lay in a bowl shaped coiled basket about 25cm in diameter. This was too charred to recover. Three strands of cylindrical wooden beads (2408) and a strand of yucca seed beads (2409) passed around the neck and down the
Fig. 25. Above, field sketch of cist containing Burials 16A and 16B (Chief’s Grave) showing position of the bodies. Below, field sketch of cist containing Burial 17 (Burial of the Hands) showing position of the forearms in the grave. Sketches by Earl Morris, courtesy of the University of Colorado Museum.
Fig. 26. Burial 16A, the uppermost body in the Chief's Grave, a Basketmaker II double burial in the Western Recess of Tseahatso, 1924. Photograph courtesy of the University of Colorado Museum.
breast. A long bottle gourd (not recovered) lay at the left side.

Mice or rats had nested in the abdominal cavity. Among the rubbish of the nest were cordage from fur and feather string blankets, bits of a 2cm wide woven band, parts of 3 slender wooden pins, a tubular ground stone pipe (2410), an unworn sandal (2411), 3 slender wooden pins bound together with fine cord (2412), the cord base and quill wrappings of a composite prayer plume (2413), and two self-wrapped rolls of split twigs (2414, 2415).

Adjacent to the right shoulder of Burial 16A were the raised knees of Burial 16B, an aged male (Fig. 27). Burial 16B was at least 20cm below Burial 16A and at right angles to it, so that the second body lay parallel to the shelter wall with head to the west and face pointing directly upward. The fire that had thoroughly charred the head end of Burial 16A had reached Burial 16B with less effect, only touching the knees, chest and chin.

The lower part of the body was completely wrapped in soft, finely tanned buckskin. Unworn twined sandals (2416) were on the feet and a second pair of unworn sandals (2417) lay transversely across the right side of the chest. A feather blanket enveloped the remains. A bowl shaped coiled basket (2418) was beneath the head and a large coiled basket tray (2420) was inverted over the head.

Lying on the face, parallel to the axis of the body, were two hair ornaments made of long, slender wooden pins (2421, 2422). A similar hair ornament lay beside the right shoulder (2452). Around the neck was a thick, wrapped cord with an abalone pendant (2423). A 3 strand bracelet of large and small olivella shells (2429) was on the left wrist, and the remains of a second bracelet
Fig. 27. Above, detail of the burial accompaniments of Burial 16A. Below, Burial 16B, the lower body in the Chief's Grave, a Basketmaker II double burial in the Western Recess of Tseahatso, 1924. Photographs courtesy of the University of Colorado Museum
were beside the middle of the left forearm (2430).

A flute (2424) lay on the chest, extending between the thighs. Beside the midsection of the flute was a smooth stick bound at the center with cords and buckskin strips that had been knotted around quills (2525).

Along the left side, next to the arm, was a second flute (2433). Beside it were two atlatls (2431, 2432) and 5 atlatl dart mainshafts (2434-2438). The mainshafts had been broken 30-40cm from the butt ends in order to fit them into the burial space. Where the ends touched the cist wall they are decayed, but the shafts are otherwise complete. Beside the dart shafts were 3 bone-tipped wooden flakers (2439-2441) and 5 wooden flakers without bone tips. With the flakers was a long smooth stick wrapped at the more slender end with sinew and cord (2447); the end of the stick tapers to a smooth, blunt point similar to a fire drill. A cuff of soft buckskin was around the midsection of the artifact. At the outer edge of the sheaf of wooden implements were two large flutes (2448, 2449) and on top of them, two more atlatls (2450, 2451).

A bowl shaped coiled basket (2426) was beside the left upper arm. In it were a tubular ground stone pipe (2427) and a number of locks of human hair, each lock wrapped and tied with cords (2428).

The area surrounding Burial 16B and extending up and around Burial 16A was packed with juniper bark; it surrounded Burial 16B on all sides and lay over it in parallel bands 20cm thick. Morris has said that he had never seen so much bark surrounding a burial: "there was enough to fill an ordinary wagon bed" (Field Notes
In view of the grass and bark surrounding them, it is apparent that Burials 16A and 16B were buried as a single event. A radiometric date of 1695±90 BP (AD 255) was obtained on a sandal from Burial 16B (GX0622); Burials 16A and 16B were made during Basketmaker II.

The fire that had charred the central area of the contents of Cist 6 has been discussed by Morris (Field Notes, 1924; Morris 1925: 292). The burnt area was surrounded on all sides with unburnt material, and there are no signs of burning above, on, or immediately below the slab floor. It seems unlikely that the grave contents could have given rise to spontaneous combustion. Morris suggested that fire might have been buried as a mortuary accompaniment. While this remains a possibility, another explanation might be that a live coal fell into the burial cavity, slipping through the grass and bark, when the slab floor was built. When the floor was sealed oxygen would have been restricted or cut off, resulting in a slow smouldering fire that eventually went out of its own accord.

**Burial 17 - the Burial of the Hands** (Morris 1925: 291-292; A. Morris 1978: 203-204): a roughly rectangular slab and boulder cist with its long axis perpendicular to the shelter wall is adjacent at its northeast corner to the cist containing Burials 16A and 16B (Fig. 25b). An unexamined slab and masonry cist is at the southeast corner.

A 3-5cm layer of sterile drift sand lay over Cist 7. Directly on the sand was a slab floor. Above the floor to the surface was a 46cm layer of clods, vegetable rubbish and the slabs
of ruined cists.

The fill of the upper part of Cist 7 was dirt clods. About 60cm below the tops of the slab walls, part of a feather string blanket (2453) was spread horizontally across the cist cavity. The blanket lay directly upon an inverted coiled basket tray (2454). Beneath the basket, resting parallel and supine on a bed of bunch grass, were the forearms and hands of an adult (Fig. 28). The proximal ends of the exposed radii and ulnae rested against the cist wall at the junction of the southwest wall slab and the masonry of the unexamined cist. No other body parts were present.

Around the wrist of the left forearm was a one-strand bracelet of concavo-convex disc beads and flat pink shell disc beads (2465). A wrapped neck cord with 18 ground Glycemeris shell rings bound to it with fine cords was spread across the midsection of the forearms, with the open portion of the necklace toward the elbows (2458). Distal to and over this necklace was a neck cord made of 22 fine 2-ply cords to which two abalone pendants had been lashed (2460, 2461). The pendants lay on the bones, pointing toward the elbows. Lying lengthwise over these necklaces was a juniper bark cord with an abalone pendant (2459). The pendant rested between the wrists. Beside the midportion of the left radius was a small coiled basket (2456) containing 63 crescentic ground Glycemeris shell pendants (2457). Beside the right radius, with toes pointing toward the cist wall, were two pairs of unworn, twined polychrome sandals, each pair stacked on one another (2462, 2463). Beside the proximal end of the right forearm was a reed tube to which feather quills were lashed with sinew and fine cord (2464).
Fig. 28. Burial 17, the Burial of the Hands, a Basketmaker II burial of mutilated human remains excavated from the Western Recess of Tseahatso in 1924. Photographs courtesy of the University of Colorado Museum.
A radiometric date of $1515 \pm 75$ BP (AD 435) was made on one of the necklace cords from Burial 17 (GX0623). This, along with the presence of sandals among the burial inclusions, indicates that the burial was made during Basketmaker II.

The burial contents were undisturbed; Burial 17 clearly never consisted of more than forearms. Although the deliberate burial of partial or mutilated bodies during Basketmaker II has been previously reported in the Grand Gulch area (McNitt 1957), no satisfactory explanation for the practice has been advanced. The burial of partial and mutilated bodies suggests magical practices, perhaps involving witchcraft or shamanism. In any case, it was obviously important to those who performed the burial that the deceased be buried with certain honours at Tseahatso.

**Burials 18 and 19:** a cist along the shelter wall west of the Burial of the Hands had been wet and all organic contents were decayed.

A slab floor was built across the cist. Above this floor was the skeleton of a child (Burial 18). The scattered bones of a second child were 76cm beneath the slab floor (Burial 19). No grave goods were preserved in either burial.

No time of burial is assigned to Burial 18. The position of Burial 19 within Cist 6 is similar to that of Basketmaker II burials in this part of the Western Recess, but the lack of burial inclusions prevents assignment to a specific period.

**Burial 20:** a slab and boulder cist is along the shelter wall west of the cist containing Burials 18 and 19. The top of the cist is 76cm below the surface of a layer of stony earth that had worked down from the slope at the west end of the cave. The body
of an adult with an undeformed skull had been buried in the cist. The contents had been wet, and all organic materials except the bones were decayed. A Kana'a b/w bowl with fugitive red wash (2640) was beside the left shoulder, and a White Mound b/w bowl with fugitive red wash (2641) and part of a plain grayware utility vessel (2642) were beside the right shoulder.

The ceramic inclusions suggest that the burial was made in late Basketmaker III to early Pueblo I.

**Burials 21-24:** a large cist is 9.1m south of the cist containing Burial 20. The cist had been partially wet and contents were poorly preserved. Burials 21-24 had been made in this cist.

The burials of two children (Burials 21 and 22) were poorly preserved and somewhat scattered. No inclusions were evident.

The body of a third child lay tightly flexed on the back with the head to the south (Burial 23). It had been wrapped in a feather string blanket, and a bowl shaped coiled basket (2643) was inverted over the head.

The body of a somewhat larger child was partly flexed on the back with head to the southeast, 1.2m northeast of Burial 23 but still within the cist (Burial 24). The remains had been wrapped in a feather string blanket, and the bundle lay on separated fiber. A large coiled basket (2645) was inverted over the head.

At the south side of the cist, unassociated with any of the burials, was a nearly complete Kana'a b/w bowl (2646).

The manner of burial of Burials 23 and 24 suggest the Basketmaker III period. Burials 21 and 22 may be contemporary with these. Although unassociated with the burials, the Kana'a
b/w bowl suggests that the fill of the cist dates to the Basketmaker III - Pueblo I periods.

PICTOGRAPH CAVE

Scattered remains

The scattered remains of 3-4 adults and at least 2 children were in the surface earth at the east end of the cave. Among these remains was the left radius of an adult around which two fine cords were tightly wrapped (2548). A coiled basket (2549) and a cylindrical plug of unfired clay wrapped in juniper bark and cordage (2550) were also recovered from this area. No age can be assigned to the remains. The coiled basket is constructed and decorated in Basketmaker III style.

Burials

Burial 1: the burial of an adult male had been made in a natural crevice between two large stones, 1.2m from the cave wall near the eastern end of the rockshelter (Fig. 29a). The body was tightly flexed with arms folded across the chest, feet on buttocks and knees pressed down on the trunk. The head was to the west.

The body had been laid directly into the crevice with no grave lining. A large feather-string blanket (2552) was spread over the remains, and a large coiled basket (2553) was inverted over the skull outside the blanket. The left ear of the individual had been pierced and a de-pithed stick 0.3cm in diameter and 1.7cm long was inserted through the earlobe (Fig. 29b).

The style of the basket indicates Basketmaker III age for the burial.
Fig. 29. Burial 1, Pictograph Cave, 1924, an adult male of the Basketmaker III period. Above, the grave prior to full excavation. Below, body of Burial 1 after unwrapping. Note decorticated stick inserted into left earlobe. Upper photograph courtesy of the University of Colorado Museum. Lower photograph courtesy of R. L. Carlson.
**Burial 2:** 4.6m west of Burial 1 and 3m south of the rear wall of the shelter an infant had been buried in a shallow pit scooped into the earth of the cave floor. The body had been wrapped in a fur string blanket (2555) and laid into a coiled basket (2556) (Fig. 30). The bundle and basket were covered with a coiled basket tray (2557) and bunch grass was spread over the tray. The top of the grass was 15cm below the surface.

The style of the basket indicates the Basketmaker III period.

**Burials 3 and 4** (Fig. 31): directly north of Burial 2, 1.5m south of the rear wall of the cave, a double interment had been made in a large cavity between natural stones. The top of the grave was 0.5m below the surface. Mice had nested among the contents of the burial, mixing them, and the bones of both skulls were missing.

The burial cavity was lined with a great quantity of bunch grass. Resting on the grass, right side up, was a large carrying basket (2558) containing the body of a child lying on a juniper bark mat (2559). The body was flexed on the back with arms crossed over the trunk and knees pressed down to the right. The head was to the south.

A pair of cordage sandals (2560) were on the feet; a second pair, wrapped in colored cords (2561) were to the left of the pelvis. A bracelet of olivella shells and disc beads (2562) was on the left wrist, and a bracelet of olivella shells (2563) was on the right wrist. A turritella shell (2564), 14 crescentic white shell pendants (2565) and an object made of 6 golden barrel cactus spines set into sinew and cord sockets (2566) lay on the breast.
Fig. 30. Burial 2, Pictograph Cave, 1924. The body of a Basketmaker III infant was laid into a coiled storage basket. The tray basket to the left of the storage basket covered the remains. Photograph courtesy of the University of Colorado Museum.
Fig. 31. Burials 3 and 4, a Basketmaker II double burial of a small child and a near-adolescent, Pictograph Cave, 1924. Photograph courtesy of the University of Colorado Museum.
Two long, cylindrical worked sticks (2567, 2568) were to the left of the body, and a polychrome sash plaited of very fine cordage (2569) lay folded over the body from the neck to the trunk. 

Lying directly on Burial 3 was Burial 4, the body of an infant wrapped in a feather-string blanket. The body was flexed on the back with arms crossed over the trunk and knees pressed down to the right of the trunk.

A bracelet of olivella shells and disc beads (2570) was on the left wrist. Beside the breast was a buckskin bag containing specular hematite (2571). Some of the hematite had leaked down to stain the blanket of Burial 4 and parts of Burial 3.

Lying on the eastern margin of the large carrying basket that held both burials, near the place where the head of the infant had rested, was a buckskin bag containing a lump of salt (2572). Just beyond the limits of the basket in the same direction was a gourd vessel in a cord pot net (2573). At the west edge of the basket, detached, was a tumpline (2574).

The manner of burial indicates the Basketmaker II period.

Portions of 2 reed arrows and one atlatl mainshaft (2575/727-729) were recovered together at the level of the top of the burial cavity in the 1.5m between it and the rear wall of the rockshelter. These were probably not associated with the burials.

*Historic burial: University of Colorado Survey, 1963*

The burial of a Navajo infant in a cradleboard had been disturbed by pothunters and the cradle had been broken and thrown out on the surface. The cottonwood bark hood and side boards (13514) and some of the burial cloths (13515, 13516) were collected. This was the only instance of recent pothunting
observed by the UCM party in the Monument.

TRAIL CANYON CAVE 2

Burials had been made along the entire length of the floor, but without exception these had been disturbed in prehistoric times. Scattered human remains and the ruins of slab cists were visible at the surface prior to excavation.

Burials

The bodies of 10 adults, only two of which retain the skulls, were observed in the disturbed fill. Each had been wrapped in a blanket of fur or feather-string and enclosed in either juniper bark or bunch grass. Nine of the bodies were displaced. The tenth, Burial 1, had been disturbed at the cranial end but otherwise lay in situ.

Burial 1: the body of an adult was in a partially dismantled cist at the west-center of the shelter. Slabs at the east side of the cist had been torn out and the skull had been removed, but the burial was otherwise intact.

The body was flexed on the back with head to the east. The remains were wrapped in a feather-string robe and surrounded by bunch grass. A perfectly preserved, unworn, miniature burden basket (2540) was against the west wall of the cist at the foot of the burial (Fig. 32). Molded into the bottom of the basket was a bundle of human hair wrapped around a length of fine fur-string and tied with a human hair cord (2341). Partially inside and spilling out of the mouth of the basket was a large twined bag (2343). A composite wand to which feathers, hide, beads and hoof
Fig. 32. Miniature burden basket, wand and twined bag in situ at the foot of Burial 1, Trail Canyon Cave 2, 1924. Photograph courtesy of the University of Colorado Museum.
tinklers are attached was beneath the basket (2344). Two oak sticks, each 5-7cm in diameter, lay lengthwise beneath the body.

None of the artifacts from Burial 1 have been dated, but Morris considered the miniature burden basket to be a cultural marker of the Basketmaker III period (Morris and Burgh 1941). The manner of burial is consistent with Basketmaker III.
CHAPTER V

ARTIFACTS

Artifacts recovered for the University of Colorado Museum in 1924 and 1963 are described. A number of artifacts presented to the University of Colorado Museum by Mrs. Earl Morris in 1959 are included.

The artifacts are categorized according to material. Material groups are subdivided into functional categories, and functional categories are further subdivided according to the techniques by which the artifacts were manufactured. Where possible, the period of manufacture and use of each artifact is given.

The artifact assemblage is generally similar to that recovered from other Basketmaker and Pueblo sites in northeastern Arizona and southeastern Utah.

Ceramics

Sixteen whole vessels, two partial vessels and a number of sherds were recovered during the 1924 excavations, and four additional vessels that had eroded from open sites within and near the canyons were purchased from local Navajos. These artifacts are described below. Sherds recovered during the 1963 University of Colorado survey are presented in Table 1.

The majority of the vessels and sherds recovered in 1924 are
Table 1
Ceramic Types by Cultural Period:
Surface Collection, University of Colorado Survey, 1963

Ceramic types listed in Table 1 are illustrated in Figs. 33-36.

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Table 2
Ceramic Types: Counts of Sherds per Level, Stratigraphic Cut, Water Level Cave, 1963

Ceramic types listed in Table 2 are illustrated in Figs. 33-36.

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Totals | 11 | 23 | 27 | 5 | 65 | 5 | 18 | 59 | 25 | 42 | 44 |

Asterisk (*) following the number indicates that matching sherds were recovered from two levels.
Fig. 33. Textured plainware sherds surface collected in 1963. a, neck banded and corrugated. b, incised corrugated.
Fig. 34. Sherds of black on white painted wares surface collected in 1963. Pueblo III: a, Mesa Verde b/w. b, Tusayan b/w. c, Tularosa b/w. d, Pollaca b/w. Pueblo II-III: f, Flagstaff b/w. g, Dogoszhi b/w. h, Sosi b/w. Pueblo II: i, Black Mesa b/w. e, Gallup/Mancos b/w. j, Escavada b/w. k, Red Mesa b/w. Pueblo I: l, Kana'a b/w. m, St. Joseph b/w. n, Kiatuthlanna b/w. q, White Mound b/w. Basketmaker III: o, Lino b/g. p, La Plata b/w.
Fig. 35. Redware and polychrome sherds surface collected in 1963.
Pueblo III: a, Naha polychrome. b, St. John polychrome. c, Wingate polychrome. f, Kiet Siel polychrome. g, Tusayan polychrome.
Pueblo II-III: e, Cameron polychrome. h, Tusayan b/r. Pueblo I: i, Deadmans b/r. j, Abajo r/o. Unidentified w/r, dark red exterior at d.
Fig. 36. Polychrome sherds of Navajo and Pueblo vessels, historic period. Rows 1-4, Navajo. Row 5, Zuni.
pueblo I-III and historic Navajo in age. Few Basketmaker III style ceramics were recovered, and of those few, most are either too fragmentary for secure age assessment, or are associated with younger artifacts. The sherd collection made during the 1963 University of Colorado survey increases the number of distinct pottery styles recovered in Canyon del Muerto, but does not differ greatly in age range from the ceramic assemblage recovered in 1924.

Ceramics are presented by phase and style. Ceramic identifications were made by R. L. Carlson, and phase assignment is based on the work of Breternitz (1966).

Plainware

2585 (Fig. 37e): Lino gray jar, Basketmaker III. Height, 13.2cm; diameter, 17.2cm. Depressed spherical form. The outer surface is smoke blackened and food residue is present on the interior. Provenience: general digging, Tseahatso.

2603 (Fig. 37f): plainware jar, Pueblo I by association. Diameter, 13.2cm; height, 11.8cm. The exterior is smoke blackened and food residue (?) adheres to the interior. Provenience: Burial 4, Tseahatso.

2642: fragmentary plainware jar, Pueblo I by association. Diameter, about 15cm; height, about 15cm. The exterior is smoke blackened. Provenience: Burial 20, Tseahatso.

2595 (Fig. 37g): miniature plainware jar, fragmentary, Pueblo II-III by association. Height, 5.3cm; diameter, about 6.5cm. Provenience: Burial 2, Tseahatso.

2586: sherds of several restorable vessels were recovered
Fig. 37. Plain and corrugated whole vessels recovered in 1924 (not to scale). a, neck banded Kana'a grayware jar, Pueblo I, UCM9455. b, fingernail indented jar, Pueblo II-III by association, UCM2594. c, overall indented corrugated pitcher, Pueblo III, UCM2616. d, Jeddito corrugated jar, Pueblo III, UCM2394. e, Lino gray jar, Basketmaker III, UCM2585. f, Tusaya grayware jar, Pueblo I by association, UCM 2603. g, Tusayan grayware jar, Pueblo III by association, UCM2595.
from the general digging at Tseahatso. These were not examined.

Textured Ware

9455: large Kana'a neck banded jar (Pueblo I) (Fig. 37a; Lister and Lister 1978: 25, Fig. 11). Diameter, 35.5cm; rim diameter, 18.5cm; height, 35.7cm. Found at edge of first bank above White House, Canyon de Chelly.

2393: the jar was observed in a museum case and measurements are approximate. Height, 35cm; rim diameter, 30cm; neck diameter, 25cm; shoulder diameter, 30cm. Independent restricted vessel, inflected contours. Surface smoothed from base to shoulder, with narrow, unobliterated coils from shoulder to neck. Six columns of 4 incised corrugated rhomboids, each rhomboid slightly to the right of the one below, are placed around the upper half of the vessel. A similar vessel from Pueblo Bonito, Chaco Canyon (Judd 1954: 187, Plate 50d), is assigned to the Pueblo II period. Provenience: cache at eastern end of Tseahatso.

2394 (Fig. 37d): Jeddito corrugated jar, Pueblo III. Height, 16.4cm; diameter, 20.1cm. Single horizontal strap handle. The surface is black from use. Provenience: cache at east end of Tseahatso.

2594 (Fig. 37b): miniature fingernail indented jar, Pueblo II-III by association. Height, 6.4cm; rim diameter, 6.9cm; base diameter, 5.7cm. Straight sided, with rim flaring to horizontal. Provenience: Burial 2, Tseahatso.

2616 (Fig. 37c): overall indented corrugated pitcher with modelled handle, Pueblo III. Diameter, 8.5cm; height, 10.6cm. Provenience: Burial 11, Tseahatso.
Decorated Wares

Black on white:

2602 (Fig. 38d): Kana'a b/w bowl, Pueblo I. Diameter, 15.8cm; height, 7.5cm. Provenience: Burial 4, Tseahatso.

2640 (Fig. 38b): Kana'a b/w bowl with fugitive red exterior, Pueblo I. Diameter, 19.1cm; height, 9.2cm. Provenience: Burial 20, Tseahatso.

2641 (Fig. 38e): White Mound b/w bowl with fugitive red exterior, Pueblo I. Diameter, 19.1cm; height, 7.8cm. Provenience: Burial 20, Tseahatso.

2646 (Fig. 38c): Kana'a b/w bowl, Pueblo I. Diameter, 21.8cm; height, 10.0cm. Provenience: Cist 10, Tseahatso.

9453: Black Mesa b/w pitcher with effigy handle representing an inverted deer foot (Pueblo I-II) (Fig. 39f) (Morris in Lister and Lister 1978: 30). Diameter, 10.4cm; height, 12.6cm. Purchased from a Navajo woman in Canyon de Chelly.

9456: Kana'a b/w bird-shaped vessel (Pueblo I) (Fig. 38a). Lister and Lister (1978: 30) consider the vessel to be Black Mesa b/w (Pueblo II). From the knoll on the east side of the sand flat between Cozy McSparron's store (now Thunderbird Ranch) and the mouth of Canyon de Chelly.

2399 (Fig. 39b): miniature Gallup b/w pitcher with strap handle, Pueblo II. Height, 7.9cm; diameter, 5.7cm. Provenience: general digging, Tseahatso.

2405: sherd of Chaco or Escavada b/w jar, Pueblo II (Fig. 39g). Provenience: Burial 1, Tseahatso.

2621: sherd of hatchured olla. Provenience: Burial 12,
Fig. 38. Pueblo I b/w vessels recovered by Earl Morris, 1924. Kana'a b/w: a, UCM9456. b, UCM2640. c, UCM2646. d, UCM2602. White Mound b/w: e, UCM 2641. Vessels shown at b and d have exterior fugitive red wash.
Fig. 39. Pueblo II-III painted wares recovered in 1924 and 1963.  
a, Tsegi orange ware, b/o, UCM9454.  b, Gallup b/w, UCM2399.  c,  
Black Mesa b/w, surface.  d, Dogoszhi b/w, UCM2617.  e, Flagstaff  
b/w, surface.  f, Black Mesa b/w, UCM9453.  g, Gallup/Mancos b/w,  
surface.
2617 (Fig. 39d): Dogoszhi b/w pitcher, Pueblo III. Diameter, 9.9cm; height, 10.6cm. Provenience: Burial 11, Tseahatso.

Red on Orange

9454: miniature pitcher of unusual form, Tsegi orange ware (Pueblo III) (Fig. 39a; Lister and Lister 1978: 83, Fig. 40). Rim diameter, 3.1cm; diameter at neck flare, 5cm; waist diameter, 3.4cm; maximum body diameter, 6.9cm; height, 9.1cm. Washed out of a bank on the north side of Canyon de Chelly around the first turn to the left up canyon from White House Ruin.

Navajo Vessels

2554 (Fig. 40a): Navajo filleted jar. Rim diameter, 23.0cm; body diameter, 24.6cm; height, 36.5cm. Two rows of finger impressed fillets are appliqued below the rim. The exterior of the jar is pitch coated, and a crack on one side is mended by tying a yucca leaf through drilled holes. Provenience: Cache 2, Pictograph Cave.

2680, 2681, 2682 (Fig. 40b): 3 Navajo filleted jars were recovered from the surface in a side canyon off Canyon del Muerto. 13517: Navajo filleted jar with conical base. Rim diameter, 23.9cm; body diameter, 27.5cm; height, 37.7. One fingernail indented band is appliqued 2.3cm below the rim. Provenience: surface, Pictograph Cave, 1963.
Fig. 40. Navajo filleted jars, historic period (one-fourth actual size). a, UCM2554. b, UCM3517.
Unfired Vessels

Unfired basket-impressed fiber tempered vessels have been reported from sites ranging in age from the Basketmaker II period (du Pont Cave, AD 217) to mid Pueblo I (Mesa Verde, AD 831) (Amsden 1949: 119) but are most often recovered from Basketmaker III sites, where they sometimes co-occur with fired pottery. They are rare after AD 700 (Morris 1980: 65).

The vessels are molded of clay mixed with plentiful amounts of juniper bark, chopped grass and occasionally, crushed local stone. Bases are started by pressing the clay into a coiled basket, and walls are raised by adding thick, somewhat flattened coils to the rim of the molded base. Tabular lug handles are frequently appliqued on opposing sides.

Morris (1927) suggested that these unfired vessels constitute a prototype for the independent invention of fired pottery, but the presence of fired pottery in the Mogollon region during the Penasco phase (300 BC - AD 100) (Martin 1979: 63) renders the idea unlikely. Unfired vessels may represent an attempt to copy fired vessels, but their co-occurance with fired pottery during the Basketmaker III and Pueblo I phases suggests that they filled some specific function. It is sometimes suggested that they are, or are derived from, clay liners for parching trays (Woodbury and Zubrow 1979: 53).

2674: 19 sherds of unfired, basket-molded vessels (Fig. 41). Two may be fitted to form a crescent-shaped portion of the wall and base of a single vessel. Length of secant, 25cm; partial radius, 5.5cm. Provenience: Tseahatso, general digging.
Fig. 41. Sherds from unfired basket impressed mud vessels.
UCM2674, Basketmaker III. Length of refit at a is 25cm.
2673: sherds of 2 unfired, basket-molded trays. Diameter of most complete specimen, 40cm; height, 9.5cm. Provenience: Tseahatso, general digging.

Clay

The artifacts are made from both the fine gray clay used in the manufacture of pottery and local red and yellow muds derived from decomposed sandstone.

Human figurines (1 whole, 1 fragmentary)

2666: female effigy, not examined. Tseahatso, general digging.

2667 (Fig. 42 a,b): female effigy, fragmentary. The figure consists of a flat slab of clay 6.2cm long, 4.1cm wide and 1.0cm thick. Legs or female genitalia are indicated by a narrow cleft at the lower margin, and rounded, elongate clay lumps representing breasts are appliqued on one face. The head, the lower margin of the left leg and the right breast are missing, the position of the last indicated by a shallow depression. No clothing or decoration is present.

The paste is gray-brown and contains rounded sand grains and soft, white opaque inclusions of some unidentified substance. The figure has been fired and shows a fire cloud along the left side. Provenience: Tseahatso, general digging.

Animal effigy (1 fragmentary)

2668 (Fig. 42c): unfired clay or mud effigy of quadruped, head and one hind leg broken away. Present length, 4.9cm; thickness, 2.4cm; height at shoulder, 2.1cm. Two semilunar holes about 0.3cm in length are placed perpendicular to each other on
Fig. 42. Unfired clay effigies.  
a, UCM2667, fragmentary effigy of a female, Basketmaker III.  
b, UCM2668, fragmentary effigy of quadruped, Basketmaker II-Pueblo III.  
c, d, UCM2669, UCM9613, miniature effigy burden baskets, Basketmaker III. All shown actual size.
the animal's back; these may be the sockets for feather quills. Two similar holes are between the front legs. An indentation indicates the anus.

The paste is local mud. Several pieces of yucca leaf protruding from the broken portions of the figure suggest an internal skeleton. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Carrying basket effigies (3 whole, Fig. 42d,e)

Miniature burden basket effigies made of unfired clay. The paste is light gray in color, and no intentional inclusions were observed. The inverted nipple shape of these objects emulates the large Type B3 carrying baskets recovered from a number of sites in Canyon del Muerto and the Prayer Rock District (Morris and Burgh 1941: 27, Fig. 11). Morris (1951) has suggested that the miniature burden basket was a part of an artifact complex related to a fertility cult that arose during the Basketmaker III phase.

2669: inside diameter, 4.3cm; outside diameter, 4.8cm; height, about 5.5cm. The effigy is pinched out of clay and is smoothed over the body and the rather uneven rim. Two punched holes suggest the former presence of a miniature carrying band. Provenience: Tseahatso, general digging.

9613: outside diameter, 3.1cm; height, 3.6cm. Roughly pinched out of clay mass, surface lightly smoothed. Provenience: Canyon del Muerto, surface.

Sandal impressions (2 whole; Fig. 43)

Modelled lumps of unfired clay bearing the impressions of geometric knot patterns from the soles of cordage sandals. The impressions are single event and very clear, but include only the
Fig. 43. Impressions of knot patterns from the soles of cordage sandals on balls of unfired mud. Basketmaker II-Pueblo III. Left, UCM2671. Right, UCM2672.
midsection of the sole.

2671: ball of reddish mud containing copious amounts of organic material, including charcoal, fiber, a bit of yucca cord and fragments of raw yucca leaf. The mud appears to have been scooped up from a walking surface and modelled into a fairly smooth ball. Finger impressions are visible on the reverse face. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

2672: ball of gray mud containing charcoal and organic fibers. A single corn grain and a twig-end are visible in the mass. Finger impressions are present on the reverse side. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Clay object wrapped in bark and string

2550 (Fig. 44): composite unfired clay object of unknown use. A mass of buff colored clay mud containing charcoal and vegetable refuse is molded around an armature consisting of a length of reed stem with a twig inserted into one end. A gall hangs from one side of the twig, and the lower half of the twig passes through a ball of fibrous material. A bone splinter is inserted into the pith at the opposite end of the reed stem, and three stone chips are pressed into the stem at irregular intervals. A strip of unidentified material is wrapped around the shaft in an open spiral. Three horizontal, conical punctures, one on the opposite side from the others, extend from the surface of
Fig. 44. UCM2550: composite object of unfired clay, reed stem and oak gall. Basketmaker II-Pueblo III. One-half actual size.
the clay to the reed at center.

One edge of the end of the reed protrudes from the face of the clay. The protruding reed and surrounding clay are somewhat charred but the object has not been intentionally fired. Length, 11.9cm; maximum diameter, 3.9cm.

When found, the object was wrapped in a bundle of coarsely and finely shredded juniper bark, with one end of the bundle encased in a mass of incompletely cleaned yucca fiber. A strand of 2 ply-z plied yucca cord is wadded into the juniper bark. A length of feather string passed twice around the bundle is presently tied in a half knot. Two loose feather cords of equal length may have been part of the bundle wrappings.

The artifact has no external features beyond the exposure of the reed. Nevertheless, the complexity of its manufacture suggests that the object is symbolic of some attribute or entity. Those who have examined it most often suggest that it is either phallic or anthropomorphic. Somewhat similar objects recovered in Chaco Canyon date to Pueblo II-III (Judd 1954: 294-295).

Provenience: Pictograph Cave, general digging.

Chipped Stone

Chipped stone is weakly represented. Only 4 artifacts, one of which is a surface find, were recovered during the University of Colorado's 1924 excavations, and chipped stone is reported only rarely for the American Museum of Natural History and Carnegie Institution excavations. The bulk of the artifacts described below were recovered from the surface of various sites by the University of Colorado Expedition in 1963.
The scarcity of chipped stone artifacts in early Anasazi contexts has been noted in other reports (e.g. Kidder and Guernsey 1919: 126, 153, 187; Guernsey and Kidder 1921: 112). Woodbury (1954: 120) has suggested that this may be partially due to the portability of chipped stone artifacts, so that few would be left behind when a site was abandoned. He also notes that small stones tend to accumulate on the surface of rubbish deposits when lighter elements such as dust and ash are removed by weathering. The artifacts are then easily spotted and picked up by any passerby.

Very little chipping debris is reported in the field notes from any season. This may be due to a judgement on the part of the excavator that detritus was insignificant in view of the many other classes of complete or near-complete artifacts. It is possible, however, that little primary reduction of chipped stone tools took place in the rockshelters and that the small flakes produced by secondary reduction, if present at all, were overlooked in the clouds of dust that raised during excavation (A. Morris 1978: 154, Fig. 32).

The classification and terminology used by Woodbury (1954) is used in the following descriptions. No attempts were made to determine function on the basis of usewear.

**Stemless Blades (6 whole)**

2506: 3 triangular, symmetric stemless blades in a bag made from the skin of a ground squirrel (Fig. 53). Two have slightly convex edges and thinned, slightly concave bases. Both are bifacially chipped of grey rhyolite. The third is somewhat more broad, with convex edges and a straight base. It is bifacially chipped of pink rhyolite. Dimensions of 2506a: length, 5.15 cm;
Similar blades are widespread in space and time. Woodbury (1954: 123) lists 16 sites from which they are recorded dating from BMIII to PIII. A cache containing 16 very similar blades was recovered from BMII contexts at Dust Devil Cave (Lindsay 1968: 46). The blades are sometimes considered to be blanks, finished except for the final notching; however, Rinaldo (1941: 23) considers them to be knives. Provenience: Tseahatso, general digging.

10271D, 10272, 10282a, 13547a: asymmetric blades with one straight edge and one convex to irregular edge (Fig. 45c-e). The bases of 13547a and 10272 are round, that of 10282 is concave due to the bifacial removal of thinning flakes, and the base of 10271 is snapped off. Material: chert. Dimensions: lengths; 4.1-7.4 cm; widths, 2.1-2.9 cm; maximum thickness, 0.6-0.7 cm. 102821 is bifacially worked; the others are unifacial flake tools retouched on the margins. Provenience: 13547a, Pictograph Cave, surface; all others, Canyon del Muerto, surface.

Side Notched Points (7 whole, 1 fragmentary)

10271L,n,o',Q,s; 10282b: small, triangular side notched points with straight bases and expanding stems wider than shoulders (Fig. 45j). Lengths, 1.9-2.75 cm; width at base, 1.25-1.7 cm. Material: chert.

10271H: proximal fragment of slender, parallel sided, side notched point with concave base, possibly a drill (Fig. 45p). Length of fragment, 2.8 cm; width at base, 1.1 cm. Material: white chert.
Fig. 45. Chipped stone artifacts, surface finds, 1923-1932, 1963.
10271e: triangular, side notched point with bicurvate convex base, expanding stem, base wider than shoulder (Fig. 45h). Length, 2.3 cm; width at base, 1.4 cm. Material, grey chert.

Provenience of all side notched points: Canyon del Muerto, surface.

Diagonal Notched Points (6 whole)

10271i,o,q: slender, barbed diagonal notched points with expanded bases (Fig. 45r,s). Lengths, 2.25-3.3 cm; widths, 1.4-2.5 cm. Material: chert, agate.

10271b: broad, barbed diagonal notched point with slightly convex edges and expanding base, shoulder wider than base (Fig. 45t). Length, 5.1 cm; width, 2.9 cm. Material: basalt.

2677 (Fig. 46): serrate edged, diagonal notched point with notched base, shoulder wider than base. The blade is bound to a reed shaft with a split yucca leaf. The serrations and the use of the leaf rather than sinew suggests that the implement is a saw. Length, 3.8 cm; width, 1.7 cm. Material: chert.

10271k: slender, barbed, triangular, diagonal notched point with tapered stem (Fig. 45k). The tips of the barbs are broken, as is the point tip. Length of fragment, 2.0 cm; width, 1.4 cm. Material: chert.

Provenience of all diagonal notched points: Canyon del Muerto, surface.

Chipped Stone Implements of Other Shapes

10271E: broad, straight stemmed point with stubby triangular blade (Fig. 45o). It is chipped from a patinated grey flint flake, and portions of the patination are present on both faces of
Fig. 46. UCM2677, chipped stone knife bound to a reed shaft with split yucca leaf. a, actual size, hafted. b, knife, twice actual size.
the artifact. The point is thick and very roughly flaked. The base is rounded. Length, 3.9 cm; width, 1.75 cm; thickness, 0.9 cm.

102710: distal end of broad, leaf shaped blade (Fig. 45s). Edges convex, returning toward the midline. Length of fragment, 3.8 cm; width, 3.0 cm. Material: grey chert.

Provenience of both specimens: Canyon del Muerto, surface.

Unclassified Fragments (5)

10271g, R, v, unlettered member of series; 13541: 2 tips and 3 medial fragments of bifacially chipped points or blades (Fig. 45n). Material: chert, agate. Provenience of 13541: Antelope House, surface. Provenience of all others: Canyon del Muerto, surface.

Projectile Points Not Examined

A number of chipped stone artifacts could not be located. Among these are several of the 10271 series from Canyon del Muerto, surface; and projectile points 13537, Tseahatso, surface, and 13548, Pictograph Cave, surface.

Drills (3 whole)

Plain shafted drill

10282c: sides parallel, base square and slightly expanded. No wear is seen on the bit. Length, 3.7 cm; width at base, 1.35 cm; width at midsection, 1.05 cm; thickness, 0.05 cm. Material, agate.

Expanded base drills

10275b, 10282d: rounded bases. 10282d is made on a thick flake and is bifacially worked only along the shaft and margins. The tip is broken. 10275b is bifacially flaked in all parts (Fig.
45b). Dimensions: lengths 3.9 and 4.7 cm; widths 2.0 and 4.4 cm; diameter of bits, 1 cm tapering to 0.3 cm and 0.4 by 0.6 cm oval (cross section of broken tip).

Provenience of all specimens: Canyon del Muerto, surface.

Scrapers (2 whole)

10273, 10274: 10273 was not examined. 10274 is made on a large, irregular pitchstone flake (Fig. 45a). Regular, bifacial flake scars are present on the convex margin, and irregular flake scars are present on one face along the concave margin. The tool may be multiuse, both scraper and spokeshave; it has not been heavily utilized. Length, 6.8 cm; width, 5.1 cm; thickness, 0.6 cm. Provenience: Canyon del Muerto, surface.

Cores and Unused Flakes

13547b,c: exhausted cores, chert. Provenience: Pictograph Cave, surface.

13546: chert flake, unmodified. Length, 5 cm. Provenience: Trail Canyon Cave 1, surface.

Ground and Pecked Stone

The category includes all stone artifacts showing evidence of pecking or grinding, including those intentionally shaped and those shaped through use. Ground and pecked stone artifacts include axes, mauls, manos, grinding slabs, mortars, pestles, beads and pendants, pipes, bottle lids and tools for pecking, grinding and rubbing.

A number of ground and pecked stone artifacts and features noted in the rockshelters were not recovered. These include bedrock grinding grooves and mortars, shaped building stones and
slabs, and metates. Metates were generally left in the field due to their weight. Although unrecorded, metates of some form were undoubtedly present during all occupation periods, and their probable forms are discussed in the description of manos.

Axes

Class A: full grooved (5 whole). Full grooved axes are of two forms: broad and thick (2587, 2596/931, 2596/933), and narrow (2530, 2653). All of the broad, thick axes are made of fine-grained black basalt.

2587: length, 15cm; width, 9.5cm; thickness, 6.2cm. Finely ground faces converge to a sharp, symmetric bit. Poll is a tapered triangle showing some evidence of battering. Provenience: Tseahatso, general digging.

2676/931: length, 16cm; width, 10.6cm; thickness, 6.3cm: width of groove, 3.8cm. Finely ground faces converge to a sharp edge at the bit. The poll is rectanguloid and somewhat battered. Provenience: Canyon del Muerto, surface.

2676/933: measurements not taken. Finely ground faces, one more convex than the other, converge to a battered bit. A smooth facet is ground on the outer side of the face of the rounded but asymmetric poll. The groove is nearly at the midpoint of the axe, probably due to resharpening of the bit. Provenience: Canyon del Muerto, surface.

Long, narrow axes might be more properly subdivided into finished and expedient forms. However, since there are only two specimens, they are reported together.

2530/544 (Fig. 47): hafted full grooved axe. Length, 18.5cm; width, 8.0cm; thickness, 4.5cm; width of groove, 2cm
Fig. 47. Axe and axe or maul handles. a, UCM2530, narrow full grooved axe of expedient form, hafted. Length of axe head, 18.5cm. b, c, UCM2473 and UCM2474, hardwood handles for axes or mauls.
(irregular). The crude head is a naturally axe-shaped piece of fine-grained sandstone altered at the bit by pecking to a rough, rounded profile. The poll is unmodified, but shows some evidence of battering. No grinding or polishing is present on the surface of the artifact.

The head is hafted to a stick 1.8cm in diameter. The shorter end of the stick is bent around the groove and bound to the longer end with 2 ply-z plied yucca cord. A second, loosely twisted 2 ply-s plied cord passes around the groove beneath the crook. Exclusive of the crook, the handle is 61cm long. Provenience: Tseahatso, general digging.

2653: length, 15.2cm; width, 6.4cm; thickness, 4.8cm; width of groove, 2.5cm. Symmetric faces converge to a sharp, straight bit. The poll is somewhat battered. All surfaces except the pecked groove are finished by grinding. The material is fine-grained black basalt. Provenience: Tseahatso, general digging.

Class B: notched axes (two whole). Axes with notches pecked in opposite edges near the midsection. Both notched axes are thin in comparison to full grooved axes.

2676/932: length, 11.3cm; width, 7.8cm; thickness, 2.2cm. Made of a spall from a fine-grained porphyritic stone. Inner and outer notches are pecked but are not finished by grinding. One face is smoothly ground and the other is roughly pecked. The faces converge to a symmetrically bevelled bit, and the poll is pecked to a rounded profile. Provenience: Tseahatso, general digging.

2676/934: length, 15.0cm; width, 6.4cm; thickness, 3.3cm.
Made of fine-grained sandstone. Inner and outer notches are pecked, and pecking appears on all margins with the exception of the cutting edge of the bit. The bit is bifacially bevelled but blunt, and may be unfinished. The butt is nearly square in profile. Provenience: Tseahatso, general digging.

Mauls

Class A: full grooved mauls (3 whole). Full grooved hammers with oval to square cross sections. The groove is at the approximate midpoint of the artifact. All are made from arkosic sandstone.

2528: length, 18.1cm; width, 10.8cm; thickness, 6cm. A groove 2.5cm wide and 1.2cm deep is pecked on both sides and one face. A chunk of stone has spalled away from the groove on the opposite face. Poll and bit are roughly pecked to shape, with no evidence of grinding. Provenience: Tseahatso, general digging.

2529: length, 15.4cm; width, 9.2cm; thickness, 7.5cm. A groove 2.3cm wide is pecked 0.5cm deep around the midline of the artifact. Although the striking surface and the poll are lightly pecked, the maul does not appear to have been used and may be unfinished. Provenience: Tseahatso, general digging.

2652: length, 18.4cm; width, 9.8cm; thickness, 6.5cm. A groove 1.9cm wide is pecked 1.0cm deep around the midline. The rounded poll shows marks of heavy battering. The bit is somewhat more narrow and more convergent than that of the other mauls. This artifact may be a full grooved axe reused as a maul, although the great length and unpolished faces argue somewhat against this. Provenience: Tseahatso, general digging.
Manos (two whole)

2531: length, 15.7cm; width, 8.8cm; maximum thickness, 2.5cm. Unifacial sandstone mano with grinding surface oblique to the upper surface. The transverse cross section is trapezoidal. For use on a flat metate (Woodbury 1954: 68-69). No finger grips are present. Provenience: Tseahatso, general digging.

2665: length, 11cm; width, 8cm; thickness, 3.7cm. Rectanguloid granite mano with two flat, parallel grinding surfaces. Ends and sides are battered, and pigment is present in pits on one side and one face. Used for pounding and grinding paint on a flat metate or grinding slab. Provenience: Tseahatso, general digging.

Cobble hammerstones (two whole)

2532: length, 9.9cm; width, 7.1cm; thickness, 4.5cm. Quartzite hammerstone with egg-shaped cross section. The narrow end and adjacent sides are battered, and one face is slightly abraded. Provenience: Tseahatso, general digging.

2654: length, 9.7cm; width, 9.4cm; thickness, 5.4cm. River rolled cobble with battering on one edge and slight abrasion on one face. Provenience: Tseahatso, general digging.

Mortars or bowls (3 whole)

2527: pecked block of fine-grained laminated sandstone with a (natural?) depression at center. The depression shows no evidence of pecking or grinding, suggesting minimal use. Dimensions of block: length, 21.2cm; width, 16.8cm; thickness, 10.9cm. Dimensions of depression: length, 13.2cm; width, 11.0cm; depth, 5.2cm. Provenience: Tseahatso, general digging.

2647: oval orthoquartzite cobble with shallow oval
depression pecked into one face. Dimensions of cobble: length, 21cm; width, 13.6cm; thickness, 6.3cm. Dimensions of depression: length, 9cm; width, 6.7cm; depth, 0.5cm. Provenience: Tseahatso, general digging.

2675: finished bowl or mortar of orthoquartzite. The exterior surface is carefully rounded and polished and the base is ground flat. The bowl is slightly off center. It has been worn in by circular grinding, and is semi-circular in cross section and oval in plane view. Exterior dimensions: diameter, 18.3-18.8cm; height, 11.2cm. Interior dimensions: diameter, 12.6-13.4cm; depth, 10cm. Provenience: Canyon del Muerto, surface.

Pestles (two whole)

2648: elongate sandstone pestle with slight longitudinal taper. The more broad end is rounded and worn from grinding. Opposing faces are ground flat. A depression 3.8cm in diameter and 0.5cm deep is pecked into one face about 5cm from the more narrow end, possibly as a thumb rest. Length, 15.3cm; width, 7.4cm; thickness, 5.8cm. Provenience: Tseahatso, general digging.

2649: elongate granite pestle with oval cross section. The artifact shows a slight taper from end to end. Both ends are rounded from grinding. A small ledge about 5cm from the broad end has been smoothed into a possible thumb or finger rest. Length, 16.0cm; width, 5.3 by 5.5cm. Provenience: Tseahatso, general digging.

Rubbing stone (1 whole)

2533: orthoquartzite cobble with both faces ground flat. The margins were battered then ground smooth. Diameter,
9.2-10.0cm; thickness, 3.5-4.5cm. Provenience: Tseahatso, general digging.

Anvil (1 whole)

2534: laminated sandstone block with subrectangular cross section. All faces are pecked and ground. One face shows dispersed pitting indicating use as an anvil. Carlson observed a small incrustation of pigment on this artifact, but this was no longer visible when examined in 1984. Length, 11.7cm; width, 10.7cm; thickness, 8.5cm. Provenience: Tseahatso, general digging.

Jar covers (3 whole)

Sandstone discs, faces ground flat and edges pecked to shape.

13540a: diameter, 6.2 by 5.2cm; thickness, 0.6cm.
Provenience: Tseahatso, surface.

13540b: diameter, 5.0 by 5.4cm; thickness, 0.7cm.
Provenience: Tseahatso, surface.

13545: diameter, 4.3 by 4.7cm; thickness, 0.4cm.
Provenience: Trail Canyon Cave 1, surface.

Pendants and beads

Pendants are differentiated from beads by the position of the perforations. In pendants the hole or holes are near one margin, while in beads the hole is near the center.

Turquoise pendants (7 whole)

2623: rectangular tablet, edges smooth and rounded. Length, 0.8cm; width, 0.6cm; thickness, 0.1cm. The pendant is perforated along the midline of the more rounded edge and is tied to one warp of olivella wristlet 2623 with fine 2 ply-z plied yucca cord (Fig. 77). Provenience: Tseahatso, Burial 13.
2631: 6 subrectangular pendants (Fig. 48a). Length, 1.3-1.75cm; width, 1.0-1.3cm; thickness, 0.2-0.35cm. One face of each is ground flat. Five retain sinew lashings so placed that it is evident that the pendants were strung with the flat face showing. Provenience: Tseahatso, Cist 5, mortuary offerings.

Lignite beads (21 whole)

2377: 18 tubular lignite beads strung on 2 ply-z plied yucca cord. Length, 4-5mm; diameter uniformly 5mm; diameter of drilled hole, < 1mm. The strand is encrusted on a fragment of a fur string robe, part of a disturbed burial, and is undoubtedly part of a longer strand. Provenience: Trail Canyon Cave 2, general digging.

2548 (Fig. 48c): a single lignite bead strung on a fine 2 ply-z plied yucca cord along with one circular shell disc bead. The cord is loosely bound around the left radius of an adult. The cord is frayed at center, and it is possible that other beads have fallen away. Length of bead, 6mm; diameter, 4.5mm. Provenience: Pictograph Cave, surface.

2631: 2 tubular lignite beads (Fig. 48b). Provenience: Tseahatso, Cist 5, mortuary offering.

Pipes (2 whole, 1 unfinished)

2410 (Fig. 48d): tapered cylindrical pipe of well polished pink and green mottled translucent stone. The residue of smoking material adheres to the interior of the pipe. Length, 4.6cm; diameter of bowl end, 1.8cm; diameter of stem end, 1.4cm; diameter of bowl opening, 1.0cm; diameter of stem opening, 1.8mm. Provenience: Tseahatso, Burial 16A (Chief's Grave).

2427 (Fig. 48e): tapered cylindrical pipe of gray-white fine
Fig. 48. Ground stone artifacts.  

a, turquoise pendants, UCM2361a, Basketmaker II burial or cache.  
b, lignite beads, UCM2361b, Basketmaker II burial or bead cache.  
c, radius of adult wrapped with cord and beads, UCM2548.  
d, UCM2410 and e, UCM2427, pipes, Basketmaker II.  
f, sandstone doughnut, UCM X-2, from the surface of Cross Section Cave.
grained sandstone. The pipe was not measured but is at least twice as long as 2410. Provenience: Tseahatso, Burial 16B (Chief's Grave).

2651: unfinished pipe (?). Elongate reddish stone with rectangular cross section, probably quartzite. All surfaces are ground. A hole 1.4cm in diameter and 1.3cm deep is ground in one end. The opposite end is ground flat, and flakes have been longitudinally struck from the lower margin. Length, 11.2cm; width, 5.8cm; thickness, 4.7cm. Provenience: Tseahatso, general digging.

Sandstone "doughnut" (1 whole)

no field number (Fig. 48f): circular sandstone nodule, ground flat on one face, with a biconically drilled hole at center. The drilled hole shows no signs of wear. Maximum diameter, 4.0cm; height, 1.6cm; hole diameter, 0.4cm.

Provenience: Cross Section Cave, surface.

Tabular worked stones (2 whole)

2650: rectangular block, ends battered and ground into rounded profiles. The faces are unaltered. Length, 14.5cm; width and thickness each about 5cm. Provenience: Tseahatso, general digging.

2656: block of fine-grained chalcedony with rectangular cross section. One face and both sides are highly polished. The opposite face is heavily battered and both ends are rough. Length, 12.4cm; width, 6.6cm; thickness, 2.2cm. Provenience: Tseahatso, general digging.
Faunal Remains

No faunal material was collected for the purpose of diet reconstruction. Faunal remains recovered from non-dietary contexts are described below.

Dogs (2 whole)

2545, 2546: the dessicated bodies of two dogs, one of which retains the hair, were recovered from refuse levels. Neither dog was formally buried. The bodies were sent to Dr. Glover Allen at the Museum of Comparative Zoology, Harvard University, for analysis. The dogs are typical of the smaller prehistoric dogs reported from other Southwestern sites. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Eagle (1 whole)

2547: the dessicated carcass of a young golden eagle (Aquila chrysaetos) was recovered from refuse deposits. The body is in a natural position, with wings folded and head tucked down along one side. Superficial examination shows no injury; radiographs were not taken. The flight feathers and tail feathers, including the quill ends, are missing. Smaller quills and some down are present, particularly across the back.

There is no evidence of intentional burial, but the presence of the large bird is of interest in view of the ritual capture and killing of young eagles among the ethnographic Hopi (Wright 1979: 64) and the formal eagle burial excavated at Tseahatso by the Carnegie Institution, 1925. Similar eagle carcasses were recovered from Pueblo II-III contexts at Chaco Canyon (Judd 1954: 266-267, Plate 76). Provenience: Tseahatso, general digging.
Insects

2633: the dried, crushed remains of 30-50 yellowjacket wasps (Vespula pennsylvanica) are retained in one of 3 small buckskin bags within a pouch made from the whole skin of a ground squirrel. The wasps were apparently crushed before being placed in the bag and are not mixed with any other substance (Appendix 1). Provenience: Tseahatso, Burial 15 (Basketmaker II).

Bone

Bone artifacts are not numerous in the del Muerto collection, and several of those recovered during the 1924 field season have been lent to other institutions and were not examined. Most are made from the long bones of deer or pronghorn antelope, and were worked by splitting, cutting and grinding.

Awls (4 whole)

2500/506 (Fig. 49d): distal end of the radius of a mule deer (Odocoileus hemionus). The bone is split longitudinally and the tip is ground to a narrow, bevelled point. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

2500/505; 2657/881; 2657/883: not examined. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Flakers (5 whole)

Class A: flakers made from split mammal long bones (2 whole)

2500/504: mammal long bone, split through medullary cavity. Length, 13cm. The shaft is smooth and well polished, but somewhat scratched. The epiphysis is modified by grinding and smoothing.
Fig. 49. Bone and antler implements. Antler flakers: a, UCM2499 and b, UCM2658. c, bone chisel, UCM13543. d, e, bone awls, UCM2500/504 and UCM2657/882.
A band of sinew is wrapped around the butt of the tool. The squared tip is polished through use, and shows a few nicks and gouges. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

2657 (Fig. 49e): mammal long bone, split through medullary cavity. Length, 8.5cm. The shaft is short, smooth and well polished. A shallow notch is cut into the shaft near the epiphysis. The epiphysis itself is essentially unmodified, showing only a slight amount of grinding and some use polish. A band of sinew is around the butt of the tool. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Class B: composite flakers. Split long bones hafted to long wooden shafts (1 whole, 2 fragmentary) (Kidder and Guernsey 1919: 96, 97, Fig. 15). See also, Wooden Flakers.

All three composite flakers were recovered from Burial 16B, Tseahatso (Basketmaker II). Each flaker had been broken in half in order to fit the long wooden shaft into the burial pit.

2439: the bone portion of the flaker is a long, narrow rectangular strip cut from a flattened rib or long bone of a large mammal. Length, 40.4cm; width, 0.9-1.3cm; maximum thickness, 0.4cm. The proximal (hafted) end is tapered and rounded, with a bevelled facet on the periosteal surface. The distal (working) end is squared, with all three margins bevelled. Diagonal striations and gouges consistent with use as a pressure flaker are on the edges and faces of the distal portion of the bone strip. The bone was fastened to a wooden shaft with sinew bindings, traces of which adhere to the bone about 14cm and 15cm above the proximal end. The bone was hafted cortical side down.
The wooden shaft is 115cm long in its present condition. Based on the position of the remaining sinew bindings, about 8cm has decayed away at the distal end. One face of the shaft is flattened to facilitate hafting. The shaft tapers bifacially to a rounded butt, and the entire surface is smoothed by grinding. Traces of pitch, possibly the remains of attachment of additional bindings, are present at irregular intervals. An area 50-60cm from the distal end of the shaft is stained with grime from handling.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2440: made in the same manner as 2439. Length of bone, 7.2cm; width, 1.0cm; thickness, 0.5cm. Length of shaft, 101cm. When the bone and wooden portions of the artifact are aligned, the bone tip extends 2.9cm beyond the somewhat eroded tip of the wooden shaft. A sinew binding is 12.4cm below the tip of the shaft, and the remains of a second sinew binding are at the approximate center, where the shaft had cracked part way through during the uselife of the artifact.

The butt of the wooden shaft is bifacially thinned, and both faces are ground smooth. The flattened end shows striations as if it had been used for pressure flaking.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2441: made in same manner as 2339. Length of bone, 27.4cm; width, 1.3cm; thickness, 0.5cm. The bone tip extends 4.3cm beyond the tip of the wooden shaft. The shaft is 113.0cm long, with a maximum diameter of 1.5cm. The butt is bifacially thinned to a
blunt, rounded end and has not been used for flaking. Shaft faces are roughly scraped diagonally and longitudinally but the shaft is not smoothed. Hand polish is present in an area 35-50cm below the distal end. The blunt shaft tip is in poor condition but is complete. One face is flattened to facilitate hafting. Three eroded bands of sinew are present on the shaft tip, matching three pale colored bands on the bone strip.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

Chisel (1 whole)

13543 (Fig. 49c): oval segment of split mammal long bone. All edges are smoothed by grinding, and the margin at the proximal end is rounded and polished. the distal end is bevelled to produce a sharp edge. Provenience: Mummy Cave, surface (Basketmaker II-Pueblo III).

Beads and pendants (21 whole)

2504 (Fig. 50): 21 beads and pendants cut from bird long bones, strung on two loops of 2 ply, z-plied yucca cord. The longer outer loop holds 12 tubular bone beads with smooth ground ends. Length of beads, 1.5-3.3cm; diameter, 0.6-1.0cm. The shorter loop hold 5 tubular bird bone beads 3.4-4.1cm long and 0.4-0.6cm in diameter, and 6 bird bone pendants 1.8-4.9cm long and about 0.4cm in diameter. The pendants are strung by passing the string through a natural fossa immediately below the epiphysis; the opposite epiphysis is broken or cut away and the raw end is ground smooth.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).
Fig. 50. Bird bone necklace strung on original cord. UCM2504, Basketmaker II-Pueblo III.
Worked bone fragment


Antler

Flakers (2 whole)

2499 (Fig. 49a): deer antler tine with blunt, large flake removed from the inner surface. The working end is pitted and scratched, but is generally smooth. A portion of the epiphysis is present and unmodified. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

2658 (Fig. 49b): antler tine with scar where adjacent tine was removed. The tip of the tine is ground to a bevelled edge with smooth, rounded margins. Cut marks are present along the sides of the shaft, perhaps from dragging stone flakes across it. A patch of red pigment stains the cup between the tines. Length, 19.6 cm. Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Leather, Hide and Sinew

The most frequent use of untanned leather or hide is in fur-string blankets found as burial shrouds or as discarded scraps in refuse deposits. Fur string is described in the section on Yucca Cordage.

Leather is used as an auxiliary element in several composite artifacts, such as the finger loops of atlatl 2432, described in Wood, and as the base for olivella bead cuff 2623, described in
Fourteen artifacts composed primarily of leather are described below.

**Bags**

**Class A**: bags made from whole animal skins or whole animal elements (5 whole)

2364 (Fig. 51): bag made from antelope scalp. The scalp of a pronghorn antelope (*Antilocapra americana*) was removed from the skull by slitting the hide behind the ears and around the neck. The hide, including the ears, was rolled or pulled off over the nose, leaving ragged edges in the nose and mouth area. The hide was tanned with the hair on. While still inside out, the opening at the neck was closed by folding the cut edges over each other and sewing over the opening with heavy 2 ply-z plied yucca cord in saddler's stitch. The bag is turned right side out except for the tips of the ears. The eyes are closed by drawing up the edges and wrapping and knotting them with fine, loosely z plied 2 ply yucca cord. Near the mouth are the remains of a red dyed cord that may be the original tie. When found, the empty bag was closed with a strand of unmodified yucca leaf wrapped twice around the mouth.

Carlson (Notes, 1963) has suggested that while the construction of the antelope scalp bag is consistent with that of other whole-skin bags, this bag may be a hunting effigy rather than a container.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2363 (Fig. 52): bag made from the whole skin of a young bobcat (*Lynx sp.*). The head, forelegs, chest and back of a young bobcat were peeled from the body. The skin was tanned with the
Fig. 51. Bag made from the headskin of an antelope. UCM2364, Basketmaker II - Pueblo III.
Fig. 52. Effigy bag made from the whole skin of a bobcat or lynx. UCM2363, Basketmaker II-Pueblo III.
hair on. Both forelegs were slit above the paws about half their length; after tanning, these slits were sewn shut and each foreleg was tied on itself in a half-knot, leaving the paws to dangle.

The eyes, ears and mouth are closed with 2 ply-s plied yucca cord, and a slit in the chest was closed with similar cord. The longer skin of the back forms a flap to close the opening of the bag. No tie is present, but the skin at the midsection and the back flap is creased and bunched. Maximum length of open bag, 37cm.

The complete bag has a rather lifelike appearance: nose, whiskers, fur, pads and small bones of the feet are retained. The claws were either purposely drawn or have dropped away. Carlson (Notes, 1963) has suggested that the bobcat bag may have been an effigy as well as a container.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2506 (Fig. 53a): bag made from the whole skin of a small rodent. The skin of a ground squirrel (Spermophilus) or rock squirrel (Citellus) was removed by slitting the skin around the hindquarters and belly and peeling it forward over the nose. A second slit was cut on the ventral side from the mouth to slightly beyond the front legs, probably during the skinning process. This slit, a hole near the left foreleg, and two holes in the belly were closed by sewing with 2 ply-z plied yucca cord. A 2 ply-z plied cord, possibly cotton, is tied around the skin of the right hind leg. This cord is used to fold and tie the flap of back skin over the opening in order to close the bag.

The hide is thin and may not have been tanned. A small amount of light golden hair is retained. Length of the bag is
Fig. 53. Bags made from the whole skins of small rodents, and their contents. a, UCM2506, Basketmaker II-III. b, UCM2633, Basketmaker II-Pueblo III.
23cm when open, 18cm when closed.

Three triangular, stemless chipped stone blades were enclosed in the bag. These are described in Chipped Stone.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2633 (Fig. 53b): bag made of the whole skin of a small rodent, containing 3 small hide bags. The whole skin of a ground squirrel (Spermophilus) or packrat (Neotoma) was removed by slitting the hide around the belly and pulling it forward over the nose. The hide is very thin and may not have been tanned. No trace of fur remains. The head and neck are gathered and tied with a slip knot of single ply yucca cord doubled and z-twisted on itself. The bag is closed by folding head and tail over the body and wrapping the neck cord around the bundle. Length of the closed bag is 11cm.

The rodent bag contains 2 kernels of corn and 3 smaller bags, each made of a small scrap of leather gathered around the contents and tied with 2 ply-z plied cord. The largest of the small bags is about 3.5cm in diameter and contains the crushed bodies of yellowjacket wasps (Appendix 1). The bag is closed with 6 turns of cord. A red stained wooden point 3.3cm long and 0.4cm in diameter protrudes from the mouth of the second small bag. With the point is a piece of corn pith and a small quantity of reddish dirt. The third bag contains a bullet-shaped concretion ground flat on one end.

Provenience: Tseahatso, Burial 15 (Basketmaker II-III).

2505/512: the whole skin of a ground squirrel (Spermaphils) was removed in the same manner as in the other
rodent skin bags. While still inside out, a hole in the left side was closed by sewing on a leather patch with 2 ply-z plied yucca cord. One end was sewn shut with similar cord, and the bag was turned right side out. The hide retains enough hair to show the squirrel’s stripes. Length of the artifact is 30cm, most of which is the flap that presumably was used to wrap and close the bag.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Leather bags (4 whole)

2571 (Fig. 54a): heavy tanned hide bag containing specular hematite. It was constructed by sewing a strip of leather 20cm long and 3-5cm wide to a second strip 62cm long and 3-5cm wide, using 2 ply-z plied yucca cord in saddler’s stitch. A 5cm flap is left unsewn above the side seams. A 6cm length of hide, cut into fringes before sewing, is set into one side seam. With the bag turned right side out, leather thongs were sewn across the lower opening in running stitch. A thong is attached to the flap at the open end. To close the bag, the long, unsewn tail is wrapped around the body and tied to the thong on the flap.

The bag contains lumps and powder of specular hematite.

Provenience: Pictograph Cave, Burial 4 (Basketmaker II).

2572 (Fig. 54b): hide bag containing salt lump. The bag is made of two comma-shaped pieces of tanned hide each about 17.5cm in greatest length and 15.5cm in greatest width. The long edges are sewn with 2 ply-z plied yucca cord in saddler’s stitch. The ends of the sewing cord extend beyond the seam at the mouth of the bag and may have been used to close it. The pointed base is sewn with a leather thong in a few running stitches.
Fig. 54. Sewn leather bags.  

a, UCM2571, Basketmaker II.  
b, UCM2572, Basketmaker II.  
c, UCM2505, Basketmaker II-Pueblo III.  
d, UCM2662, Basketmaker II-Pueblo III.
Provenience: Pictograph Cave, Burials 3 and 4 (Basketmaker II).

2662/894 (Fig. 54d): small buckskin pouch made by folding a rectangle of tanned hide in half and sewing opposite edges with 2 ply-z plied yucca cord in running stitch. Turned right side out, the bag is 6cm wide and 5.5cm long, with a 1.5-2.5cm flap at the open end. Two holes punched into the upper margin of the flap suggest the a tie or carrying string.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

2505/513 (Fig. 54c): a roughly diamond-shaped piece of heavy, tanned hide, 15cm by 18cm. The piece is perforated along three margins and fragments of 2 ply-z plied yucca cord are retained through some of the perforations. The artifact suggests part of a leather bag, but may be a patch or other item.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Moccasin (1)

2539: the moccasin was mended and altered several times during its use, and the original form is difficult to determine. It probably originally consisted of a round toed and heeled sole of heavy antelope hide with the hair turned toward the inside and an upper of similar hide with hair turned to the outside, sewn at the toe and margins of the sole. A semi-circular flap of heavy hide is sewn to the heel.

The heel had worn out, and a patch is sewn on the inside of the moccasin. The toe is also worn out. This has been mended by first sewing a patch on the exterior of the sole, then sewing a
portion of the moccasin upper to the sole. This, intentionally or not, has reduced the moccasin to fit a smaller foot.

The moccasin is 21.5cm long, 11.5cm wide at the toe and 9cm wide at the heel. It does not appear to have been made for a left or a right foot.

Provenience: Tseahatso, general digging.

Blanket

2605: whole, tanned rabbit skin, retaining the fur.

Provenience: Tseahatso, Burial 5, Cist 2 (Basketmaker III (?)).

Scrap

2505/511: irregular scrap of heavy buckskin, 33cm long and 1-7cm wide.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Sinew bundle

2511: bundle of 3 plied-z plied sinew cord, diameter about 0.3cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Feathers

Feathers of the turkey (*Meleagris gallapavo*) are used in all feather string and feather-string cloth in the University of Colorado collection. A robe utilizing the down feathers of the golden eagle was recovered from a Pueblo III burial at Battle Cove by the Carnegie Institution in 1929 (Morris 1948); this appears to be a unique occurrence. The feathers of small, unidentified wild
birds are reported on the feather string ties of several fur-string blankets recovered by the AMNH.

Arrows and atlatl darts are fletched with turkey feathers and flicker feathers (Colaptes cafer or auratus).

Other feather artifacts, described below, consist of bundles of feathers, or feathers incorporated as a major component of composite artifacts. Most of these appear to be non-utilitarian and may have functioned as personal ornaments, game pieces or ceremonial objects.

Bundles of feathers

2501: 12 primary wing feathers from one or more turkeys are bound with a loosely twisted 2 ply-s plied yucca cord and wrapped in the skin of a small rodent. The cord extends through the overlap of the skin and is loosely wound around the bundle.

Provenience: Tseahatso, general digging. (Basketmaker II-Pueblo III).

2661 (Fig. 55d): 5 tail feathers and one wing feather of the golden eagle, and one unidentified feather, wrapped with a strand of loosely twisted 2 ply-z plied yucca cord.

Provenience: Tseahatso, general digging. (Basketmaker II-Pueblo III).

Feathers suspended from cords

2376 (Fig. 55e): 12 bundles of 4-8 small feathers attached to 6 loosely twisted 2 ply-z plied yucca cords. Each bundle is formed by wrapping the quill ends of 4-8 secondary wing feathers of the mallard duck (Anas platyrhinus) with red dyed split yucca leaf, in each case catching one end of a yucca cord in the bundle.
Fig. 55. Artifacts incorporating feathers.  

a, UCM2413, paho.  
b, UCM2464, paho.  
c, UCM2375, paho.  
d, UCM2661, bundle of feathers.  
e, UCM2376, feathers suspended from cords.  
f, UCM2425, stick with feathers in buckskin sockets.  
g, UCM2412, paho.  
h, UCM2344, feathered wand.
Nine bundles are grouped by wrapping the quill ends and cords of 3 bundles with fine (< 1mm diameter) yucca cord, then gathering in 6 bundles and wrapping them as a group. The central portion of the suspension cords forms a loop and is wrapped with a length of similar fine cord.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

**Prayer plumes and ceremonial objects**

2413 (Fig. 55a): quills in buckskin and cord base. A bundle of buckskin strips 0.5cm wide is folded in half and wrapped at the fold first with sinew and then with 2 ply-z plied yucca cord. The original length and number of strips could not be determined without dismantling the artifact. Five free, unbroken strips extend from the bundle. Four of these retain a quill end bound to the strip with sinew.

Provenience: Tseahatso, Burial 16A (Chief's Grave) (Basketmaker II).

2375 (Fig. 55c): paho fragment (Kidder and Guernsey 1919: Plate 18d). One light colored narrow twig 15.1cm long and 0.2cm in diameter, and one darker colored narrow twig 14.6cm long and 0.3cm in diameter, bound together at one end with a 0.9cm wrapping of sinew. 4.1cm from the inner edge of the binding, the sticks are bound with a further 0.4cm wrapping of sinew, and then each stick is separately wrapped for 1.0cm on the light colored stick and 1.4cm on the darker stick. The tips of 3 brown secondary wing feathers of the mallard duck are bound under these wrappings, two on the dark twig and one on the light. The darker twig is broken 8.8cm above the separate wrappings, the light twig is broken 9.3cm
above the double wrappings, and the single feather is broken 9.7cm above the double wrappings.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2464 (Fig. 55b, 56b): wrapped quills on reed tube. 10 quills bound to a section of heavy reed stem 4.3cm long and 1.1cm in diameter. The lower edge of the reed is lightly bevelled by grinding, and upper and lower margins are ground flat. The artifact was constructed by wrapping the reed tube with a layer of 2 ply-z plied yucca cord 1mm in diameter. The ends of quills were caught under the cords as wrapping continued; in at least one case the wrapping cord is looped around the quill end. Nine quill ends are bound with sinew, and one is wrapped with 2 ply-z plied yucca cord.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2412, whole (Fig. 55g); 2502, fragmentary: quills bound to midsection of 3 slender, cord wrapped wooden pins. On the whole specimen each pin is 15.5cm long and 0.4cm in diameter, with a flat butt and dull, tapered tip. Two pins are straight and one is slightly curved. The pins are bound about 1cm above the butt end with 9 turns of 2 ply-z plied yucca cord 0.15cm in diameter. 2.0-2.3cm above this, a second cord wrapping covers about 4.5cm of the length of the pins. A single quill is caught under these wrappings. An over-wrapping of finer 2 ply-z plied yucca cord covers about 2.5cm of the cords, and in this are the quill ends of down feathers.

Only the midsection of the fragmentary artifact is present.
Fig. 56. Details of feathered artifacts.  

a, UCM2425, one-fourth actual size.  
b, UCM2464, twice actual size.  

Basketmaker II.
The midsection of the pins was first wrapped with human hair or human hair cordage, then with split, untwisted yucca leaf. A notched quill protrudes from the yucca leaf wrapping. The hair and yucca leaf wrapping is now partially coated with hardened mud, probably post-depositional.


2344 (Fig. 55h): plumed wand. Two slender chokecherry sticks (Prunus sp.), one 46.4cm long and 0.9cm in diameter, and the other about 38cm long and 0.4cm in diameter, are bound together with a 0.6cm wrapping of sinew 10.5cm from their lower ends. The upper end of the heavier stick is ground flat, and the lower end was cut part way through and then broken. The lower end of the more slender stick is ground flat, and the upper end is obscured by bindings. A second band of sinew 0.5cm wide and 18.6cm above the first holds the sticks, several loops of human hair cord, and the quill of a turkey feather. A third sinew binding immediately above the second holds in place the quills of 4 turkey feathers and the iridescent blue speculum of a mallard duck, 4 or more fiber wrapped bundles of fine z plied yucca cords, each holding shell disc beads, and several 2 ply-z plied human hair cords. Untwisted yucca fiber is wrapped over the third sinew binding, holding in place: seven cord-wrapped quills, each with 2 olivella-tip beads on the wrapping cords; a bundle of 2 ply-z plied human hair cords wrapped at center with yucca cord so that the loops of the hair cord extend below the fiber wrapping and the loose ends, 5 of which are tipped with a fetal antelope hoof,
extend above the fiber wrapping; a bone plaque, 0.7cm by 1.0cm, ground smooth; and the tip spike of a yucca leaf. Just below the top of the heavier stick, a final wrapping of sinew holds in place 5 self-wrapped bundles of yucca cord, one holding an olivella tip shell bead, two with single shell disc beads, and two with one tip and one disc beads.

A piece of tanned antelope hide retaining the hair is wrapped 5 times around the feathered portion of the wand (Fig. 32). Eighteen fetal antelope hooves, 7 still attached to human hair cords, are loose within the hide; these undoubtedly fell away from the wand.

The wand is perhaps the most esthetically pleasing artifact in the entire del Muerto collection. Preservation is near perfect. The feathers retain their gloss, and when the wand is lifted, the antelope hooves on their human hair cords produce a musical rustle.

Provenience: Trail Canyon Cave 2, Burial 1 (Basketmaker III).

Wood and Cane

Wood is among the most heavily utilized materials in the rockshelters. In addition to the artifacts listed, wood in the form of structural timbers of small to great size is present in retaining walls, cists and houses; and charcoal from intentional and accidental fires is widespread through the deposits.

Only a few of the wooden artifacts have been examined by a botanist. Dr. S. Shushan, Department of Biology, University of Colorado at Boulder, identified the wood used for flutes as
chokecherry (*Prunus* sp.). The material of the atlatls was identified as scrub oak at the UCM; snare 2477 was identified by myself as the same wood. Game billets 2484, 2485, 2486 and 2487 were identified by Dr. Roy Carlson as cottonwood (*Populus* sp.). Cane, used for the mainshafts of arrows as as (uncollected) roofing material in Basketmaker III-Pueblo I rooms, is the common reed (*Phragmites communalis*).

**Atlatls**

While showing slight variation from one to another, all atlatls are of the mixed type with long slender shafts, a groove and self spur, and leather finger loops (Cressman, Williams and Krieger 1940: 26). The shafts are made of a single piece of wood. Upper faces are flat except for the channel and spur, and lower faces are convex. The sides of the shaft are cut in at the position of the finger loops, and the narrowed portion is wrapped with sinew and cordage. Finger loops, preserved on only one atlatl, are made of leather folded around a sinew core and are attached to the shaft with sinew.

2431: length, 63.2cm; proximal (maximum) width, 2.8cm; proximal thickness, 0.6cm; distal thickness exclusive of spur, 1.1cm; length of groove, 8.1cm; length of raised spur portion, 4.8cm; length of free end of spur, 0.4cm. The proximal end of the atlatl is rounded, and the distal end is square with rounded corners. The spur is raised above the plane of the distal end for its entire length. The rectangular groove is shallow (about 0.1cm deep) for most of its length, but is cut somewhat deeper immediately beneath the free end of the spur. The implement is
carved from a single branch or trunk, so that the heartwood runs down the midline. The material is scrub oak (Quercus sp.), very hard, light colored, with a tiny black heart. The surface is finely finished, but the atlatl shows no signs of use polish and may have been new when interred.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2432 (Fig. 57a-d): length, 65.1cm; proximal width, 2.1cm; distal width, 3.4cm; thickness, 1.0-2.3cm; length of groove, 14.0cm; depth of groove, about 0.2cm; length of spur portion, 5.9cm; length of free end of spur, 0.6cm. Proximal and distal ends are smooth points. The artifact is finely finished and shows some evidence of use polish. Leather finger loops are partially preserved. The artifact was examined by Cressman (1942: 69; Fig. 93a), who classified it and atlatl 2431 as male types on the basis of the raised spur.

2450 (Fig. 58b): length, 70.0cm; proximal end decayed; width of distal end, 2.7cm; maximum thickness, 1.0cm; length of groove, 9.0cm; depth of groove, 0.3-1.0cm. The spur is only slightly raised above the upper face, and takes the form of a carved cone extending 0.6cm over the groove. Distal and proximal ends of the atlatl are rounded, and the intact portion of the proximal end is polished from use. Cressman (1942: 69; Fig. 93) examined the atlatl and classified it as a female type.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2451 (Fig. 58a): length, 73.3cm; proximal width, 2.2cm;
Fig. 57. Atlatl, UCM2432. a, ventral surface, b, c, finger loops, shown actual size. d, profile. Basketmaker II.
Fig. 58. Atlatls. a, UCM2451. b, UCM2450. c, UCM2580. Basketmaker II.
at proximal end, 1.1cm; thickness at distal end, 1.4cm; depth of groove (maximum) 0.3cm. The spur is raised only slightly above the distal end, angling slightly upward just above the groove. Length of spur, 0.6cm. The atlatl is finely finished and shows the polish of much use. It is nearly identical to atlatl 2450.

Provenience: Tseahatso, Burial 16B (Chief’s Grave) (Basketmaker II).

2580 (Fig. 58c): distal end of atlatl. Length, 31cm; width at distal end, 2.2cm; width at break, 1.4cm. Upper and lower faces are convex. The spur is raised 0.3cm above the plane of the upper face, in the same manner as 2431 and 2432. The free end of the spur is about 0.3cm long. A short, oval depression 0.3cm deep is beneath and proximal to the spur; this is a far smaller groove than is seen in the other atlatls. The wood is stained a reddish color, and a meandering pattern of dots in incised in the lower face at the distal end. Several nick on one side (not shown in Fig. 58) may indicate that a weight had been attached.

Provenience: Pictograph Cave, general digging (Basketmaker II).

2626: proximal end of atlatl. Length, 11.4cm; width, 2.8cm; thickness, 0.8cm. Margins are thinned and rounded. The upper face is flat, and the lower face is slightly rounded. A 2cm wide sinew wrapping around the opposed notches is the remnant of finger loops.

Provenience: Tseahatso, Burials 14 and 15 (Basketmaker II).

Atlatl darts

Atlatl darts consist of a foreshaft and a mainshaft. Foreshafts are tapered at the proximal end for socketting into the
mainshaft, and are prepared at the distal end for hafting a stone point or are shaped as a self point. Mainshafts display a cup or notch at the proximal end for engaging the atlatl spur and a socket at the distal end into which the foreshaft is fitted (Guernsey and Kidder 1921: 83). No foreshafts were recovered.

**Mainshafts** (6 whole, 4 fragmentary; Fig. 59)

All mainshafts in the del Muerto collection are straight, smoothed sticks with all knots and imperfections ground flush with the surface. Length, 150-154cm; distal outer diameter, 1.2-1.5cm (mode and average, 1.3cm); foreshaft socket diameter, 0.65-0.83cm (mode and average, 0.8cm); depth of foreshaft socket, 1.8-3.6cm (mode and average, 3.0cm); proximal outside diameter, 0.9-1.0cm; spur cup diameter, 0.4-0.5cm; depth of cup, 0.23-0.37cm. Distal socket margins are strengthened with narrow bindings of sinew (Fig. 59d). The mainshafts are feathered by placing the tips of feathers, or materials used to secure feathers, under sinew bindings 5.8-9.6cm above the proximal end. The quill ends of feathers are held under sinew bindings 17.2-27.6cm farther up the mainshaft. The feathers are unsecured along their lengths, and are laid straight or in a spiral (Fig. 59a). The quills of 1-7 feathers are held by the upper bindings.

All complete mainshafts had been broken in half and placed in graves as burial offerings.

2434, 2435, 2436, 2437, 2438: complete, intentionally broken. Strands of 2 ply-z plied yucca cord 0.1cm in diameter are
Fig. 59. Atlatl dart mainshafts. a, feathering, UCM2627/850.
b-e, mainshaft, UCM2437: b, c, shaft, 1/8 actual size. d, distal end, actual size. e, proximal end, actual size. Basketmaker II.
wound around the midsections of 2436 and 2437.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2627/848, 849: proximal and distal end of single mainshaft, midsection decayed.

Provenience: Tseahatso, Burials 14 and 15 (Basketmaker II).

2627/850 (Fig. 59a): proximal end of mainshaft. This fragment provides the best preserved example of the method of feathering. Sinew bindings 9.8cm from the extreme proximal end hold 3 2 ply-z plied sinew wrapped yucca cord equidistantly around the mainshaft. The longest of the sinew and cord bundles holds the tip of a feather. A second sinew binding 17.8cm above the extreme proximal end holds the quills of 3 feathers equidistantly around the mainshaft, offset 60° from the position of the cords in the lower binding. The loose cords tend to spiral around the shaft to the right.

Provenience: Tseahatso, Burials 14 and 15 (Basketmaker II).

2475, 2575/729: distal ends of mainshafts. Red paint covers the sinew binding and about 1.5cm of the distal end of 2475. The dimensions of artifact 2575/729 are somewhat dissimilar to the other mainshafts: outside diameter of socket, 1.5cm; inside diameter, 0.64cm; depth of socket, 1.8cm; length of fragment, 72.6cm. The sinew binding at the distal socket is 3.8cm wide, and a second band of sinew is set 5.8cm proximal to the first. A band of red paint is between the bindings. The artifact is of particular interest because of its association with two reed arrow fragments.

Provenience: 2475, Tseahatso, general digging. 2575/729,
Pictograph Cave, in Basketmaker II-III level in 1.5m distance between Burials 3 and 4 and the rockshelter wall (Basketmaker II-III).

2476: medial portion of mainshaft, near proximal end. One band of sinew 1.0cm wide binds the quills of 3 feathers equidistantly around the shaft. A 0.5cm band of red paint is 3.3cm distal to the sinew binding. The proximal end is decayed, and the distal end is broken.

Provenience: Tseahatso, general digging (Basketmaker II).

Bow

2578 (1 fragmentary): tip of a bow made of fine-grained yellow wood (Fig. 60b). The central part of the bow had burnt. The fragment is semilunar in cross-section, with convex inner and outer surfaces, and is slightly bowed along its length. A carved projection at the extreme distal end, now mostly broken away, held the bowstring. Length in present condition, 14.4cm; width at string end, 1.3cm; thickness at string end, 1.2cm. Maximum width at charred portion, 2.2cm; thickness, 1.2cm.

Provenience: Pictograph Cave, general digging.

Arrows (4 whole, 10 fragmentary)

All arrows are compound, consisting of a hardwood foreshaft fitted to a cane mainshaft. All foreshafts are tapered proximally to fit into the mainshaft, and are carefully ground distally to a smooth, blunt point. None of the foreshafts are notched for hafting a projectile point. Mainshafts consist of lengths of cane bound at both ends and at several intervals along their lengths.
Fig. 60.  a, 3 of 4 arrows cached in Pictograph Cave, UCM2581.  b, end of bow, UCM2578.  c, wooden arrowpoint and socket, showing method of hafting.  d, feathering, UCM2575.  All, Basketmaker III-Pueblo III.
with sinew. A tapered wooden plug is inserted into the proximal end and glued in place with pitch. A V- or U-shaped nock is cut through both cane and plug (Fig. 60d). Mainshafts are feathered with 3 red-shafted flicker (Colaptes auratus or turkey (Meleagris gallopavo) feathers by binding each end of the feather under a band of sinew. Feathers may be laid straight or spiralled around the shaft.

2582/737-740 (Fig. 60a): 4 identically made and decorated arrows in perfect condition. Length, 82.2cm; length of mainshaft, 62.7cm; diameter of mainshaft, 0.9cm; diameter of foreshaft at joint, 0.8cm. Nocks are V shaped, painted black, and are bound with 0.85cm bands of red-dyed sinew. On each mainshaft two 1.5cm wide bands of clear sinew 0.6 and 10.0cm above the red sinew band hold the ends of 3 red-shafted flicker feathers. Feathers are laid parallel to the shaft. Red bands 1mm wide are painted below the lower feather binding and above the upper feather binding. The distal end of the mainshafts are painted blue-green and are bound with 2.1cm bands of clear sinew. The finely tapered foreshafts extend 21cm beyond the joint. A red band 3.7cm wide is painted 5.5-9.2cm below each foreshaft tip.

Provenience: Pictograph Cave, Cache 1 (Pueblo I-III).

2466/450-457, 2575/727-728 (Fig. 60c,d): fragments of compound arrows.

Fragmentary specimens are all parts of separate arrows. The method of construction is the same as that of the whole arrows. Dimensions: diameter of mainshafts at distal end, 0.6-0.9cm; diameter of nocks, 0.7-0.9cm; length of foreshafts beyond joint, 7.5-19.5cm; length of feathering, 7.5-11.5cm. Of 4 nocks present,
two are V-shaped and 2 are U-shaped. Feathers are turkey or flicker, and in one case, turkey feathers are dyed red. Red painted bands or spirals are present at the feathered portions of several specimens.

Provenience: 2466/450-457, Tseahatso, general digging (Basketmaker III-Pueblo III); 2575/728-729, Pictograph Cave, in the 1.5m distance between the rockshelter wall and Burials 3 and 4 (Basketmaker II-III levels).

**Snare (?)**

2477 (Fig. 61a): the artifact is tentatively identified as part of a snare. Length, 22.3cm. The debarked and smoothed wooden peg is carved so that for 2/3 of its length it is about 1.0cm in diameter; it then tapers abruptly to 0.7cm in diameter. Fine 2 ply-z plied yucca cord is wrapped below the junction of the two diameters on the more slender portion of the shaft. A free loop of this cord was formed by holding the loop and one free end of the cord in place, then wrapping the remainder of the cord over it.

Provenience: Tseahatso, general digging.

**Digging Sticks (7 whole, 2 blade fragments) (Fig. 62).**

Digging sticks are made from slender trunks, branches or roots of dense woods such as oak and mountain mahogany. Several forms are represented.

**Rabbit crook**

2406 (Fig. 62a): length, 104cm; diameter, 1.7-2.0cm. One end is intentionally shaped by thinning the inner margin and bending the shaft over in a crook. Both inner and outer surfaces of the crook are polished. The opposite end is unifacially
Fig. 61. a, snare, UCM2477, one-fourth actual size. b, hearth, UCM2355, one-half actual size.
Fig. 62. Digging sticks. a, UCM2406. b, UCM2469. c, UCM2470. d, UCM2437. e, UCM2468. f, UCM2467. Shown one-eighth actual size. Basketmaker II-Pueblo III.
thinned for 13cm, then trimmed along both edges to form a wedge shaped point; the point shows abrasion from much use. It is suggested that the implement was used a both digging stick and as a hook for collecting rodents from their burrows.

Provenience: Tseahatso, Burial 1 (Pueblo II).

**Sticks with narrow, symmetric, straight blades**

2356, 2357, 2468, 2469, 2470, 2472 (Fig. 62b-e): length, 75-91cm; diameter, 2.3-3.8cm. Proximal ends are rounded and smooth with use. Distal ends are bifacially bevelled to narrow, symmetric blades.

Provenience: 2356, 2357, Trail Canyon Cave 2, general digging. 2468, 2469, 2470, 2472, Tseahatso, general digging. (Basketmaker II-Pueblo III).

**Hockey stick shaped digging sticks**

2467, 2471 (Fig. 62f): length of 2467, 143cm; diameter, 2.1-5.5cm; length of blade, 5.0-5.5cm. Proximal end of the whole specimen is smoothed and polished with use. The distal ends taper gradually to flat, curved blades.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

**Firedrill and hearth**

2355 (Fig. 61b): two sticks, one 39.6cm long and 1.3cm in diameter, the other 17.2cm long and 1.1cm in diameter. While one end of each stick tapers to a similar blunt point, only the tip of the larger is blackened from use as a drill. Circular, blackened depressions resulting from use as a hearth are present along the lengths of both sticks. The pair are loosely bound with two strands of split yucca leaf tied in square knots.
poker

2479: length, 33cm; diameter, 2.5cm. The poker is a heavy branch or trunk, side branches removed and knots smoothed. One end is a smooth knob, while the other is tapered and charred. Possibly a reused digging stick.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Axe or maul handles

2473, 2474 (Fig. 47): crooks made by bending sticks 1.6cm in diameter around axe or maul heads. The inner faces of the crooks are compressed and polished from wear against the stone. Lengths in broken condition, 37.3 and 70.7cm including crook. Inside diameter of most intact crook, 3.2cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Flakers

2442-2446: 5 flakers made from long, slender, forked sticks, each deliberately broken. Length, 100-114cm; maximum width at spatulate end, 1.2-1.7cm. On each flaker approximately 14cm of the end opposite the fork is bifacially thinned and rounded and bears striae and gouge marks consistent with use as a pressure flaker. Pitch or gum is present at the spatulate ends, but there is no indication that anything was hafted. The forked end is smoothed, and the notch is highly polished, as though something had been repeatedly drawn through it. Hand polish is present over most of the shaft and is most marked from 25-40cm below the fork.
See also, Bone Tipped Flakers.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

Drill(?)

2447: present length, 72cm; diameter, 1.1cm. One end of the slender, straight stick is decayed. The other end is a blunt, rounded point showing some evidence of charring. The midsection is highly polished. A 4.1cm wide band of sinew is 54cm from the rounded end. 1.7cm above this is a 0.9cm wide sinew band, and above this are remnants of several fragmentary bands. Between the wide sinew band and the rounded tip, over a distance of about 12cm, are several widely spaced marks suggesting rope burns. The area above the wide band is loosely wrapped with 2 ply-z plied yucca cord 0.2cm in diameter, doubled for about half its length. The cord consists of one ply of natural and one ply of red ochre rubbed s-twisted yucca fiber.

The artifact gives the appearance of having been spun on its axis. An experienced hand weaver, Susan Lacey of Boulder, Colorado, has examined the specimen; in her opinion it is unsuitable for use as a spindle. It is suggested that the artifact is a drill of some sort.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

Stakes

2480, 2481: branches retaining the bark, roughly pointed at one end and crushed by pounding at the other. Length, 28.5 and 30.0cm; diameter, 1.8 and 1.9cm.

Provenience: Tseahatso, general digging (Basketmaker
Cradles

2590-2593 (Fig. 63): fragments of infant's cradle with bark hood. A lath 75cm long is carved and lightly ground to an oval cross section 2.2cm wide and 0.9cm thick (Fig. 63d). The lath is bent into a U-shaped bow 27.5cm high, maximum width 29.2cm. The free ends are broken. Associated with the bow are the broken remains of a bark cradle hood (Fig. 63b), two plaited rush mats (see Mats), and a belly band consisting of a pair of chokecherry sticks 1.2-1.4cm in diameter and 21.2-22.3cm long, connected by a strip of loom woven cotton fabric (Fig. 63c). Similar, complete examples of this type of cradle have been recovered from Canyon del Muerto, Canyon de Chelly and Tsegi Canyon (e.g. Guernsey 1931: 105-6, Plate 64).

Provenience: Tseahatso, Burial 2 (Pueblo II-III).

2404 (Fig. 63c): belly band for infant's cradle. Two chokecherry sticks 20.9cm and 21.3cm long, 1.4 and 1.2cm in diameter, to which are attached a strip of loom woven cotton cloth 40cm long and 15-16cm doubled width. The cloth is folded lengthwise and each end is folded around one stick. One seam is sewn with split yucca leaf and the other with 2 ply-s plied sinew. The completed width of sticks and band is 28cm. It is associated with 3 rush mats (2401-2403, see Mats), together forming part of an infant's cradle.

Provenience: Tseahatso, Burial 1 (Pueblo II).

13514a-e (Fig. 64): portion of a handmade Navajo cradleboard. Two longitudinal back pieces, a triangular foot piece, a bow to support the hood, and the hood itself were
Fig. 63. Parts of Pueblo II-III cradles.  a, cradle pad (?) of feather and fur string, UCM2515.  b, bark headpiece UCM2590.  c, belly band UCM2404.  d, bow for headpiece, UCM2591.
Fig. 64. Navajo cradleboard, UCM13514. One-quarter actual size.
recovered. Where finished ends are present, holes for lacing the cradle together are burnt through the wood along the margins. The boards are 6.9cm wide and 0.75cm thick. No saw marks are evident. The hood bow is 35cm wide and 23cm high in its present condition, and the cottonwood bark headpiece is 80cm long.

Provenience: Pictograph Cave, surface (disturbed burial) (historic Navajo).

Ceremonial Sticks

Class 1: paho (?)

2425 (Fig. 55f, 56a): straight stick 34.3cm long, 1.7cm in diameter, with smoothed surface and flat ground ends. An area 3.3cm wide, 12.8cm from one end and 18.2cm from the other, is carved with alternating grooves. Six buckskin thongs with knotted ends are bound over the grooves with wrappings of 2 ply-z plied yucca cords of two weights: 2.3mm diameter and 1.2mm diameter. The knots at the end of the thongs are empty but once formed sockets for holding slender objects such as quills.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

Class 2: staffs with ferrule and collar (Fig. 65).

The staffs are carved from slender sticks of fine grained yellow wood. They are round in cross-section and are highly polished throughout their length. While generally similar to prayer sticks found in the wall of Mummy Cave Tower and elsewhere (Morris 1941), Class 2 ceremonial sticks are more slender and finely finished. The similarity in form suggests that the sticks date to the Pueblo III period.

2353 (Fig. 65c-e): length, 90.2cm; diameter of shaft 0.7cm
Fig. 65. Ceremonial wands. a, b, UCM2534. c-e, UCM2353. f-h, UCM2582. Wands shown one-eighth actual size; details shown one-half actual size.
at tip to 1.3cm at midsection; length of collar, 0.8cm; diameter of collar, 1.3cm; maximum diameter of ferrule, 1.5cm; length of ferrule, 1.1cm; diameter of shaft at base of ferrule, 1.0cm. The ferrule is a flat-topped knob, triangular in profile. From the base of the knob the neck of the shaft expands then tapers in a gentle curve to meet the cylindrical collar 7.9cm below the base of the ferrule. The shaft below the collar gradually expands to its maximum diameter near the midsection, then tapers to a blunt tip. A faint diamond pattern is incised into the shaft 12.8-13.5cm below the top of the ferrule.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2354 (Fig. 65a,b): length, 100.4cm; diameter of shaft, 0.7cm at tip to 1.3cm at midsection; length of spool collar, 1.4cm at margins, 1.2cm at groove; length of head, 3.3cm; width of head, 2.4cm; thickness of head, 1.6cm. The head is subrectangular in outline and is flattened from back to front. All margins are carefully smoothed. The neck expands gently then tapers to meet a grooved collar 11.4cm below the top of the head. The shaft exhibits its maximum diameter at the midsection of the shaft, then tapers to a blunt point. The artifact conforms to Pepper's Type 1 ceremonial staff (1920: Plate V).

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2582: length, 120.5cm; diameter of shaft, 1.0cm at tip to 2.6cm at midsection; dimensions of spool and head not taken. The head is oval in outline and is flattened from back to front. A semilunar opening passes through the center of the head.
The spool-shaped collar is 8.8cm below the lower edge of the head. The shaft reaches its greatest diameter at the midsection, then tapers to a blunt point. The midsection of the shaft is wrapped for a distance of 43cm with coarse strands of juniper bark. The artifact is in pristine condition, showing no signs of handling after initial construction.

The artifact conforms to Pepper's Type 1 ceremonial staff (1920: Plate V), and is identical to a fragmentary painted staff recovered by Judd at Pueblo Bonito (1954: 268, Fig. 71).

Provenience: Pictograph Cave, Cache 1 (Pueblo period).

Class 3: slender composite staffs, rectangular in cross-section, with curved wooden blades bound to one end (Fig. 66).

2583 (Fig. 66a,b): total length, 125.2cm; length of blade, 19.5cm; length of shaft, 111.3cm; width of shaft, 1.7cm; thickness of shaft, 1.4cm; blade width, 3.7-3.9cm; blade thickness, 0.2cm at edges, 0.8cm at center. The slightly concave faces and all edges of the shaft are highly polished. The shaft tapers toward the lower end, but is not pointed. The blade is a biconvex board with a squared upper margin. This portion of the board is bent in a smooth curve to a right angle to the rest of the blade. Sides are parallel for most of their length, but curve toward the midline near the lower margin to meet a tongue 2.2cm long and the width of the staff. One face of the upper end of the shaft is bevelled to a wedge shape over a distance of 5-6cm; the blade tongue is placed against the bevel with the inside curve of the blade toward the shaft. The joint is wrapped with a band of sinew 2.5cm wide.
Fig. 66. Ceremonial wands. a, b, UCM2583. c-e, UCM25584. Wands shown one eighth actual size; details shown one-half actual size.
At the upper margin of the sinew band, 11 turns of 2 ply-z plied yucca cord are wrapped in a lcm band. Two holes are drilled through the blade, matching horizontal grooves on either side of the upper shaft. Blade and shaft are tied together through the holes and grooves with two courses of z plied sinew. The staff is in pristine condition, showing no marks of handling after initial construction.

Provenience: Pictograph Cave, Cache 1 (Pueblo period).

2584 (Fig. 66c,d,e): total length, 114.5cm; length of shaft, 101.8cm; width of shaft, 2.0cm, thickness of shaft, 1.4cm; length of blade (less tongue), 20.8cm; length of tongue, 3.4cm; width of blade, 9.2cm; thickness of blade, 0.5cm. The upper end of the blade is bent to form nearly a right angle to the rest of the blade. Inner and outer faces of the curved portion are coated with a thin, clear substance resembling pitch. The upper end of the shaft is channeled to match the tongue of the blade, and the two parts overlap by 8.1cm. Blade and shaft are connected in the same manner as 2583.

The staff appears to have been in the final stages of manufacture when it was cached. A binding of 2 ply-z plied yucca cord 0.2cm in diameter is tied over and around the curve of the blade, apparently to prevent it from springing back to its original form. The staff is in pristine condition, showing no marks of handling.

Provenience: Pictograph Cave, Cache 1 (Pueblo period).

Flutes

Long, slender tubes of chokecherry (Prunus sp.) with 3-6 holes spaced evenly or placed in two groups nearer the distal end.
The flutes are well smoothed and highly polished. The recovery of
the four flutes in the University of Colorado Museum collection
has been described (Morris 1925) and the nature and occurrence of
flutes of this type in Basketmaker sites in northeastern Arizona
has been documented (Morris 1956).

2424 (Fig. 67a): length, 76.5cm; outside diameter, 2.6cm at
distal end, 2.2cm at proximal end; wall thickness, 0.3-0.4cm. Six
holes, each about 0.7cm in diameter, are placed in two groups of
three on the distal half of the flute. Hole spacing from distal
end: 14.8cm, 18.5cm, 23.0cm, 31.2cm, 35.5cm, 40.0cm. The back of
the artifact is heavily charred, but the otherwise the flute is in
new condition, with little or no wear on the margins of the finger
holes.

2433 (Fig. 67b): length, 76.5cm; diameter, 2.6cm at distal
distal end, 2.4cm at proximal end; wall thickness, 0.3cm. Five holes,
each 0.8cm in diameter, are placed in groups of 3 and 2. Hole
spacing from distal end: 14.6cm, 22.7cm, 32.9cm, 36.9cm, 39.6cm.
The flute is finely finished and shows no signs of use.

2448 (Fig. 67c): length, 93.4cm; outside diameter, 4.0cm;
wall thickness, 0.5cm. Three holes 1cm in diameter are in the
distal half of the flute; hole spacing was not measured. A
geometric pattern of zigzag lines is distal to the holes. A rough
hole is gouged in the upper face of the flute. A strip of sinew
is wrapped three times around the body of the flute near this
hole, and traces of other sinew wrappings, evidently repairs, are
present over old cracks at the proximal end and at two points
below it. The margins of the finger holes are worn and polished
through use, and the midsection of the flute is black from long
Fig. 67. Basketmaker II flutes from Burial 16B, Tseahatso.
a, UCM2424.  b, UCM2433.  c, UCM2448.  d, UCM2449.
handling.

2449 (Fig. 67d): length, 96.9cm; diameter, 3.3cm; wall thickness, 0.3cm. Four holes are set in one group in the midsection and distal half of the flute. Hole spacing from distal end: 20.6cm, 30.2cm, 42.5cm, 52.0cm. Wide bands of sinew are wrapped at the proximal and distal ends and between the third and fourth holes where cracks appear. The margins of all holes are smooth, thinned and polished through use, and the midsection is blackened from long handling. The flute, although now somewhat flattened, is still playable.

Provenience of all flutes: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

Game Billets

Short lengths of cottonwood roots or branches, peeled and roughly shaped into round-ended cylinders. Culin (1907: Fig. 909) identified identical objects collected at Zuni by James Stevenson as kick stick billets.

2484 (Fig. 68a): length, 10.7cm; diameter, 2.4cm. A red band is painted around the midsection. All surfaces are battered.

2485 (Fig. 68b): length, 9.5cm; diameter, 2.7cm. A black band is painted around the midsection. All surfaces are battered.

2486 (Fig. 68c): length, 9.9cm; diameter, 2.7cm. The billet is covered with a pattern of incised lines. It is more heavily battered than the other billets and the design cannot be made out.

2487 (Fig. 68d): longitudinal half of hourglass shaped billet. Length, 11.9cm; diameter of ends, 3.2 and 3.4cm; diameter at midsection, 2.2cm. The outer surface is heavily weathered.
Fig. 68. Game pieces. a–d, kicksticks. a, UCM2484. b, UCM2485. c, UCM2486. d, UCM2487. e, hoop, uncatalogued.
Provenience of all billets: Tseahatso, general digging (Basketmaker II-Pueblo III).

Hoop
(no catalogue number): twig bent into a circle and tied with yucca leaf (Fig. 68e). Diameter of twig, about 0.8cm; diameter of hoop, about 13cm. The hoop is heavily battered and may have formed a part of a hoop and stick game.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Owl Charms

Objects of split willow sticks interlaced in offset double spirals or in the form of a "god's eye".

2494, 2678 (Fig. 69b,c): double spirals. On specimen 2494, two lengths of raw yucca leaf are brought around the intersection of the spirals and are wrapped with additional yucca leaf to form a handle. Measurements of 2494 not taken. Long axis of 2678, 5.2-5.4cm; short axis, 2.8-3.0cm.

2495 (Fig. 69a): god's eye. Split willow sticks are wrapped over a framework of two sticks set at right angles. Crosspieces were wrapped on alternate faces as work progressed; the horizontal crosspiece is now missing. Length of vertical crosspiece, 7.8cm; length of vertical wrapping, 6.0cm; length of horizontal wrapping, 4.9cm.

Provenience of 2494, 2495: Tseahatso, general digging.

Provenience of 2678: Canyon del Muerto, surface (Basketmaker II-Pueblo III).
Gods eyes and owl charms made from yucca and split willow. 

- a, UCM2495.
- b, UCM2494.
- c, UCM2678.
Beads

2408 (Fig. 70a): 64 tubular wooden beads from a single necklace. Length, 2.0-3.8cm; diameter, 1.0-1.3cm. The beads are strung on a doubled 2 ply-z plied yucca cord suspended between two yucca leaf coils.

Provenience: Tseahatso, Burial 16A (Chief's Grave) (Basketmaker II).

Hair Ornaments

Personal ornaments made of 5-11 slender wooden pins to which cord and feather decorations are fastened. Similar artifacts were recovered from Basketmaker II burials in the Marsh Pass caves (Guernsey and Kidder 1921: Plate 18 a, b; Gurnsey 1931: Plate 49 b-d).

The wooden pins are longitudinally split from an evenly thinned wooden board that had been pre-shaped so that one end was somewhat more broad than the other. Prior to splitting, the long edges of the board were ground to a half-round and the more broad end was ground flat. After splitting, the more narrow half of each pin was ground to a cylinder with a blunt, tapered end. The opposite end is unmodified.

The pins are laid side by side in the order in which they were split from the board and are held in place with 1-7 weft-wrapped open-twined courses of sinew (Fig. 71b). Cordage made from yucca and an unidentified fiber is wrapped around midsection, forming a base for the attachment of decorative cord bundles and feathers.

2421 (Fig. 71a): 8 pins are bound with single rows of weft-wrapped twined sinew at points approximately 1, 3.5, 6 and
Fig. 70. Basketmaker II necklaces. a, UCM2408, cylindrical wooden beads. b, abalone shell pendant lashed to part of composite neck cord, UCM2423.
Fig. 71. Basketmaker II hair ornaments from the burial of an adult male, 1/4 actual size. a, UCM2421. b, detail of lacing. c, UCM2452. d, UCM2422.
10cm from the squared ends. The ornament widens fairly abruptly at midsection. The midsection is wrapped first with a layer of sinew, which holds the quill of one feather. Over this is a wrapping of 2 ply-z plied cord which holds in place a sinew socket for a quill, and after additional wrappings, sinew sockets holding the flattened ends of 3 quills and a small wooden plaque. Length, 29.2cm.

2422 (Fig. 71d): 11 pins. Light colored bands mark the former position of bindings 1.7, 2.5, 10.0, 10.5, 11.0, 17.0 and 17.3cm below the flat ground ends. A band of sinew is at the point where the original board flared toward the broad end. Over this 12 self-wrapped bundles of 2 ply-z plied cord and one buckskin strip are held in place by wrappings of red dyed cord. Each cord bundle is composed of about 12 fine cords with knotted ends; quill tips remain in two of the knots. A band of sinew is twisted around the buckskin strip. The cordage is of an unidentified fiber, neither Yucca nor Apocynum. Length of ornament: 34.3cm.

2452 (Fig. 71c): 5 pins. A single row of sinew is twined across the pins about 5cm below the squared end, and a light colored band about 1.5cm below the squared end marks the position of a second binding. The midsection of the ornament is wrapped with sinew, and two wrapped cord bundles similar to those on 2422 are laid over the sinew and held in place with a wrapping of 2 ply-z plied cord. The cordage is made of the same unidentified fiber noted on artifact 2422. Several quill ends remain in place in the knotted ends of the cord bundles. Length: 24.7cm.

Provenience of all hair ornaments: Tseahatso, Burial 16B
(Chief's Grave) (Basketmaker II).

**Worked Wood**

Several whole and fragmentary worked wooden artifacts of unknown use were recovered.

2358: polished stick, ends smoothed and blunt, midsection painted red. A hole 3mm in diameter and 4mm deep is punched into each end.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2482: spatulate end of plano-convex blade. Length, 38.5cm; width, 3.8cm; thickness, 1.0cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

2567: cylindrical stick with bark removed and all knots sanded down. Ends are battered and rounded. Length, 52.6cm; diameter, 1.6-1.8cm.

Provenience: Pictograph Cave, Burial 3 (Basketmaker II).

2568: cylindrical stick with bark removed and all knots sanded down. A conical cup 0.84cm by 0.78cm is ground 1.1cm into one end. A 0.1cm natural hole runs from the base of the cup through the length of the stick.

Provenience: Pictograph Cave, Burial 3 (Basketmaker II).

**Juniper Bark and Seeds**

The inner bark of the juniper was stripped from the tree and used in whole sheets or strips, or processed into fibrous masses or hanks. Trash deposits at all levels in every rockshelter contain a large proportion of juniper bark, suggesting that it was
an item of common utility throughout the occupation of the canyon. In addition to the artifacts described below, juniper bark was used in great quantities as grave linings during the Basketmaker II-III periods. It appears as reinforcing material in the mud of architectural features of the same periods, and was similarly used as reinforcement in the paste of unfired vessels. Juniper bark also was used as the soft, warm liner in winter sandals.

**Torch**

2509 (Fig. 72b): bundle of juniper bark strips folded in half and wrapped with a split yucca leaf tied in a square knot. The loose end is charred. Length, 37cm; diameter at midsection, 3cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

**Mat**

2559: bundles of partially macerated juniper bark, each about 1cm in diameter, are laid parallel and twined over with two courses of 2 ply-z plied yucca cord. The weft courses are 23cm apart, and the pitch of the stitch is down to the left. The curved impression of a basket rim is present on one face of the mat, and many bits of down from a feather-string blanket adhere to the opposite face.

A similar mat was recovered from Basketmaker II contexts at Sand Dune Cave (Lindsay et al. 1969).

Provenience: Pictograph Cave, Burial 3 (Basketmaker II).

**Aprons and menstrual pads:** 33 whole and fragmentary

2536/565-580, 591-597: oval bundles of juniper bark strips and fiber. Aprons consist of juniper bark strips folded over a
Fig. 72. Juniper bark artifacts. a, liner for winter sandal. b, torch, UCM2509. c, menstrual pad. d, e, juniper bark ring wrapped with cotton rag, UCM2664.
waist string of yucca cord or twisted juniper bark. The strips are held in place with 1-3 courses of plain close twining. The waist cords of 2536/571 and 579 are dyed red; all others are undyed. The bark of the apron is generally only long enough to pass between the legs and tuck under the waist cord at the back. After use the aprons were rolled into neat bundles, tied with the waist cord, and discarded (Fig. 72c). A few of the bundles lack a waist cord. These may have been simple pads, or the cord may have been removed for re-use.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

**Juniper bark ring with cloth fragment**

2664 (Fig. 72d,e): strips of juniper bark are bunched into a ring and wrapped with a spiral of additional bark. A strip of loom woven cotton cloth is wrapped twice through the ring; a long strip of the cloth now hangs loose. Diameter of ring, 6.3cm; diameter of hole, 2.9cm; thickness of ring, 1.2cm.

Provenience: Tseahatso, general digging, Pueblo III refuse.

**Juniper seed beads**

2407b (Fig. 73a): bracelet of 8 juniper berries strung alternately with 7 spine-lopped olivella shells beads and 3 ground shell pendants. All are strung on a 2 ply-z plied yucca cord 48cm long.

Provenience: Tseahatso, Burial 7 (Basketmaker III-Pueblo I).

**Shell**

Shell artifacts may be divided into four categories: beads, pendants, worked shell and whole shell. However, most of the
Fig. 73. a, juniper berry and olivella shell bracelet, UCM2407b, Basketmaker III-Pueblo I. b, olivella shell and shell disc bead bracelet, UCM2430, Basketmaker II.
shell was recovered from burial contexts in the form of bracelets and necklaces, often composed of both beads and pendants. The artifacts are therefore described in order of catalogue number rather than by form.

The shells are all salt water species from the Pacific Coast of California and the northern Gulf of California. Identification and provenience of species were made by C. J. McCoy, Jr. of the Carnegie Museum, Pittsburgh (Appendix 2).

2423 (Fig. 75a): subrectangular pendant of Haliotis rufescens, heavily ground on all edges. Length, 7.6cm; width, 6.1cm. It is attached to a cord made up of a 3 strand braid of buckskin wrapped with very loosely twisted 2 ply-z plied yucca fiber. Cord fragmentary; diameter, 1.85cm.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2429 (Fig. 73b): 20 spine-opped Olivella incrassata (Solander) beads and one large, flat unidentified shell disc bead.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2430: bracelet of 17 Olivella dama (Wood) shells and 10 thin shell disc beads, strung on 2 ply-z plied yucca cord 0.15cm in diameter.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2457 (Fig. 74a): 57 of an original 63 pendants cut from the lips of Glycemeris gigantea (Reeve), ground smooth along margins and rounded ends. Length, 4-6cm; width, 0.5-0.8cm. Biconically drilled holes are at one end of each pendant. A groove has been
Fig. 74. Basketmaker II jewelry made from the valves of Glycemeris shells. a, pendants, UCM2457. b, detail of joining of Glycemeris rings to a braided neck cord, UCM2458 (necklace shown in Fig. 28).
recovered in basket 2456.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2458 (Fig. 74b): 18 rings ground from Glycemeris gigantea (Reeve). Average outside diameter, 7cm; width and thickness, 0.5cm. The rings are lashed with unspun yucca fiber to a cord composed of 11 2 ply-z plied cords braided into a single cord 0.6cm in diameter, wrapped with 0.1cm wide bands of untwisted yucca fiber.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2459 (Fig. 70b): subrectangular pendant of Haliotis rufescens with 5 perforations in the upper edge. Height, 2.8cm; width, 4.5cm. Sinew is wrapped through 4 of the perforations. The perforation at the left edge is broken, and was mended prehistorically by cementing a small disc bead over the break. The pendant, loose when recovered, had been bound to its neck cord with 2 ply-z plied yucca cord. The upper half of the back of the pendant is coated with a lustrous black substance resembling pitch; the substance does not, however, give off a pitchy aroma when burned. Its purpose is unknown, but it suggests that the pendant may once have been part of a composit artifact, perhaps as an inlay.

A composite neck cord made up of 4 individual neck cords (Fig. 28) was with the pendant. The cores of 3 of the cords are made of untwisted juniper bark. Two are wrapped with juniper bark. Of these, one is overwrapped with 2 ply-z plied cord. The
third cord is wrapped with yucca fiber then with very fine 2 ply-zplied cord of unidentified fiber. All cords have a final wrapping of rabbit skin strips. A fourth neck cord is made of 22 fine 2 ply cords. Carlson (notes, 1963) has suggested that cords and pendants 2458, 2459, 2460 and 2461 may have all been part of the same artifact, and were perhaps torn apart when the burial was made.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2460 (Fig. 75b): D-shaped pendant of Haliotis rufescens, biconically drilled in upper left corner. Length, 4.2cm; width, 2.7cm. The back and edges are ground smooth.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2461: trapezoidal pendant of Haliotis rufescens, drilled from one face near center of short side. 5.1cm by 5.9cm by 6.0cm by 3.6cm; thickness, 0.2cm.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2465 (Fig. 75c): bracelet of 121 flat shell disc beads and 28 thick shell beads on a loosely twisted 2 ply-s plied yucca cord 0.5mm in diameter. Diameter of beads, approximately 0.6cm.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2562: bracelet of 4 spine-lopped Olivella beads, 49 thin, flat disc shell beads and 5 thick pink (Haliotis?) beads (now restrung on commercial cord).

Provenience: Pictograph Cave, Burial 3 (Basketmaker II).
Fig. 75. Shell artifacts: a-e, Basketmaker II; f, surface find. a, abalone pendant, UCM2423. b, abalone pendant, UCM2460. c, disc bead bracelet, UCM2465. d, 14 white shell pendants, UCM2565. e, Turitella pendant, UCM2564. f, unaltered Laevecardium valve.
2563: bracelet of 51 well polished spine lopped Olivella dama shells, strung on a fine, 2 ply-s plied yucca cord.
Provenience: Pictograph Cave, Burial 3 (Basketmaker II).

2564 (Fig. 75e): Turritella sp. pendant, possible subfossil, drilled through the wall near the opening. Length, 5.9cm.
Provenience: Pictograph Cave, Burial 3 (Basketmaker II).

2565 (Fig. 75d): 14 white shell pendants, species unidentifiable, perforated at one end. A fragment of fine 2 ply-z plied cord is retained in one hole.
Provenience: Pictograph Cave, Burial 3 (Basketmaker II).

2570: bracelet of 5 spine-lopped Olivella dama shells and 7 thin, curved shell disc beads.
Provenience: Pictograph Cave, Burial 4 (Basketmaker II).

2607: bracelet of 3 spine-lopped Oliva shells, 4 spine-lopped Olivella shells, 2 pendants cut from the margins of white shells, and 6 juniper berries. Described in section on Juniper (Fig. 73a).
Provenience: Tseahatso, Burial 7 (Basketmaker III).

2614c: bracelet of 50 white shell disc beads 0.7cm in diameter and 0.25cm thick, and one spine-lopped Olivella shell, strung on loosely twisted 2 ply-z plied yucca cord.
Provenience: Tseahatso, Burial 10 (Basketmaker II-Pueblo I).

2623 (Fig. 76): armlet of 200 spine-lopped Olivella dama shells and one turquoise pendant. The artifact was made by winding a continuous 2 ply-z plied yucca cord (3mm in diameter) into a 21 strand warp. Weft of 2 ply-s plied yucca cord (2mm in diameter) is weft-faced twined or woven over 2.3cm of each end of the web. Starting from the second warp, every other warp was cut
Fig. 76. a, armlet of 200 Olivella shells and one turquoise pendant, one-half actual size.
b, detail of construction. UCM2623, Basketmaker II-III.
away, reducing the number of warps to 11. The remaining warps are held in place by the rectangle of fabric at each end. The beads were attached by fastening a 2 ply-z plied yucca cord (1mm in diameter) to the left end of the topmost exposed warp. The cord passed around the top warp once, a bead was strung on it, then the cord passed around the next lower warp (Fig. 76b). A second bead was added, and the cord returned to wrap around the upper warp. A third bead was added, and the cord was again wrapped around the lower warp. The process continued across the length of the armlet until the top row of 20 beads was loosely attached. The stringing cord was then brought back through the row until the starting point was reached. Rows 2-10 were added in the same manner.

Finally, a covering of thin leather was folded and sewn over the fabric rectangles at each end, and outermost warps were wrapped with the same leather. Perforations in the corners of the leather covered ends indicate the method of fastening the armlet to the forearm (Fig. 24).

Provenience: Tseahatso, Burial 13 (Basketmaker III).

2631: 153 spine-lopped Olivella dama shell beads; the basal portion of 4 Olivella sp. shells; 66 thin, curved shell beads; 23 thick (Haliotis?) shell beads, each about 0.6cm in diameter; 46 flat disc beads cut from the nacre of Haliotis rufescens shell, 0.9-1.6cm in diameter; one flat white shell bead, pierced off-center, 2.4cm in diameter and 0.2cm thick; one subrectangular orange shell pendant 1.25cm wide, 1.9cm long and 0.15cm thick, with two holes holding strands of sinew.

Provenience: Tseahatso, Burial 14 in Cist 5 (Basketmaker II).
13549: 7 shell disc beads.

Provenience: Navajo Yei Site, surface.

Uncatalogued (Fig. 75f): valve of Laevicardium elatum (Sowerby), broken through midsection but otherwise unaltered.

Provenience: Canyon del Muerto, surface (Basketmaker II-historic Navajo).

Yucca

Yucca is the most commonly utilized material among the del Muerto artifacts. Unaltered yucca leaves, strong, flexible and available, are used as ties and in flexible constructions such as containers and sandals. Yucca fiber stripped from the leaves is used as-is in artifacts in which softness or absorbancy is desirable, or is spun into cordage and used as ties and in the manufacture of fabrics. The tremendous quantity of yucca cordage textiles recovered from Canyon del Muerto suggests that the processing and manufacture of yucca cordage was a major domestic industry during the Basketmaker and early Pueblo periods.

Whole and split yucca leaves

Container

2491 (Fig. 77a): a whole narrowleaf yucca plant was cut off at the root, and the inner core of leaves was cut away. The remaining ring of outer leaves was drawn upward and held in place with a twined course of split yucca leaves. A twig or root, drawn into a 10 cm ring, is bound inside the container above the twining by coiling around it and the upright leaves with a split yucca leaf. Similar specimens have been noted in Basketmaker II and III context at Cave 1, Segi; Broken Roof Cave; Hagoe (Guernsey 1931:...
Fig. 77. Artifacts made from whole yucca leaves. a, container made from a whole yucca plant, UCM2491, Basketmaker II-Pueblo III. b, tumpline made from wide yucca leaves, UCM2524, Basketmaker II-Pueblo III.
and Broken Flute Cave (Morris 1980: 101). Length: 30 cm.

Provenience: Tseahatso, general digging.

Plaited ring basket

2698: a plaited yucca ring basket is described in the section on Basketry.

Sandals

Class 1. Oblique interlaced (plaited) sandals: whole or split yucca leaf.

Oblique interlaced sandals are constructed of one set of undifferentiated elements, each of which passes over or under elements that cross its path, changing direction only at the margins (Emery 1966: 62, Fig. 73). The sandals are made of whole or split yucca leaves interlaced in an over 1-under 1 pattern, or twill-interlaced in an over 2-under 2 pattern. Occasionally both patterns are combined in a single specimen.

All sandals are constructed from toe to heel. The manner in which the ends of the elements are treated in finishing the sandal is variable and forms part of the basis of the following classification. There is some correspondence between the method of finishing the sandal and the method of fastening the sandal to the foot, but because of the small number of specimens, the presence of heel and toe loop ties versus the presence of side loop ties is not considered diagnostic of a separate type.

Type 1 (4 whole, Fig. 78). Oblique interlaced sandals with heels finished by wrapping each element over or under a rigid element placed across the heel. Yucca leaf ends turned toward the toe of the sandal are uncut; those turned toward the heel are cut short. Toes are square to diagonal.
Fig. 78. Whole yucca leaf sandals, oblique interlaced, Type 1. From left to right: UCM2538/600; UCM2538/603; UCM2538/608; UCM2538/607. One-half actual size.
Provenience of all Type 1 whole leaf sandals: Tseahatso, general digging.

2538/600 (Fig. 78a): 6 unsplit, broad yucca leaves are folded over at the toe resulting in 12 oblique elements that interlace in a 1/1 pattern. The diagonal toe indicates that the sandal was made for the left foot. The heel is damaged, but it may be seen that the rigid horizontal element around which the working elements are wrapped is formed of the working elements that were outermost when the sole was at the desired length. The method of fastening is a toe and heel loop combination. Length, 25 cm; width, 10.5 cm.

2538/603 (Fig. 78b) 4 unsplit, broad yucca leaves are folded over at the toe to form 8 working elements that interlace in a 1/1 pattern. The diagonal toe indicates that the sandal was made for the right foot. The rigid bar at the heel is a separate, added element. A toe loop is present. Length, 25.5 cm; width, 10 cm.

2538/607 (Fig. 78d): 3 unsplit, broad yucca leaves are folded over at the toe to produce 6 oblique elements that interlace in a 1/1 pattern. The toe is nearly square, with a slight diagonal to the left. The outermost elements are pulled across the heel and knotted to form a rigid bar around which the working elements are wrapped. No loops or ties are present. Length, 15 cm; width, 6 cm.

2538/608 (Fig. 78c): 8 unsplit, narrow yucca leaves are folded over at the toe to form 16 oblique elements that interlace in 2/2 twill. The toe is diagonal to the left indicating a sandal made for the right foot. The outermost elements are drawn across the heel to form the bar around which the working elements are
wrapped. A long strand of z-twisted, crushed yucca leaf is sewn through the sandal as a tie. Although not a typical toe and heel loop combination, the pattern of fastening is similar to the toe and heel loop method. Length, 26 cm; width, 9 cm at midsection.

Type 2 (5 whole, Fig. 79). Oblique interlaced sandals with heels finished by bunching the elements and tying in place. All are 2/2 twilled and have side loop fastenings. Toes are square to rounded. In 3 of the 5 specimens, a separate narrow yucca leaf has been interlaced through the turnings of the outermost elements, probably to strengthen the margins for side loop attachment.

Provenience of all Type 2 whole leaf sandals: Tseahatso, general digging.

2537/599 (Fig. 79a): 16 unsplit, narrow yucca leaves are folded over at the toe to form 32 oblique elements that interlace in 2/2 twill. None of the fastening elements are present, but side loops are indicated by lifted sections along the margins. The toe is square. The elements at the heel, while bunched, are interlaced to some extent, suggesting that the bunched heel may be transitional to the interlaced heel seen in Type 3 sandals. Length, 28 cm; width, 13 cm. Recovered from Pueblo III refuse.

2538/601 (Fig. 79b): 6 unsplit yucca leaves are folded at the toe producing 12 oblique elements that are interlaced in both 2/2 twill and 1/1 pattern. The toe has been damaged by fire. Elements at the heel are bunched across each other and tied in place. Fragments of side loops are made by looping yucca leaves in half hitches around the outer elements. Length, 23 cm; width, 10 cm.
2538/602 (Fig. 79c): 12 unsplit, narrow yucca leaves are folded at the toe to produce 24 oblique elements that are interlaced in 2/2 twill. The sandal is markedly long and narrow, with rounded toe. Supplemental yucca leaf elements are interlaced along the margins. The heel is bunched and tied with the ends of the elements left behind the heel. A few fragments of yucca leaf side loops remain in place. Length, 27.5 cm; width, 9.5 cm.

2538/604: 7 split and whole yucca leaves are folded at the toe to produce 14 oblique elements that interlace in 2/2 twill. The toe is damaged but appears to be rounded. Remnants of yucca leaf side loops remain in place. Elements at the heel are bunched, turned back onto the face of the sandal, and tied in place. Length, 27.5 cm; width, 10 cm.

2538/609: 5 unsplit, narrow yucca leaves are folded at the toe forming 10 oblique elements that interlace in 2/2 twill. The toe area is broken away. Heel loops and side loops with lace cord are intact; beneath the lacing is a hollow wad of cornhusks, warmth or padding for cold weather wear. Length, 27 cm; width with padding, 12 cm.

Type 3 (4 whole, Fig. 80). Yucca leaf sandals, oblique interlaced in 2/2 twill. All toes are diagonal. Both heel and toe loop fasteners and side loop fasteners are present.

Provenience of 2395, 2396 and 2397: Test Pit 1, Pueblo III levels, Tseahatso. Provenience of 2537/598: Tseahatso, general digging, Pueblo III levels.

2395 (Fig. 80a): 12 unsplit, narrow yucca leaves are folded at the toe to form 24 oblique elements that are interlaced in 2/2 twill. The diagonal toe indicates a sandal made for the left
Fig. 80. Whole yucca leaf sandals, oblique interlaced, Type 3. From left to right: UCM2395; UCM2396; UCM2397; UCM2398. One-half actual size.
Double toe loops of cord and a heel loop of z-twisted yucca leaf are present. Toe loops are made of a 2 ply-s plied cord doubled and twisted on itself to form a heavier z-twisted cord.

It is sewn through the sandal in two loops and tied in a square knot. Supplemental yucca leaf elements are tucked under the working elements on the sole, and narrow yucca leaves are wrapped around the elements at the margins. All raw ends extend from the sole and are patterned in lines along the axis of the sandal.

Length, 24 cm; width, 10 cm.

2396 (Fig. 80b): 11 unsplit, narrow yucca leaves are folded at the toe to form 22 working elements that interlace in 2/2 twill. The diagonal toe indicates a left sandal. The sandal was worn out at the ball of the foot and has been roughly mended with broad yucca leaves. Side loops of crushed yucca leaf, loosely s-twisted, are back-stitched through the margins. Length, 25 cm; width, 13 cm.

2397 (Fig. 80c): 5 split or trimmed narrow yucca leaves are folded at the toe forming 10 oblique elements that are interlaced in 2/2 twill. The diagonal toe indicates a left sandal. The heel is broken away, and no method of fastening is apparent. Not measured.

2537/598 (Fig. 80d): 10 unsplit, narrow yucca leaves are folded at the heel to form 20 oblique elements that are interlaced in 2/2 twill. The diagonal toe indicates a right sandal. The specimen is worn out at the heel and is mended with broad yucca leaves in 2/2 twill. Side loops and heel loops are of 2 ply-z plied cordage. The side loops are back stitched through the margins and are tied in square and granny knots. Length, 26 cm;
width, 12 cm.

**Class 2:** Wicker sandals made of 4-8 straight, bunched or twisted yucca leaf warps over which unprocessed yucca leaves are woven. Warp ends may be braided or otherwise worked back into the sandal at the toe or heel, or may be turned back over the toe to form a slipper. All whole and most fragmentary specimens show some evidence of side-loop laced ties. Heel loops are sometimes present. Heavy pile, applied by sewing or inserting fibrous material, is present on the sole of some sandals.

**Type 1:** Flat wickerwork sandals (3 whole, 1 fragmentary) (Fig. 81).

2380: Child's sandal with square, braided toe, woven of split, narrow yucca leaves over 6 yucca leaf warps. A toe loop and fragments of side loops are present. The ends of the discontinuous yucca leaf weft protrude onto the sole of the sandal, where they have frayed out into fibrous, thickened areas. The heel has been damaged and gives the impression of having been used as a brush or broom. Length of remainder of artifact, 17 cm; width: 8 cm. Provenience: Trail Canyon Cave 2, general digging.

2541 (Fig. 81a): Adult's sandal with twined and woven yucca leaf weft over 5 yucca leaf warps. The weft is heavy, and has become frayed through use to form fibrous pile on the margins and sole. The toe is very worn, but it appears that warps and weft fag ends were turned back into the body of the sandal. The heel is wrapped with yucca leaves. A heel loop of heavy 2 ply-z plied cord is fastened around the outer warps in a cow hitch. The ends of the heel cords are sewn through both margins to form side loops. Length, 23cm; width, 12cm.
Fig. 81. Whole yucca leaf sandals, woven, Type 1. Left, UCH2541/612. Right, UCH2577.
2577 (Fig. 81b): adult sized wicker sandal with applied pile sole. This very worn sandal was altered by mending and sewing during its uselife. The weft is worn to fibrous bundles and the warp is obscured. Toe and heel are wrapped. The body is reinforced by sewing in yucca leaves in a running stitch, and yucca leaves are backstitched up the midline and the left margin. Side loops of yucca leaf, looped on themselves, are sewn through the sole, and at the left margin these pass around the row of backstitching.

Provenience: Pictograph Cave, general digging (Basketmaker II-Pueblo III).

2385: heel and part of toe of adult's flat wicker sandal with applied pile sole. The outside warps, toe and heel are wrapped. A continuous, heavy 2 ply-z plied cord passes around the perimeter, sewn through the sole and looped on itself in half-hitches to form heel and side loops. Strips of yucca leaf were sewn through and knotted on the sole, where they have frayed out to form thick pile. Sole and pile are caked with red and yellow mud, remnants of the last trip before discard. Maximum remaining width, 12cm.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

Type 2: slipper toed wicker sandals (whole yucca leaf) (Fig. 82). Provenience of all specimens: Trail Canyon Cave 2, general digging.

2378 (Fig. 82a): adult's slipper-toed sandal of yucca leaf weft woven over 4 yucca leaf warps, woven from toe to heel. Warp
Fig. 82: Whole yucca leaf sandals, woven, Type 2. From left to right, UCH2378, UCH2379, UCH2386.
elements at the toe are left long, and each is split and braided into neighboring elements across the width of the toe. Additional longitudinal elements are inserted into the braid, and warps and insertions are folded back over the toe to form a slipper. A single twined course of yucca leaf divides the toe flap into 13 bundles.

The heel is shaped by wrapping the free ends of warp and weft elements around a horizontal bar of yucca leaf.

Side loops are formed by wrapping bundles of 2-3 yucca leaves around the outermost warps at regular intervals. New leaves are fastened with square knots. The ends of side loop elements are incorporated into the toe braid and heel wrappings.

Length, 29.5cm; width, 11.5cm.

2379 (Fig. 82b): child's slipper-toed wickerwork sandal woven over 6 warps. Warps are 3 long, split yucca leaves each folded at the heel to form 6 nonmoving elements. Weaving proceeded from heel to toe. The toe flap is formed in the same manner as on artifact 2378, with the flap divided into 6 bundles by a single row of twining.

The heel is unfinished.

Side loops are formed by knotting long strips of yucca leaf in half hitches around the outer warp elements along each margin. A lining of soft, shredded juniper bark remains in the toe.

Length, 14.5cm; width, about 7cm.

2386 (Fig. 82c): adult's slipper-toed wicker sandal woven of yucca leaves over 4 yucca leaf warps, with applied pile sole. The sandal is constructed in the same manner as 2378 and 2379 but lacks the row of twining across the toe flap. Pile cushioning was
added to the sole by backstitching yucca leaves from the face to the sole in longitudinal lines. These added elements have frayed to fiber, and as a result the sole is 2cm thick.

Side loops of 3 strands of yucca leaf, s-twisted, are sewn around the outer warps along the margins. A strand of 3 yucca leaves, s-twisted, is laced between the side loops.

Soft, shredded juniper bark remains in the slipper toe.

Length, 29cm; width, 12cm.

Fragmentary wickerwork sandals (whole yucca leaf). Provenience of all fragmentary specimens: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2381, 2384: medial sandal fragments of split yucca leaf weft over yucca leaf warps.

2383: fragment of wicker sandal with pile sole applied as in 2386.

2387: heel fragment, yucca leaf twined and woven over 8 yucca leaf warps. The heel is wrapped as in specimen 2379. A heavy 2 ply-z plied yucca cord is sewn through the sole around the outermost warps, emerging on the face of the sandal. Similar cord is sewn through the sandal in running stitch, with knots appearing on the sole between each stitch. These knots are frayed to pile. Maximum width, 11cm.

2382: missing.

Tumpline

2524 (Fig. 77b): 3 broad yucca leaves, each about 4cm wide and 59cm long, are overlapped along their long edges and sewn together with 2 ply-z plied yucca cord in saddler's stitch. The resulting band is about 9.5cm wide at center and 6.5cm wide at the
ends. Each end of is split into 14 segments, each separated by twine-stitches of 2 ply-z plied yucca cord. The free ends of the 14 yucca strips are divided into two bunches of 7, the bunches are crossed, and the crossings are wound with yucca cord to form a bound hole at each end of the tumpline. A 2 ply-z plied yucca cord 3mm in diameter and 50cm long is looped through the holes and tied in a square knot.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Artifacts of cleaned yucca fiber

Aprons

2535/550-564; 2659/885-591: 22 menstrual aprons made of unspun yucca fiber were recovered. Each had been rolled into a neat bundle and tied with the waist cord. In some cases the apron bundle enclosed a yucca fiber pad (Fig. 83d).

All yucca fiber aprons were made by folding hanks of unspun fiber over a multi-ply, z plied yucca or human hair waist cord; and twining one or more weft rows of yucca cord over the doubled fiber bundles. Width of apron fronts is from 18-20cm, and length of the unspun fiber skirt is 65-70cm. The fiber of artifact 2659/886 is dyed yellow; in all others the fiber is natural colored. In several cases, weft rows are twined in red dyed cordage, and in one case (2535/561) red and yellow cords were twined to produce an alternating red and yellow weft pattern.

Provenience of all specimens: Tseahatso, general digging (Basketmaker II-Pueblo III).
Yucca fiber wickerwork sandals

Fiber wickerwork sandals are made in the same manner as whole yucca leaf wickerwork sandals. All are woven in weft-faced plain weave over 4-6 warps.

**Type 1:** flat wickerwork sandals of unspun yucca fiber (Fig. 84). Toes are wrapped in the same manner as the wrapped toes of Type 1 cordage sandals (see below), which suggests that they may be Basketmaker II in age.

2388 (Fig. 84a): soft yucca fiber is woven over a continuous 2 ply-s plied yucca cord folded into 6 warps. Additional fiber is wrapped around the upper weft rows at the toe, and is sewn into the sole at the toe and heel as thickening. A loosely z plied yucca cord heel loop passes through the sandal around the outer warps to tie in a square knot.

Length, 23cm; width, 10cm.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).

2390 (Fig. 84c): infant's sandal, not used for walking. Soft yucca fiber is woven over a continuous 2 ply-z plied yucca cord folded into 6 warps. Weft ends and additional fiber are wrapped around the uppermost weft courses at the toe. Warp ends are sewn across the heel in false braid. Heel loops and a toe loop of unspun yucca fiber are sewn through the sandal and knotted on the left side of the sole. A fine, loosely z plied yucca cord connects toe and heel loops.

Length, 8cm; width, 5.5cm.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-Pueblo III).
Fig. 84. Yucca fiber sandals, woven, Types 1 and 2. From left to right, UCM2388, UCM2540, UCM2390, UCM2389.
2540 (Fig. 84b): Soft yucca fiber is woven over 4 warp bundles of raw yucca leaf. Toe and heel are wrapped with weft ends and additional fiber, and fiber pile is run in under the heel. A heel loop of 2 ply-z plied yucca cord passes under the outer warps, crossing the upper surface of the heel, and is tied in a square knot. The ends of this cord are square knotted to a loosely 2 ply-z plied cord that passes through the doubled cord toe loop.

Length, 21cm; width, 9cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Type 2: Slipper-toed yucca fiber wickerwork sandal.

2389 (Fig. 84d): Soft yucca fiber is woven over a continuous 2 ply-z plied yucca cord folded into 4 warps. The ends of the warp cord are tied around the central warps in a cow hitch. Weft ends are wrapped around the horizontal weft rows at the heel. At the toe, weft ends and added fiber bundles are held in place with a row of twining and are turned back over the toe to form a slipper. Side loops of 2 ply-z plied yucca cord are backstitched along the margin, and a loosely 2 ply-z plied cord is laced through them.

The left phalanges and metatarsals of an adult are enclosed in a hollow of juniper bark beneath the lacing at the toe of the sandal. A quantity of dried mud is among the bones and bark.

The artifact is made in the same way as slipper-toed yucca leaf sandals. Because sandals are frequent burial inclusions during the Basketmaker II period but not during subsequent periods, the presence of a human foot in the artifact suggests
that it may be of Basketmaker II age.

Length, 22cm; width, 10cm.

Provenience: Trail Canyon Cave 2, general digging (disturbed burial, Basketmaker II-III)

Padded ring

2496: ring-shaped pad, a potrest or tumpline pad (?). Long hanks of unspun yucca fiber are wrapped through a ring of juniper bark.

Outside diameter, 19.5cm; inside diameter, 5.3cm; thickness, 4.7cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Hanks of cleaned yucca fiber

2492/492, 493, 494, 495: hanks and bundles of clean, unspun yucca fiber. Unfolded length of 2492/492: 35-40cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Cordage

Cordage and artifacts made from cordage comprise the largest artifact category in the del Muerto collection. Scraps of string, cord and rope are ubiquitous throughout the fill of all sites, and finished artifacts constructed wholly or partially of spun cordage occur in refuse and primary deposits.

Cordage consists of parallel fiber bundles twisted into strands, strands plied together into cords, and cords twisted together into rope. The number of plies and the direction of twist were recorded for the majority of specimens. A final z
twist is by far the most common configuration.

One hundred samples of cordage were examined microscopically and compared to modern, recently extracted fiber samples of Apocynum cannibium and modern and archaeological samples of Yucca elata. Of the samples examined, 94 are Yucca, one is native cotton, and 3 are the same unidentified fiber. None of the samples are Apocynum. Occasionally one or two unidentified fibers appear, mixed in with a strand of yucca fiber. These are considered to be accidental inclusions.

Rolls and bundles of cordage

2624b: two bundles of 2 ply-z plied undyed yucca fiber cords, consisting of 81 single cords each about 1mm in diameter and 124cm long, and 101 single cords each 1mm in diameter and 112cm long. Each bundle is wrapped at center with similar cord. The bundles appear to be the remains of two continuous coils of cordage or the preliminary warp set-ups for long fabrics such as bands or tumplines.

2624c: small roll of 2 ply-s plied yucca cord, 1mm diameter, undyed. The cord is bunched and self- wrapped at midsection.

2624d: a number of strands of fine 2 ply-s plied brown dyed yucca cord, originally a continuous cord coiled into a circle, half-twisted and pulled through itself. Original length at least 720cm.

2624e: coil of undyed 2 ply-s plied yucca cord less than 1mm in diameter. It is coiled in 16 turns, each 80cm in circumference, and twisted on itself. Total length, 1280cm.

2624f: piece of yellow-brown dyed 2 ply-s plied yucca cord, 2mm in diameter and about 250cm long.
2624g: ball of 2 ply-s plied yucca cord, one strand undyed and one strand dyed brown. Cord diameter, 1.5mm. The ball is 5.3 by 3.5 by 1.3 cm. It was not unrolled, but gentle probing revealed nothing but cord within the bundle.

2624h: skein of 3 strand braid of unidentified fiber. Each strand is 2 ply-s plied and about 1 mm in diameter. The braid is flat, about 2.5 mm wide and 1.5 mm thick. The skein was originally a coil held in place at opposing points with a self slip-knot. Original braided length, about 2000 cm.

Provenience of 2624b-h: Tseahatso, Burial 13, within shroud (Basketmaker II-III).

2518: bundle of 13 doubled 2 ply-s plied yellow dyed yucca cords. The doubled length is 140 cm. The bundle may have originally been a continuous coil of doubled cords. It is tied with a single wrap and half knot of similar cord.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

2519: rope, z plied of two 2 ply-s plied yucca cords. Diameter, 0.7 cm; length, 195 cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

10307a: two lengths of rope, each z plied of two 2 ply-s plied yucca cords, tied together in a square knot. Total length, 245 cm.

Provenience: Canyon del Muerto (Basketmaker II-Pueblo III).

10307: rope, z plied of two 2 ply-s plied yucca cords. Diameter variable, 0.5-1.0 cm; length, 430 cm.

Provenience: Canyon del Muerto (Basketmaker II-Pueblo III).
Blankets

Feather string blankets

Feather string blankets are a meshwork of yucca cords twined over a continuous yucca cord warp (Fig. 85). The warp is arranged in overlapping loops that sometimes cross internally, and weft rows are open twined over the closely spaced warp. Weft cords, warp cords or both are wrapped prior to construction with strips of turkey feather peeled from the quill so that only a thin band of keratinous material secures the vanes. Occasionally the upper and lower margins of the soft, fluffy blanket are finished with a wrap or twining of additional feather or fur-wrapped cord.

2365: fragment of a feather blanket, very well preserved. Warps, 2 ply-z plied yucca cord 3mm in diameter; weft, 2 ply-z plied feather wrapped yucca cord 2.5mm in diameter. A single cord is wrapped with tiny whole turkey feathers. Maximum width of fragment, 36cm.

Provenience: Trail Canyon Cave 2, general digging.

2453: Feather blanket. Warps and wefts are 2 ply-z plied yucca cord 4-6mm in diameter. Both are wrapped with feather strips from which most of the down has fallen. Direction of twining is down to the left. Maximum width, 30cm; maximum length, 70cm.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2552: feather blanket, complete. Warp and weft are 2 ply-z plied yucca cord 5mm in diameter. Both are feather wrapped. 92 warp rows are made by looping a continuous cord. Over these, 21 weft rows are twined with pitch of the stitch down to the right.
Fig. 85. Fur and feather string blanket. Note arrangement of warps and method of twining.
Maximum width along weft rows, 100cm; maximum length along warp, 127cm.

Provenience: Pictograph Cave, Burial 1 (Basketmaker III).

2588: feather blanket, not unwrapped from burial bundle. Visible warp and weft are 2 ply-z plied yucca cord wrapped with feather strips and fur strips.

Provenience: Tseahatso, Burial 2 (Pueblo II-III).

2613a: feather string blanket, complete. Warps, 2 ply-z plied yucca cord 3mm in diameter; weft, 2 ply-z plied yucca cord 2.5mm in diameter. Pitch of the twining stitch is down to the right. A few feather strips remain, but most have fallen away or have been destroyed by feather eating insects. The robe is 83cm wide with 15 weft rows, and 120cm long with 126 warp rows.

Provenience: Tseahatso, Burial 9 (Basketmaker III-Pueblo I, by association).

2614a: feather string blanket fragment. Turkey feather strips are wrapped around 2 ply-z plied yucca cords 3mm in diameter.

Provenience: Tseahatso, Burial 10 (Basketmaker III, by association).

2620: feather string blanket. Not examined.

Provenience: Tseahatso, Burial 12 (Pueblo II-III).

2624: feather string blanket, fragmentary. Warp, 2 ply-z plied yucca cord 6mm in diameter including the feather wrapping; weft, 2 ply-z plied yucca cord 4mm in diameter not including feather wrapping. Weft rows are both plain woven and plain twined with pitch of stitch down to the right. Length, 96cm; width, 96cm.
Fur string blankets

Fur string blankets are constructed in the same way as feather string blankets. Warp, weft or both are wrapped with strips of rabbit skin retaining the fur.

2366: fur string cloth, fragment. Warps and weft are 2 ply-z plied yucca cord 2mm in diameter. Pitch of stitch is down to the left.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II-III)

2400 (Fig. 85): fur string blanket, complete. Warps are 2 ply-z plied yucca cord 4mm in diameter; weft is 2 ply-z plied yucca cord 2.5mm in diameter, open twined over tightly spaced warps. A separate tie cord 83cm long is wrapped with feather strips. Width, 43cm over 48 warps; length, 37cm over 9 weft rows.

Provenience: Tseahatso, Burial 1 (Pueblo II).

2555: fur string blanket, complete. Warps are 4 ply-z plied and 2 ply-z plied yucca cord; weft is 2 ply-z plied yucca cord. Ten weft rows are twined over 38 warps with pitch of stitch down to the right. Length, 45cm; width, 37cm.

Provenience: Pictograph Cave, Burial 2 (Basketmaker II-III).

2605: small fur string blanket, complete. Warp and weft are 2 ply-z plied yucca cord. Pitch of twining is down to the left. Not measured.

Provenience: Tseahatso, Burial 5 (Basketmaker III-Pueblo I, by association).

2606: fur string blanket. Loaned to Museum of New Mexico, not examined.
Provenience: Tseahatso, Burial 6 (Basketmaker III-Pueblo I, by association).

2607a: fur string blanket with feather string ties, complete. Warps, 4 ply-z plied and 2 ply-z plied yucca cords 3-5mm in diameter; weft, 2 ply-z plied yucca cord 2.5mm in diameter. The weft is laid in countered open weft twining. Length, 77cm over 13 weft rows; width, 102cm over 99 warp rows.

Provenience: Tseahatso, Burial 7 (Basketmaker III).

2613b: small fur string blanket, complete. Not examined.

Provenience: Tseahatso, Burial 9 (Basketmaker III-Pueblo I, by association).

2614b: small fur string robe, complete. Warps, 2 ply-s plied yucca cord 5mm in diameter; weft, 2 ply-z plied yucca cord, not measured. Length, 30cm over 9 weft rows; width, 48cm over 48 warp cords.

Provenience: Tseahatso, Burial 10 (Basketmaker III-Pueblo I, by association).

Miscellaneous fur and feather string artifacts

2341a: yucca and fur cord. 2 ply-z plied yucca cord, each ply made up of 3 s-twisted cords. The medial portion of each of the 6 cords is spun with white rabbit fur (Appendix 4), and all 6 are twisted tightly together to produce a soft fuzzy cord. At the ends of the furred area, the cords are divided into 2 bundles of 3 cords that are then z plied together. Length, 42cm.

The construction of this cord is unique among the del Muerto artifacts, and none like it are described in other sources.

Provenience: Trail Canyon Cave 2, Burial 1 (Basketmaker III).
2516: oval pad (Fig. 63a). Feather wrapped cord folded and bunched at the ends, then carelessly woven with: fine 2 ply-z plied cord, heavier 2 ply-z plied cord, 3 ply-z plied cord, and a human hair cord wrapped with strips of rabbit skin. The pad is 37cm long and 15cm wide. Morris (notes, 1924) suggested that this might be some sort of cradle pad.

Provenience: Tseahatso, general digging.

2512, 2513, 2515: bundles and lengths of fur and feather wrapped yucca cordage.

Provenience: Tseahatso, general digging.

Aprons

Women's aprons made from cordage are constructed in the same manner as aprons made of yucca fiber and juniper bark: cords are folded over a waist string and held in place by one or more rows of twining. The loose ends of the warp cords extend down and around to tuck under the waist cord at the back.

Type 1

2534 (Fig. 83c): fine 2 ply-z plied yucca cords folded over a waist cord of 8 ply-z plied human hair and wrapped at midsection with unspun yucca fiber. Warps are grouped into bunches of 12-16, over which 3 weft courses are twined. The first weft row is yellow dyed 2 ply-z plied cord; the second, red dyed 2 ply-z plied cord; and the third, yellow dyed 2 ply-z plied cord. The waist cord is 3-4mm in diameter and present incomplete length is 33cm. Width of the twined area is 20cm. The warp cords extend about 65cm beyond the twined rows.

Provenience: Tseahatso, general digging.

2660 (Fig. 83a): the apron is constructed in the same manner
as 2534 but its treatment after use is unusual. The waist cord has been cut away at the edges of the twined rows. The apron is folded twice along the vertical axis, and the warp cords are wrapped with unspun yucca fiber. The result is a tapered bundle 31.5 cm long. Six cm below the folded twined area, the bundle is wrapped 3 cm along its length with 2 ply-z plied yellow dyed yucca cord. These wrappings cover 25.5 cm of the total length of the bundle. The warp cords that extend below the wrappings are untwisted and frayed; the effect appears deliberate.

Provenience: Tseahatso, general digging.

**Type 2**

2360 (Fig. 86): twined polychrome apron flap, monochrome warps. 129 fine 2 ply-z plied yucca cords are folded over a 3 ply-z plied human hair waist cord. Weft of fine 2 ply-z plied yucca cord is twined over bundles of 3 warps, each bundle containing both short and long ends of the folded warps. The twined portion is 14 cm wide and 5 cm long. A geometric pattern is achieved by utilizing natural, yellow, red and gray dyed yucca cordage in twined tapestry technique. Stitches are dovetailed at color changes (Emery 1966: 80, Fig. 9). Pitch of all twining stitches is down to the right.

Similar apron flaps have been recovered from Basketmaker III contexts in the Prayer Rock district (Morris 1959).

Provenience: Tseahatso, general digging.

**Sandals**

Cordage sandals are made of fine yucca cord, weft twined or plain woven over heavier yucca cord warps. The form of the toe of the sandal is determined at the outset by the arrangements of
Fig. 86. Polychrome apron flap, actual size. Circled area is shown 3 times actual size. UCM2360, Basketmaker III.
warps and the method of beginning the web. The method of finishing off the warp ends determines the form of the heel. Sandals are fastened to the foot by toe loops, heel loops, side loops and laces, or a combination of these. Fastenings are added elements and are not involved in the construction of the foot portion of the sandal.

With the exception of Type 2 cordage sandals, the sandals were clearly made for use as everyday footwear. Most of those recovered were worn through at the heel and sometimes at the ball of the foot. Several had been patched before they were finally discarded, and a few, apparently salvaged from earlier rubbish deposits, were reworked. Some are mud encrusted and nearly all show the marks of the feet that wore them.

All but a very few sandals are thickened over at least a part of the sole with complex geometric patterns of knots and weft wrappings; each geometric pattern appears to be unique (Kidder 1926). Many are further embellished with polychrome geometric patterns in twined tapestry or plain tapestry weave. The mechanics of tapestry weaving/twining and weft wrapping are mutually exclusive, so that knotting of the sole does not occur on areas with colored designs. The colored geometric patterns are similar, and probably related, to designs on twined fabrics and coiled basketry.

The following classification is based on the method of construction of the toe and heel, and the method of fastening the sandal to the foot. Notation is made of the presence of colored geometric patterns or unusual sole treatment, but the stylistic analysis of the knot patterns on the soles and the colored
Fig. 87. Soles of sandals showing geometric patterns of knots and weft wrappings. a, Type 2. b, Type 3. c, Type 4. d, Type 6.
geometric designs is not undertaken.

**Type 1**

Woven cordage sandals with square, wrapped toes and square heels, corresponding to Kidder's and Guernsey's Types IIIa and IIIb (1919: 159, Plate 68 a-d). Similar sandals are associated with Basketmaker II deposits in Grand Gulch and Tsegi dry cave burial sites.

Warps are parallel individual cords, each knotted around a suspension string at the toe. Natural colored weft is laid in plain weaving or twining. The heel is finished by tightly tying each successive warp around the next warp to the right in a half knot, so that warp ends appear on the face of the sandal. Warp ends are cut off short, producing a false braid across the width of the heel. The toe is finished by wrapping over the first few weft courses with unspun fiber and cordage or fine buckskin.

A toe and heel loop combination fastens the sandal to the foot. Where preserved, toe loops are made by sewing 2 ply human hair cord through the sandal below the wrapped toe in a running stitch.

2391/85 (Fig. 88c): weft, 2 ply-s plied; warp, 2 ply-z plied. Toe wrapping is a layer of unspun fiber over which 2 ply-s plied cords and two weights of 2 ply-z plied cords are wrapped. The sole is not thickened by weft wrapping or knotting.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker II, by style).

2542/613 (Fig. 88a): weft, 2 ply-z plied; warp, 2 ply-z plied. Toe wrapped with unspun yucca fiber and narrow strips of thin buckskin. Weft wrapping, unpatterned except for 3 floated
Fig. 88. Cordage sandals, Type 1.  a, UCM2542.  b, UCM2636/860.  c, UCM2371/85. Basketmaker II.
weft courses in a chevron pattern, covers the sole. A heel loop passes across the face of the heel, piercing it at each corner and returning to the surface outside the margins. Heel cords pass through the loop in a cow hitch and are tied together in a granny knot.

Provenience: Tseahatso, general digging (Basketmaker II by style).

2636/860 (Fig. 88b): weft not examined; warp, 2 ply-z plied. Made in the same way as other Type 1 sandals but lacks toe wrapping. Warps are doubled over the suspension cord rather than being knotted.

Provenience: Tseahatso, refuse above Slab Floor 3, 1924 (Basketmaker II?).

Type 2

Twined and woven sandals with square, tubular toes and square heels. Warps are 15-18 parallel, individual cords. An approximately 2cm band of weft is run over the warps in weft-faced plain or twilled twining. The rectangular web is then folded over a suspension string and each warp cord is tied in a half hitch around the adjacent warp, forming a hollow tube at the toe of the sandal. The suspension string is often retained in the tube, with ends tied together across the toe. Warp ends hanging below the toe are doubled in number and the sandal is somewhat wider at the ball of the foot than at the toe. The sandal is narrowed toward the heel by the removal of one or more warps. The body of the sandal is weft-faced twined, with rows of plain weft wrapping alternating with rows of intricate rows of knotting and weft wrapping in geometric patterns on the soles of monochrome sandals.
(Kidder 1926), or close woven in weft faced tapestry weave on both faces of polychrome sandals.

Toe loops of 1-3 yucca cords are present on most sandals. Heels are finished in the same false braid seen in Type 1 sandals, but in several cases the warp ends are left long and plaited into a flat 3 strand braid. Heel loops and toe and heel loop combinations may be present.

All Type 2 sandals found primary contexts are mortuary accompaniments in Basketmaker II burials and are entirely unworn.

Type 2A: monochrome hollow toed sandals

2411/628 (Fig. 89a): weft unexamined; warp, 2 ply-z plied. Toe loop is 3 2 ply-z plied yucca cords; heel loop is 6 2 ply-z plied cords. Sole patterned with knots set in non-symmetric upright triangles, parallelograms and bands.

Provenience: Tseahatso, Burial 16A (Chief's Grave) (Basketmaker II).

2416/273a,b: pair of sandals, warps and wefts of 2 ply-z plied yucca cord. One sandal is intact, with the suspension string still tied through the hollow toe and heel finished in false braid with uncut warp ends plaited in a flat 3-strand braid. Toe and heel loops are absent. The toe of the second sandal is burnt away; the heel is treated in the same way as the intact sandal. The soles of both are geometrically patterned with knots and weft wrappings.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2417a,b (Fig. 89b): pair of sandals, warps and wefts 2 ply-z plied yucca cord. One sandal intact, with suspension cord
Fig. 89. Cordage sandals, Type 2. a-d, soles, showing geometric patterns. a, UCM2411/628. b, UCM2417/274. c, UCM2463/312. d, UCM2543/618. e, heel, showing braided warp ends, UCM2543/641. All, Basketmaker II.
tied through the hollow toe. No toe loops are present. The heal is finished in false braid with warp ends cut short. A 4 strand heel loop is sewn across the face of the heel. The second sandal has been charred along the lower left margin. The suspension cord is in place, tied through the toe. Neither toe nor heel loops are present. The heel is finished in false braid with warp ends uncut. Four long warp cords at the heel are bent, indicating that warp ends had been plaited in a flat 3 strand braid. The soles of both sandals are geometrically patterned with knots and weft wrappings.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2543/618 (Fig. 89d): Weft unexamined; warp, 2 ply-z plied and 2 ply-s plied yucca cord. Heel finished in false braid, with warp ends cut short. A 6 strand toe loop of 2 ply-z plied yucca cords and part of a 2 strand heel loop of 2 ply-z plied yucca cords are present. The sole is geometrically patterned in knots and weft wrappings.

The sandal is fragmentary and rodent chewed. No damage due to use is present.

Provenience: Tseahatso, general digging (Basketmaker II by style).

2543/641 (Fig. 89d): heel of Type 2A sandal. Warps, 2 ply-z plied; weft unexamined. Heel finished in false braid with warp ends plaited in a flat 3 strand braid. The sole is patterned in knots and weft wrappings. The fragment shows no sign of wear and is probably a displaced burial accompaniment.

Provenience: Tseahatso, general digging (Basketmaker II by
2576/731: reused Type 2a sandal, much worn. The hollow toe has broken across the width of the sandal and a thin, single layer of fabric projects from the front. Pile has been added by sewing through the margins, leaving the cut ends of the stitches on the sole where they have frayed out into a fibrous bundles. Side loops are sewn along both margins.

Provenience: Pictograph Cave, general digging (Basketmaker II by type; disturbed burial goods reused during Basketmaker II-Pueblo III).

10308c: reused Type 2a sandal. Toe and heel are folded onto the sole and sewn in place with yucca cord. The knots of a new single strand toe loop are present on the original face of the folded sandal, suggesting that the old face became the sole of the refurbished sandal.

Provenience: Canyon del Muerto (Basketmaker II by type; disturbed burial goods reused during Basketmaker II-Pueblo III).

10312: two carbonized but intact Type 2a sandals, now mounted in a plaster batt (presumably by Earl Morris). Warps, 2 ply-z plied yucca cord; weft not distinguishable. The sandals are very similar to those from Burials 16A and 16B, and may be a catalogued but unlocated pair from the feet of one of these mummies. They are entirely unworn.

Provenience: Canyon del Muerto (Basketmaker II by type).

Type 2B: polychrome hollow toed sandals

2462/309, 310 (Fig. 90a,b): pair of tapestry woven polychrome sandals. Warp 2 ply-z plied yucca cord; weft not examined. The sandals are constructed in the same way as the
Fig. 90. Cordage sandals, Type 2, polychrome. Left and center, UCM2462/309, 310. Right, UCM2561/714.
monochrome sandals, but warps are finer: 30 initial warps form
the hollow toe. After the warps are half-hitched around each
other below the toe tube, one end of each doubled warp is cut off
short on the sole. The web of the toe is woven in diagonal twill,
and the body of the sandal is woven in dovetailed tapestry plain
weave. Heels are flat, finished in false braid. Warp ends are
left long at the heel and plaited into a flat 3 strand braid. A 4
strand toe loop of 2 ply-z plied cords is present on each sandal.
A loosely twisted 2 ply-z plied cord runs across and through each
corner of the heel, looping through itself in a cow hitch. A
doubled and wrapped z plied cord connects toe and heel loops.

The soles are thickened by rows of supplemental weft wrapping
but are not geometrically patterned due to the mechanics of
tapestry weaving. Stepped geometric designs in red, black, yellow
and natural appear on the upper faces of both sandals; the designs
are not identical. Both sandals are the same size: length,
23.1cm; width at heel, 7.0cm; maximum width, 9.5cm; width at toe,
7.4cm. 2462/310 has been damaged by fire. Neither sandal shows
other damage or wear.

Provenience: Tseahatso, Burial 17 (Burial of the Hands)
(Basketmaker II).

2463/311, 312 (Fig. 90a,b): pair of polychrome, tapestry
woven sandals. The sandals are constructed in the same way as
2462/309 and 2462/310, using 34 initial warps. The red, black,
natural and yellow stepped geometric designs on the faces of these
sandals are identical, but colors are counterchanged: where red
appears on one sandal, black appears on the other.

Provenience: Tseahatso, Burial 17 (Burial of the Hands)

Provenience: Pictograph Cave, Burial 4 (Basketmaker II).

2561/714 (Fig. 90c): sandal with narrow black and red bands on natural background. It is constructed in the same manner as 2462/910, using 30 initial warps. Heel is flat and square, with warp ends cut short above the line of false braid. A 4 strand toe loop of 2 ply-z plied yucca cords is present. A 5 strand heel loop of 2 ply-z plied yucca cords is sewn across the face of the heel. The sole is geometrically patterned with knots and weft wrappings. A single course of red dyed weft is 5.7cm from the toe, followed by 3 natural colored weft courses, then a single course in black dyed weft. A single course of red dyed weft is 18.5cm below the toe.

Provenience: Pictograph Cave, Burial 4 (Basketmaker II).

2579: toe of sandal constructed as 2561/714, with 24 initial 2 ply-z plied warps. The artifact is torn at the toe and across the midsection, but the heavy, single strand toe loop is intact. Two narrow black bands appear across one corner of the broken edge, about 12.0 and 12.5cm below the fragmentary toe. The sole is thickened with close-set rows of weft wrappings, not geometrically patterned. Despite the fragmentary condition of the artifact, sole and face show no signs of use wear.

Provenience: Pictograph Cave, general digging (Basketmaker II, by style).

Type 3, square toed sandals

Twined cordage sandals with flat, square to concave solid
toes, heels finished in false braid and left flat, cupped, or drawn into a tight ring. Heel and toe loop combinations fasten the sandal to the foot (37 sandals); in two cases (2543/640 and 10308e) side loops are roughly sewn in. On both side-loop sandals, heel and toe loops are present but broken, suggesting that the sandals had been refurbished for further use.

Kidder (1926) dissected a sandal of this type. His analysis is used extensively in the following description.

Type 3 sandals are constructed by twill twining a few weft courses over 13-34 parallel warp cords, then folding the narrow web over a horizontal suspension cord. Twilled twining continues over the doubled warps, tightly encasing the suspension cord which is in all cases retained at the toe. The toes of the sandals are square to slightly concave, indicating that the suspension cord was fixed between two points rather than from a single point as suggested by Kidder (1926: Fig. 5). The doubled warps extend to the lower edge of the twilled portion of the sandal, where one end of each doubled warp is cut off on the sole. Below this, weft courses continue in close, plain weft twining, sometimes incorporating bands or blocks of geometric designs in red, yellow, black, brown or gray.

Soles are thickened with geometric patterns of knots and weft wrapping. Such patterns appear below the twill twining and exclusive of any tapestry woven or twined colored blocks or bands, since weft wrapping would disrupt the progress of these techniques.

All Type 3 sandals were recovered from trash areas. Nearly every sandal shows signs of heavy use as footwear; none have the
entirely unworn appearance of the Type 2 mortuary sandals described above. As far as I can determine, Type 3 sandals from other sites in the northern San Juan area were recovered from similar contexts and none were found on the feet of buried individuals. This suggests either that Type 3 sandals came into vogue after Type 2 sandals, or that Type 2 sandals were strictly for mortuary use while Type 3 sandals (and others) were strictly utilitarian.

No dates have been determined for Type 3 sandals, but similar sandals have been recovered in from Basketmaker III contexts in the Prayer Rock district (Morris 1959). The techniques used in constructing Type 3 sandals appear to be a logical outgrowth of techniques used to manufacture Type 2 sandals. Although all of the Type 3 sandals in the Canyon del Muerto collection were recovered from the general digging in cultural refuse, none were recovered from what Morris referred to as "cliff dweller" refuse levels (Pueblo II-III). In the absence of direct dates, the type is tentatively assigned a Basketmaker III age, with possible occurrence as late as Pueblo II.

Type 3a: sandals with natural colored ground weft, some with colored or patterned bands (26 whole and fragmentary)

The sandals are of sizes to fit both adults and children. Length, 12-25cm, bimodal averages 12.5cm and 23.0cm; width at toe, 4.5-12.2cm, bimodal averages 5.0 and 10.2cm. The length of the twill twined area at the toe ranges from 1.0-6.5cm, or 9-28% of the total length, averaging 3.8cm or 17% of total length.

Heels of sandals 2453/615 and 2576/732 are flat; the heels of all other Type 3a sandals, where present, are drawn up into a cup
or ring.

2543/615, 620, 621, 622, 626, 627, 631, 634, 637 (Fig. 91a-b): monochrome sandals. Provenience, Tseahatso, general digging.

2576/732: monochrome sandal. Provenience, Pictograph Cave, general digging.

10308b, e, g; and sandal without catalogue number:
monochrome sandals. Provenience: Canyon del Muerto.

2452/614; 2543/617, 619, 628, 632, 636, 640; 2665/897 (Fig. 91c-g): polychrome sandals. Provenience: Tseahatso, general digging.

10308f, h, j: polychrome sandals. Provenience: Canyon del Muerto.

Type 3b: Type 3 cordage sandals with yellow dyed ground weft and geometric polychrome designs (11 whole and fragmentary) (Fig. 92a-g).

Length, 23.5-27.5cm, average 24.8cm; width, 9.5-11.0cm, average 10.3cm. The length of the twill-twined area at the toe of Type 3b sandals is longer than that of Type 3a, from 5.5-14.5cm, or 23-55% of the total length, averaging 8cm or 31% of the total length. The heels of all but one (2598/819) are drawn into a cup and sewn in place with either warps or supplemental cords.

Seven of the 11 sandals (2598/813-819) were found in a heap on the floor of an undescribed slab-walled room. The close similarity of design suggests that the sandals may be the product of a single weaver, and context suggests an age no earlier than Basketmaker III and no later than Pueblo II.

The midsection and heels of 2598/818, 819 are embroidered
Fig. 91a. Cordage sandals, Type 3A.  

- a, UCM2543/634.  
- b, UCM2543/621.  
- c, UCM2542/614.  
- d, UCM2543/640.  

One-half actual size.
Fig. 91b. Cordage sandals, Type 3A. e, UCM2543/636, f, UCM2543/637. e, One-half actual size.
Fig. 92b. Cordage sandals, Type 3B. From left to right, UCM2598/818, UCM2598/819, UCM1068.
with an open diamond pattern with brown dyed cord in running stitch. These are the only instances of decorative embroidery among the del Muerto textiles.

Provenience: 2598/813-819, Tseahatso, floor of House 2; 1068, 10308a, i, m, Canyon del Muerto.

**Type 4**, concave toed cordage sandals

Twined cordage sandals with pronounced concave toes, generally described as scallop-toed sandals (Kidder and Guernsey 1919: 154; Morris 1980: 116, 118). Type 4 sandals are twined over 22-32 warp cords in the same manner as Type 3 sandals, with warps suspended from a cord tied in a loop. Heels are drawn into a tight cup or ring, with warp ends either cut short or drawn through the aperture and wrapped in a tight cylindrical bundle. Heel cords commonly arise from the uncut warp ends, but may also be secondary cords lashed across the heel by wrapping with warp ends or secondary cords. Sandals are fastened to the foot with heel and toe loop ties or with side loops, heel loops and laces.

Type 4 sandals are unplaced in time. All were recovered from the general digging in pre Pueblo III refuse levels. Their morphology suggests an age similar to or somewhat later than Type 3 sandals, but no upper age may be assigned with confidence. They are tentatively assigned to Basketmaker III-Pueblo II.

**Type 4a**: Type 4 sandals with toe and heel loop ties (24 whole and fragmentary, Fig. 93a-c)

The group is internally divisible into sandals with natural colored ground weft and sandals with yellow ground weft. The natural colored sandals are for the most part monochromatic, only two (2543/656, 2665/901) having simple geometrically patterned
Fig. 93. Cordage sandals, Type 4, monochrome. From left to right, UCM2543/6459, UCM2543/652, UCM2543/649, UCM2543/661.
Fig. 94. Cordage sandals, Type 4 polychrome. From left to right, UCM2543/650, UCM2665/900, UCM2665/899, UCM2543/651.
colored bands. Yellow sandals are highly decorated with intricate blocks and bands of colored weft.

Length, 24.0-26.5cm, average 25.5cm; width, 9-12cm, average 10.5cm. Length of twill-twined area at toe, 1-14cm, average 10cm or 39% of the total length.

2543/616, 645, 649, 652, 656, 679, 680; 2665/901, 903; one sandal without catalogue number: Type 4a sandals with natural colored ground weft.

Provenience: uncatalogued sandal, Canyon del Muerto; all others, Tseahatso, general digging.

2543a, 2543/643, 646, 650, 651, 654, 655, 663, 682; 2665/899, 900, 902; 10308k; one sandal fragment without catalogue number: sandals with yellow dyed ground weft.

Provenience: 10308k and uncatalogued fragment, Canyon del Muerto; all others, Tseahatso, general digging.

Type 4b: Type 4 sandals with side loops and laces (15 whole and fragmentary; Fig. 93d)

Side loops of yucca cord are sewn through the margins of the sandals in individual or paired loops. The loops are commonly sewn in running stitch, but occasionally are sewn in backstitch, in which case the emerging cord is run between the plies of the cord loop left in the previous stitch. All Type 4b sandals are monochrome: 14 are of natural colored weft and 2 (2543/644; 13542) are of yellow dyed weft.

Length, 22.0-27.5cm, average 25cm; width 10.0-13.0cm, average 11.5cm. Length of twill-twined area at toe, 9.0-18.5cm, average 14cm or 53% of the total length.

2543/638, 642, 657, 658, 659, 660, 661, 662, 664, 666, 667,
668, 669; 2665/905; 13542: Type 4b sandals.

Provenience: 13542, Trail Canyon Cave 3, surface; all others, Tseahatso, general digging.

**Type 5**, round toed cordage sandals.

Round toed cordage sandals twined over 12-16 warp cords that are suspended in concentric loops from a horizontal cord or bar. The sandals are constructed from toe to heel in plain twining, or more rarely, twill twined for some distance and finished in plain twining. Twining proceeds in radii from the center of the concentric warps to the margins of the toe, with additional weft courses run in to fill spaces. When the half-circle at the toe is complete, weft rows proceed across the entire sandal.

Heels are finished by turning adjacent warps over each other in half hitches and drawing the heel into a tight ring, or by twining or weaving into a cupped heel by removing a few central warps and turning the outer warps around the heel, then twining over them in a manner similar to work at the toe.

All Type 5 sandals are monochrome with natural colored warp and weft. Soles exhibit complex geometric patterns of knots and weft wrappings.

The sandals are fastened to the foot with heel and toe loop combinations, or with heel loops, side loops and laces, and occasional toe loops.

Type 5 sandals have not been dated, either directly or by association. While the twining and weaving techniques are identical to those in other, presumably earlier sandals, the arrangement of warps is a departure from that of Types 1-4. The suspended concentric warp provides the same basic structure as
that of the jog-toed Pueblo III cordage sandal (Type 6). Type 5 sandals were recovered from the general digging, and none were reported to have been recovered from Pueblo III trash levels. It is suggested that Type 5 sandals occur fairly late in the sequence, dating to some time during the Pueblo I to Pueblo III periods.

Type 5A: Type 5 cordage sandals with toe and heel loops (2 whole, 1 fragmentary).

2543/673: whole, plain twined, with ring heel; heel loops arise from bound warps. Length, 23cm; width at midsection, 7.5cm.

2543/677: whole, plain twined, with woven heel; heel loops added. Length, 23cm; width, 9cm.

2543/675: toe of Type 5 sandal, twill twined to center of concentric warps then plain twined. Not measured.

Type 5B: Type 5 cordage sandals with side and heel loops (4 whole, 1 fragmentary; Fig. 95).

The category is internally divisible into sandals with ring heels and sandals with woven heels.

Sandals with ring heels:

2543/672: plain twined; toe loop present; length, 23cm; width, 9cm.

2665/904: twill twined over 8.5cm, then plain twined. Patched at heel with a similar sandal. Length of mended sandal, 31cm; width, 12.5cm.

Sandals with woven heels:

2543/670: entire sandal is plain twined. Side loops are back-stitched through the margins with the cord passing between the plies of the loop left in the previous stitch. Length, 25cm;
Fig. 95. Cordage sandals, Type 5. Left, UCM2543/670. Right, UCM2665/904.
width, 12cm.

2543/671: entire sandal is plain twined. Side loops are back-stitched through the margins with the cord passing between the plies of the loop left in the previous stitch. Length, 25cm; width, 13cm.

2543: toe of sandal, entirely plain twined; toe loop present.

Provenience: all Type 5 sandals, Tseahatso, general digging.

**Type 6**: jog toed sandals, shaped for left or right foot, corresponding to Kidder's and Guernsey's Type IIa (1919: 101, 103-105)

Type 6 sandals are woven in a similar manner to Type 5 sandals. Warp cords are suspended in concentric loops from a horizontal cord or bar, and twining or weaving proceeds from the central point toward the margins. A shorter concentric warp-loop is inserted between warps near one edge, so that the sandal margin jogs outward at the approximate position of the little toe (Kidder and Guernsey 1919: Fig. 38) (Fig. 96).

While both Type 6 cordage sandals in the del Muerto collection were recovered from the general digging, plaited yucca sandals of the same jog-toed outline were recovered from Pueblo III contexts, and cordage sandals of this type have been recovered from Pueblo III contexts in other sites in the northern San Juan. The sandals are assigned a Pueblo III age.

2398/255 (Fig. 96a): jog-toed sandal made for the right foot. Plain twined over 16 concentric warps with one folded supplementary warp at the right edge. The heel is woven in the same way as the woven heels of Type 5 sandals. A double heel loop
Fig. 96. Cordage sandals, Type 6. Left, UCM2398/255. Right, UCM2543/676.
of 2 ply-s plied rope and a double toe loop of loosely 2 ply-s plied rope are present. The sole of the sandal is covered in diamond shaped patterns of knots and weft wrappings. Three brown bands are plain twined at midsection, one just above the heel and one at the margin of the heel.

Length, 24cm; width, 11.5cm.

2543/676 (Fig. 96b): toe and midsection of a jog-toed sandal made for the right foot. The sandal is entirely twill twined and is patterned in irregular bands and inverted triangles in yellow, black and natural yarns. No knots or weft wrappings appear on the sole. The knots of a buckskin toe loop are at the toe, and the upper righthand margin has been reinforced by sewing a buckskin strip through the sandal between the first and second outside warps.

Provenience: both Type 6 sandals, Tseahatso, general digging.

**Fragmentary cordage sandals**

2543/683: heel of sandal, monochrome, natural colored weft over 28 warps, sole is patterned in knots and weft wrappings. Warp ends are finished in false braid, and the heel is flat. Knots for heel loops are present. Consistent with sandal Types 3a and 4 (Basketmaker III-Pueblo II).

Provenience: Tseahatso, general digging.

2665/906: heel and midsection of sandal, plain twined of monochrome, natural colored weft over 26 warps. Sole patterned in knots and weft wrappings. The heel is finished in false braid then drawn into a tight ring. Uncut warp ends are drawn up and bound, then divided and twisted into two 3 ply-z plied heel cords.
Consistent with sandal Types 3a and 4 (Basketmaker III-Pueblo II).

Provenience: Tseahatso, general digging.

10308c: midsection of polychrome sandal. Consistent with Types 2, 3 and 4 (Basketmaker II-Pueblo II).

Provenience: Canyon del Muerto.

13539a, b, c: undiagnostic fragments of one or more polychrome sandals.

Provenience: Tseahatso, surface.

Bags

Bags made by simple looping

2361 (Fig. 97): narrow necked bag. A single foundation cord is at the lip of the bag. A single moving element is looped over the foundation in half-hitches; as work progresses around the perimeter, the moving element is half-hitched through the loop formed by the clove hitch above it. The bag is flared at the base by increasing the number of loops per stitch. Stitches are tightly packed and trend upward from left to right. The artifact was not available for measurement, but is about 10cm wide at the base and 20cm long.

Provenience: Trail Canyon Cave 2, general digging.

2362: fragment of simple looped bag similar to 2361. Now at Laboratory of Anthropology, Santa Fe; not examined.

Provenience: Trail Canyon Cave 2, general digging.

2521: fragment of simple looped fabric, portion of bag(?). A human hair string is looped into the margin. The remainder of the bag is made of 2 ply-s plied yucca cord, 4mm in diameter.

Provenience: Tseahatso, general digging.
Fig. 97. Bag made by the simple looping technique. UCM2361.
Twined bags

The construction of twined bags has been discussed by Guernsey and Kidder (1921: 65-74). The four twined bags in the del Muerto collection conform to the published description in every way. Initial warps are crossed or twisted about each other at the base, close weft twining commences immediately at the junction of the warps, and supplementary warps are laid in and held in place by courses of close weft twining.

The bags were twined from base to rim, probably in inverted position over suspended warps. This arrangement may be seen as a prototype for the suspended warp loom.

The bags are finished by bunching adjacent warps and rolling them into loose z twisted bundles.

Multicolored geometric designs and bands are created by the manipulation of dyed weft cords or by painting the weft of completed bags.

2343 (Fig. 98): weft twined bag 130cm in circumference, 31.5cm high. Number of warps at the mouth is 492; number of weft courses is 506; average element spacing, 4 warps/cm and 8 weft courses/cm. Warp cords extend about 30cm beyond the final weft course. The pitch of each stitch is down to the right except in decorative bands where weft is countered to create a pattern.

Warps are natural colored, 2 ply-z plied yucca cords 1mm in diameter. Weft cords are 2 ply-z plied yucca cords 1mm in diameter. Color decoration is entirely due to the manipulation of weft cords dyed or colored red, orange, yellow or black.

Ten colored bands are present. Three narrow bands near the base of the bag each consist of 6 weft courses with the following
Fig. 98. Bag made by twining and hand weaving. UCM2343, Basketmaker II-III.
color patterns:

- band 1: 2 black weft courses, 2 natural weft courses, 2 red weft courses.
- band 2: 2 black weft courses, 2 yellow weft courses, 2 black weft courses.
- band 3: 2 red weft courses, 2 natural weft courses, 2 black weft courses.

The 7 colored bands above these are patterned using several tactics: by twining with two weft cords of different colors to form vertical lines or checkerboard patterns; by changing the pitch of the stitch to form chevron patterns; by using two weft cords of the same color to form solid bands; and by twining one colored weft cord and one natural weft cord above a solid band of the same color and below a solid band of natural color to form fringed lines.

In addition to the 10 decorative bands, a single weft course of 1 natural and 1 yellow cord partially encircles the bag between the fourth and fifth colored bands. This partial course may be a line break.

The bag had been used as a shroud. It is slit from top to bottom, and a 10 cm circle including the warp crossing is cut away. The flexed body had been placed inside, then the raw edges of the bag were tied together with unprocessed yucca leaf and a length of 2 ply-s plied yucca rope. These ties were broken when the burial was robbed in prehistoric times.

The use of such bags as shrouds is a common feature of Basketmaker II burials in the Marsh Pass region (Guernsey and Kidder 1921: Plate 8). This artifact was found stuffed into a
small Basketmaker III coiled burden basket, and may be a reused bag salvaged from an earlier burial. It is assigned a Basketmaker III age for its last use, but may be somewhat older.

Provenience: Trail Canyon Cave 2, Burial 1 (Basketmaker II-III).

2360: weft twined bag, 17cm in height; diameter at base, 10cm; diameter at neck, 8cm. 7 weft courses/cm; 4 warps/cm. Pitch of stitch down to right. The final few courses are plain woven. Warp and weft are 2 ply-z plied cords. The material from which the cords were spun was examined microscopically; it is neither yucca nor apocynum.

Warp ends extending beyond the mouth of the bag are gathered into 5 bunches, each rolled in a loose z twist and knotted at the end. The loose end of the final weft course is included in one of the rolled warp bundles.

Background weft is dyed yellow. Three red or alternating red and yellow bands appear around the shoulder and body of the bag. The red weft was colored by rubbing the strand with red ochre before twining.

Provenience: Trail Canyon Cave 2, general digging.

2522: lower part of twined bag; length, 15cm. 6.5 weft courses/cm; 4 warps/cm. Warp cords are 2 ply-z plied and about 2mm in diameter. Weft cord is 1 ply-z twisted, about 1mm in diameter. The base of the bag is missing, but the warps radiate outward as in complete bags. Pitch of the twining stitch is down to the right.

The bag is decorated with two narrow red bands alternating with broad, black areas. The red weft was rubbed with ochre
before twining, and the black was painted after twining. From the lower margin of the fragmentary bag, a black painted area extends 8.5cm to a red band of 8 weft courses. Above the red band is a black band 4.7cm wide. Above the black band is one course of alternating black and natural stitches, which suggests that one weft cord was painted black before use. Above this are a few weft courses in red.

Provenience: Tseahatso, general digging.

2632: fragmentary weft twined bag. 9 weft courses/cm; 6 warps/cm. Warp cords are 2 ply-z plied yucca: weft is very fine 2 ply-z plied plant fiber that is neither yucca nor apocynum. Pitch of twining stitches is down to the right. All colored weft cord was dyed before twining.

Provenience: Tseahatso, Burial 15 (Basketmaker II).

Pot nets

Carrying nets for gourds or pots, constructed of two yucca cord rings, one below and one above the maximum diameter of the vessel, over which yucca cord is looped or looped and twisted in a zigzag pattern. The handle is formed by threading a heavy cord under the upper ring on opposing sides of the net. The ends of the cord are tied and the doubled loop may be wrapped.

2517: net and carrying handle of heavy 2 ply-z plied cord, each ply of 2 ply-z or s plied cords. The composite cord is 7-12mm in diameter. Two moving cords join the upper and lower rings: the upper moving cord is alternately turned over or under the lower cord at each meeting, so that each cord remains in its own hemisphere. These cords are knotted around the upper and lower rings in half-hitches. The handle incorporates the loose
ends of the upper ring cord and is wrapped with additional 2 ply-z plied cord.

Provenience: Tseahatso, general digging.

2599: carrying net of 2 ply-z plied yucca cord, each cord of 2 ply-s plied cord. Diameter of composite cord is 3-7mm. One moving cord joins the upper and lower rings in half-hitches. No handle is present. A broken gourd was within the net when recovered.

Provenience: Tseahatso, floor of House 2 (Basketmaker III-Pueblo II).

2611 (Fig. 99): carrying net and gourd vessel. Upper and lower rings are each 2 ply-z plied yucca cords made by folding 2 ply-s plied cords in half and twisting the halves together. Diameter of doubled cord, 4mm. The upper ring is 6.8cm in diameter, and the lower is 8.3cm in diameter. A continuous 2 ply-z plied cord passes over the upper and lower rings in half-hitches. A handle of loosely twisted 2 ply-z plied cord is looped under the upper ring and tied to the moving cord on the opposite side of the net in a half-knot. The ends of the doubled handle-cord are tied. The handle is not wrapped. The gourd vessel within the net is described in the section on gourds.

Provenience: Tseahatso, Burial 7 (Basketmaker III).

Tumplines

Carrying straps for baskets or heavy loads.

2523a, b (Fig. 100): double tumpline, joined at ends with buckskin thong.

2523a (Fig. 100c: the warp is formed by a single 3 ply-s plied yucca cord concentrically coiled to form 13 warp rows. The
Fig. 99. Gourd in carrying net of heavy yucca cord. UCM2611, Basketmaker III.
Fig. 100. Double tumpline made from yucca cordage. a, 2353b. b, method of construction, 2353b. c, 2353a.
body of the tumpline is weft-faced tapestry twined using fine 2 ply-s plied yucca cord. Pitch of the twining stitch is down to the left; 13 weft courses/cm, 3 warps/cm.

The design is twined in yellow and natural colored weft. The yellow motifs are painted over with red and are outlined in black paint. The outlines are somewhat irregular in that the paint sometimes jumps from one weft covered warp to another.

End loops are formed by twining over paired or single warps and turning the weft at the central warps to form bound openings at each end of the fabric.

The inner face of the tumpline is coated with grease, suggesting that this was the inner half of the double tumpline.

2523b (Fig. 100a): a single 2 ply-s plied yucca cord more than 12m long is coiled, tied, and divided into 9 warp bundles of 4-5 cords each. Weft of 2 ply-s plied yucca cord is coiled over 2-3 warp bundles in a zigzag pattern (Fig. 100b). End loops are wound with the ends of the warp cord. Length, 36.8cm; width, 4.0cm.

Provenience: Tseahatso, general digging.

2574: warp is heavy 2 ply-z plied yucca cords, each folded into thirds and placed side by side to form 6 warp lengths. Similar cord is twined over portions of the body of the tumpline, and finer 2 ply-z plied cord is both twined and coiled over the warps at irregular intervals. While the weave is somewhat decorative, it is entirely non-symmetric. End loops are formed by coiling over the paired loops at each end of the band with fine cord, leaving doubled warp loops at each end to serve as tie loops.
The artifact was not measured.

Provenience: Pictograph Cave, Burials 3 and 4 (Basketmaker II).

2624 (Fig. 101a): two fragments of a tumpline or belt. Not located. The following description is from Carlson's notes.

Warp faced as in modern Hopi belts. Badly faded, seems to have 4 bands - (1) natural or yellow and natural (2) checkerboard of red-brown and yellow (3) natural or yellow and natural (4) checkerboard of red-brown and yellow. On the complete end is a loop formed by wrapping the warp bundles in the center. The bundles are separated by a row of weft twining. The first weft course then commences. Part of the row of twining at the opposite end is present, but beyond this the loop is gone. Several pieces of bunched yarns [2624b-g] may have been part of this belt.

This is the only example of warp-faced twining in the del Muerto collection. A similar specimen is reported from Basketmaker II contexts at Cave 1, Kinboko Canyon (Kidder and Guernsey 1919: 173-174), and a unique example combining warp-faced twining and oblique interlacing was recovered from Pueblo II contexts at Antelope House (Kent 1983: 64, Fig. 29A).

Provenience: Tseahatso, Burial 13 (Basketmaker III).

Sash

2569 (Fig. 101b): two fragments of a 2/2 oblique interlaced sash with sinnet fringes. The more intact fragment is 9cm wide and 44cm long exclusive of the fringe; the less intact piece, a badly charred medial fragment, is of similar width. The charred and wadded fragment was not measured because of the fragility of the specimen. Cordage is 2 ply-z plied yucca fiber less than 1mm in diameter.

The sash is self-patterned in large diamonds reaching obliquely from margin to margin. The pattern is derived from the
Fig. 101. a, tumpline or belt, UCM2624, one-quarter actual size. Circled area shown actual size. Basketmaker II-III. b, fragment of oblique interlaced sash, UCM2569, one-quarter actual size. Basketmaker II.
original arrangement of red, black and yellow dyed elements, and is continuous over the entire fabric.

One end of the more intact fragment is finished with 5 fringes 15-17cm long, incorporating all elements of the sash. The fringes are braided (3 square, 2 round) for 10-11cm of their total length. Each sinnet is then separated into two bundles, each of which is s-twisted. The bundles are then z plied together. Four of the 5 are finished by wrapping the ends with red or yellow cord. The fifth is finished with a smooth spherical knot.

Provenience: Pictograph Cave, Burial 3 (Basketmaker II).

Other cord and plant part artifacts

Yucca seed beads

2409: 130 yucca seeds perforated at the center and strung on 2 ply-z plied yucca cord 1.5mm in diameter. Length of fragmentary strand, about 32cm. Portions of the necklace are visible at the right side of Fig. 26.

Provenience: Tseahatso, Burial 16A (Chief's Grave) (Basketmaker II).

2392: small white seeds, tentatively identified as Lithospermum, strung on 2 ply-z plied yucca cord 2mm in diameter.

Provenience: Trail Canyon Cave 2.

2566 (Fig. 102a): 6 spines from the Golden Barrel cactus, wrapped at stem end with sinew and z spun yucca cord. The artifact is fragmentary, but the spines appear to have been suspended from cords.

A similar cactus spine was recovered from Basketmaker II deposits in Cave du Pont, Utah (Nusbaum, Kidder and Guernsey 1922: Fig. 8).
Fig. 102. Artifacts made from other plant parts. Above, cactus spines suspended from cords. UCM2566, Basketmaker II. Below, walnuts strung on cords. UCM2597, Pueblo II-III.
Provenience: Pictograph Cave, Burial 3 (Basketmaker II).

2597 (Fig. 102b): 5 black walnut shells (Juglans sp.) strung on 2-ply-z plied yucca cord. The stem end of each nut is ground flat, and the natural cavities within the shell are exposed. The cord passes through these cavities. Two of the shells are ground over the entire surface and the crenulations are nearly worn away. The others are polished but retain natural surface grooves. The cord is tied in a series of knots, and a second cord similar to the first passes between knots, suggesting that the artifact was once tied to something else. It was recovered along with a cradle and may be a rattle or teething ring.

Provenience: Tseahatso, Burial 2 (Pueblo II-III).

Basketry

The majority of the baskets recovered in 1924 have been previously described and analyzed by Morris and Burgh (1941).

Coiled baskets

All but one of the coiled baskets are close coiled in simple interlocked simple stitch over a 2 rod and bundle foundation (Morris and Burgh 1941: Fig. 3j). The exception, described below, is close coiled in random stitch (1941: Figs. 20, 30e). Designs, where present, are achieved by replacing a natural colored splint with one of a contrasting color. Splicing is similar in all coiled baskets: both ends of the splint pass through the foundation, with moving end hidden and fag end visible (1941: 24, Fig. 9a).

Because of the close similarity of techniques used to make the coiled baskets, they are classified below according to form.
The terminology used is that of Morris and Burgh (1941). Assignment to cultural period is based on provenience and/or morphology.

**Bowl-shaped baskets** (Morris and Burgh 1941: Fig. 11A-3)

2418 (1941: Fig. 23n): diameter, 32cm; height, 9.5cm. Center: spiral, normal. Decoration: discontinuous lines in black made by substituting a dark splint for a natural splint over a short distance on single coils. Self rim, no false braid.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2426: fragmentary. Coils/cm, 2.5; stitches/cm, 3.5-4. No decoration. Self-rim with added elements.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).


Provenience: Trail Canyon Cave 2, general digging.

2549 (1941: Fig. 23j): diameter, 20cm; height, 6cm. Center: spiral, normal. Coils/cm, 2-2.5; stitches/cm, 3-4. Decoration "a visual disturbance produced by the use of black and red coils, and other coils in which plain and colored stitches are alternated in disorder...remarkably unattractive" (Morris and Burgh 1941: 35). Self rim with false braid termination.

Provenience: Pictograph Cave, general digging (Basketmaker III).

2553 (1941: 35, Figs. 16b, 23g, h) (Fig. 103c): diameter, 21.5cm; height, 7cm. Center: spiral, normal. Coils/cm, 2;
Fig. 103. Coiled baskets.  a, UCM2645, Basketmaker III.  
b, UCM2368, Pueblo period.  c, UCM2553, Basketmaker III.
lines, in black on natural. Self rim with false braid termination.

Provenience: Pictograph Cave, Burial 1 (Basketmaker III).

2608: diameter, 15cm; height, 8cm. Center: spiral, normal. Decoration: discontinuous lines in black made by substituting a dark splint for a natural splint over a short distance on single coils. Self rim over bundle of yucca (?) leaves.

Provenience: Tseahatso, general digging.

2609 (1941: Figs. 231, m): diameter, 24.5cm; height, 6cm. Center: spiral, normal. Coils/cm, 1.5; stitches/cm, 3.5-4. Decoration: 6 full radii frame a pattern of one short, one long and one short partial radii that are pendant from the rim; in stitch and wrap technique, natural on natural. Self rim.

Provenience: Tseahatso, Burial 7 (Basketmaker III).

2610: diameter, 12cm; height, 5cm. Center: random. Coils/cm, 2; stitches/cm, 3.5. Decoration: discontinuous lines over single coils, dark on natural. Self rim with false braid termination.

Provenience: Tseahatso, Burial 7 (Basketmaker III).

2622 (1941: Fig. 25d): diameter, 36cm; height, 8.5cm. Center: spiral, normal. Coils/cm, 2; stitches/cm, 2.5-4. Wall: close coiled, uninterlocked stitch over bundle foundation. Decoration: 4 spiral radii each extending through 180°, made up of offset segments of coils, stitches colored black on inner curve and red on outer curve (Morris and Burgh 1941: 35). Self rim with false braid termination. Form transitional to tray basket.

Provenience: Tseahatso, Cist 4, 1923 (Basketmaker III).

2643: diameter, 24cm; height, 8cm. Center: spiral, normal.
No decoration. Self rim with added elements.

Provenience: Tseahatso, Burial 23 (Basketmaker III).

2645 (1941: Fig. 25b) (Fig. 103a): fragmentary. Reconstructed diameter, 40cm; height, 15cm (Fig. 103b). Center missing. Coils/cm, 2-2.5; stitches/cm, 3-4. Decoration: 4 identical, geometric motifs of stepped elements in black and red between black framing lines. The outer framing line is offset by one coil over the solid black portions of the design. Two stylized, geometric birds rest on framed rectangular motifs below the inner framing line. Self rim with false braid termination.

Provenience: Tseahatso, Burial 24 (Basketmaker III).

Tray baskets


Provenience: Trail Canyon Cave 2, general digging.

2407 (Morris and Burgh 1941: Fig. 13c): fragmentary, center missing. Decoration: 4 spiral motifs made up of large, stepped triangular elements partially framed by ticked lines of the opposite color; in black and red on natural. Color of the motifs alternates around the tray. Upper and lower framing lines in black; lower framing line broken.

Provenience: Tseahatso, Burial 16A (Chief's Grave) (Basketmaker II).

2420 (1941: Fig. 26g): diameter, 45cm; height, 6.5cm. Center: spiral, normal. Coils/cm, 2.5; stitches/cm, 4. Decoration: field divided into assymetric thirds, motifs in black and red with stepped elements. Morris and Burgh (1941: 33-34)
discuss the misjudgement of available space that may have led to asymmetry of the design. Self rim with added elements; cord replaces bundle at rim.

Provenience: Tseahatso, Burial 16B (Chief's Grave) (Basketmaker II).

2454 (1941: Figs. 13g, 25g): diameter, 51cm; height, 8cm. Center: spiral, normal. Coils/cm, 2; stitches/cm, 4. Decoration: 4 identical spiral radii made up of lines of red triangles reflecting black triangles. Color order reversed on alternate radii. Upper and lower framing lines at the rim and near the base each consist of one full coil of black stitches. Self rim, fragmentary.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

2557 (1941: Fig. 25a): outer coils missing; present diameter, 43cm; height, 7cm. Center: spiral, normal. Coils/cm, 2-2.5; stitches/cm, 3.5. Decoration: 3 spiral radii, motifs within each identical in form, with color reversal. Two radii with stepped figures in black bordered by a stepped red line, and one radius in red with black line. Asymmetric motif in red between the black figures, perhaps introduced to balance the design (Morris and Burgh 1941: 33). Upper and lower framing lines in black.

Provenience: Pictograph Cave, Burial 2 (Basketmaker III).

Carrying baskets

2340 (1941: Figs. 16c, 28g, h): diameter, 18cm by 20cm; height, 15cm. Center: oval, spiral. Coils/cm, 2.5; stitches/cm, 3.5-5. Decoration: field divided into upper and lower zone by
black framing lines. Upper zone filled with a motif made up of alternately inverted and reversed notched right triangles. Color alternates between black and red. Lower zone is clear. Two black coils separated by a natural coil frame the base (Morris and Burgh 1941: 36). Self rim with false braid termination.

This miniature burden basket is in pristine condition, with no signs of use and no trace of decomposition. It was considered by Morris to be the finest specimen of basketry ever to be recovered from the prehistoric Southwest.

Provenience: Trail Canyon Cave 2, Burial 1 (Basketmaker III).

2372a: wall fragment, center not present. Coils/cm, 2; stitches/cm, 3. Decoration: present, fragmentary, black splints substituted for natural. Self rim with additional elements.

Provenience: Trail Canyon Cave 2, general digging (Basketmaker III, by style).

2507b: oval base, fragmentary. Center: oval, bundle added after 3 spiral turnings of paired rods; splints pass over central turn of rods, taking initial stitch through bundle. Coils/cm, 1.5; stitches/cm, 4. Decoration: none.

Provenience: Tseahatso, general digging (Basketmaker III, by style).

2558 (Morris and Burgh 1941: Frontispiece, Fig. 15b): large conical burden basket. Diameter, 75cm by 80cm; height, 40cm. Center: decayed away. Coils/cm, 2-2.5; stitches/cm, 3-4. Self rim with false braid termination. Decoration:

Two encircling bands are bounded by [3] framing lines (the one at the bottom almost entirely lost on the part rotted away). In lower zone, on opposite sides are ascending
wedge-shaped bands of red and black, in which massiveness is relieved by serrated edges, narrow border lines, and plain blocks inside the bands of color. The inside pattern (indicated by the tumpline attachments) is plainer than the outside (or visible one when the basket was being carried) on which narrow zigzag border lines, one stitch in width, are used to touch up the inner margin of the outer ascending units. The upper zone is divided into 6 panels by transverse bounding lines. The motifs occupying the panels are identical in form but the colors [red and black] are reversed in alternates. The area of each panel is almost completely filled by the massive and complex motif" (Morris and Burgh 1941: 36).

Because the style is more derived than that of burden baskets from classic Grand Gulch and Tsegi Canyon Basketmaker II sites, Morris and Burgh assign a Basketmaker III age to this style of burden basket. However, the artifact was recovered from a Basketmaker II type burial, and while neither basket nor any other of the grave goods have been dated, it is suggested that it is of Basketmaker II age.

Provenience: Pictograph Cave, Burials 3 and 4 (Basketmaker II).

4972 (1941: Figs. 15a, 29i): large conical burden basket. Diameter, 75cm by 80cm; height, 45cm. Center: missing, decayed away. Coils/cm, 2; stitches/cm, 3.5-4. Decoration: 3 black framing lines 2 coils wide set off upper and lower zones. Back and front of the lower zone carry black and red patterns of ascending bands of stepped parallelograms, alike in form but reversed in color. The upper zone bears 6 motifs in black and red, each made up of 3 stepped rhomboids with borders in reversed color; the motifs are identical in form but alternate in color (1941: 36). Self rim.

Provenience: South Trail Canyon (Basketmaker II, by style).

Straight sided baskets
2368 (1941: Fig. 17b, 29g, h) (Fig. 103b): rim diameter, 26.5cm; base diameter, 15cm; height, 10.5cm. Center: oval, spiral. Coils/cm, 2.5-3; stitches/cm, 4-5. Decoration: in quadrants, each quadrant containing a motif in black made up of 2 lines of pendant triangles, lines converging at the base of the basket (Fig. 103d). A small symmetric motif made up of triangles is at the rim on the midline of each quadrant; below the motif is a vertical line made up of single stitches in black. The uppermost remaining coil is in black. Rim is missing. The joint between base and wall was repaired aboriginally.

Provenience: Trail Canyon Cave 2, general digging (Pueblo III, by style).

2371 (1941: Fig. 30e): rim diameter, 17cm; base diameter, 17cm; height, 6.5cm. Center: spiral, normal. Coils/cm, 2.5; stitches/cm, 1.5. Wall technique: random. Decoration: 'none. Rim not present.

Provenience: Trail Canyon Cave 2, general digging.

2456: rim diameter, 13cm; base diameter, 13cm; height not measured. Center: spiral, normal. Coils/cm, 2; stitches/cm, 4. Decoration: occasional coil or segment of coil in black. Rim not present. The wall and base were mended aboriginally by tying fine (1mm diameter) 2 ply-s plied cords around adjacent coils in square knots.

Provenience: Tseahatso, Burial 17 (Burial of the Hands) (Basketmaker II).

Squat storage basket, incurving rim

2556: diameter at rim, 29cm; maximum diameter, 40cm; height, 15cm. Center not present. Decoration: none. Self rim.
Provenience: Pictograph Cave, Burial 2 (Basketmaker III).

Pitched water basket, Navajo

2679: close coiled, simple stitch over 2 rods, no bundle. Diameter of rim and neck, 16cm; maximum diameter, 26cm at height of 8-10cm; base diameter, 9.5cm; height, 19cm. The basket is coated with pitch and the center is obscured, but appears to be spiral, normal. No decoration. Self rim.

Provenience: Side Canyon, surface (historic Navajo).

Plaited yucca ring basket

2618: body plaited of unsplit yucca leaves in 2/2 twill (Fig. 104). The technique is the same as that used in woven rush mats. Diameter, 27.5cm; height, 7.5cm. Plain rim with yucca leaves folded over willow hoop, raw ends of leaves exposed on exterior of basket, held in place by a row of yucca leaf twining.

Provenience: Tseahatso, Burial 11 (Pueblo III).

Basket splints

2508: bundle of split willow sticks: basket splints. One end of the bundle is charred. Width of splints, 2.5-6.5mm; length of splints, 50cm; thickness of bundle, 3.3cm.

Provenience: Tseahatso, general digging (Basketmaker II-Pueblo III).

Mats

Eleven whole and fragmentary mats were recovered. Ten are made of rush leaves (Scirpus sp.) and one of juniper bark. Techniques used are oblique interlacing and weaving ("plaiting"), twining, and a combination of these. The juniper bark mat (2559), the only one made entirely by twining, has been described in the
Fig. 104. Yucca leaf ring basket. UCM2618, Pueblo III.
section on Juniper. It is of interest that the twined juniper bark mat was recovered from a Basketmaker II burial, while all plaited rush mats were recovered from Pueblo III contexts. **Oblique interlaced and woven** (plaited) **mats**

Plaited mats are constructed by two methods. Method one: two sets of parallel elements are placed at right angles to each other and woven in an over-under fashion until the desired size is reached. Additional elements are added by overlapping; theoretically, these mats may be of any desired width, length, and outline. The selvages of woven mats are made of elements turned 45° from their line within the body of the mat; corners are slightly to moderately rounded by necessity. Method two: elements laid parallel to one another are each folded at 90° angles along parallel, intended margins. Element ends are passed over and under each other in oblique interlacing as in plaited yucca leaf sandals. Although very wide mats may be constructed by splicing elements, the width of the mat is determined at the outset. Selvages are formed in a similar manner to those of woven mats. However, in plaited mats the lines of elements in the finishing selvages at upper and lower margins are parallel to the lines of elements in the body of the mat.

Selvages of the del Muerto mats are constructed in 3 ways. In all 3 methods, fag ends are folded at 90° to their final line and worked back into the mat by oblique interlacing.

**Selvage 1:** fag ends are turned to emerge on one face of the mat, producing a single-edged margin.

**Selvage 2:** fag ends are turned to emerge on both faces of the mat, producing a double-edged margin.
selvage 3: fag ends are turned to emerge on one or both faces, and are turned once again so that the raw ends are hidden.

2401 (Fig. 105a): woven in 2/2 twill, selvage 1. Dimensions: 15cm by 18cm. Part of cradle.

Provenience: Tseahatso, Burial 1 (Pueblo III).

2402 (Fig. 105c): woven in 2/2 twill, selvage 1. Dimensions not taken. Part of cradle.

Provenience: Tseahatso, Burial 1 (Pueblo II).

2403 (Fig. 105b): oblique interlaced in 2/2 twill, one selvage present, selvage 2. The mat is crease-folded parallel to the non-selvage margins, with each upward fold 6.5cm wide. Width, including folded areas, 34cm; fragmentary length, 30cm. Part of cradle.

Provenience: Tseahatso, Burial 1 (Pueblo II).

2490 (Fig. 106b): 2 fragments of large woven mat, 2/2 twilled near margins and twilled in a pattern involving 1-3 crossovers near the fragmentary center. selvage 3, about 3cm wide. Length of fragments, 45cm; width, 44cm.

Provenience: Tseahatso, general digging (Pueblo II-III).

2589 (Fig. 106a): fragment of oblique interlaced mat, 2/2 twill, margins and one selvage present. selvage 2, variant: fag ends from each face are folded inward so that ends are hidden and double edges are produced. Width, 25.5cm; fragmentary length, 50cm. Part of cradle.

Provenience: Tseahatso, Burial 2 (Pueblo II-III).

2592: oblique interlaced mat fragment, 2/2 twill, selvage 1; two edges and one selvage present. Width, 32cm; fragmentary length, 35cm. Part of cradle.
Fig. 105. Oblique interlaced mats, cradle parts. Above, UCM2401. Below, UCM2403. Pueblo II.
Fig. 106. Oblique interlaced mats.  

a, UCM2589.  
b, UCM4290.  

Pueblo period.
Provenience: Tseahatso, Burial 2 (Pueblo II-III).
2619: fragmentary woven mat, 2/2 twill, selvage 3. Width, 42cm; length, 91cm.

Provenience: Tseahatso, Burial 10 (Basketmaker III by manner of burial).
13544: fragment, corner and selvage of woven mat, 1/1 and 2/2 twill, selvage 1. Width, 14cm; length, 15cm.

Provenience: Mummy Cave, surface (Pueblo period).
uncatalogued: corner fragment, oblique interlaced, 2/2 twill, selvage 2. Width, 16cm; length, 14cm.

Provenience: Canyon del Muerto, surface (Pueblo period).
Twined mat, interlaced selvage
2489 (Fig. 107a, b): 8 fragments of a twined rush mat.
Rushes are laid parallel, and one or both ends are oblique interlaced in selvage 1. A layer of rushes is placed over half of the mat, parallel to the mat elements. The uncovered half is folded over the loose rushes to form a mat with doubled selvages above and below 3 layers of rushes. The parallel rushes are separated into bunches; the bunches are held by courses of open weft twining using 2 ply-s plied yucca cord. Weft courses contain simple twine stitches, full twist stitches and simple over-under weave stitches. Weft spacing is 7-14cm. One edge parallel to the line of rushes is finished in a 3 strand braid incorporating 3 rush stems. Maximum present dimensions: width, 46cm; length, 43cm.

Provenience: Tseahatso, general digging.
Fig. 107. Twined mat with interlaced selvage, UCM2489.
Loom-woven Cloth

All prehistoric loomed cloth is woven of cotton (Appendix 3), in tabby weave except where noted.

2404: belly band for cradle. The artifact is described in the section on wood. The cloth band is a rectangular strip 15-16cm wide and about 32cm long, folded lengthwise and bound at each end to a wooded peg.

Provenience: Tseahatso, Burial 1 (Pueblo II).

2593: belly band for cradle, not examined. Similar to 2404.
Provenience: Tseahatso, Burial 2 (Pueblo II-III).

2601: fragment, no selvage present. Length, 34cm; width, 21.5cm.
Provenience: Tseahatso, Burial 3 (Pueblo II-III).

2664: cloth wrapped through juniper bark ring, described in the section on Juniper Bark. The cloth fragment is made in twine-stitching (Kent 1957: Chart 2a) with 10 2 ply-z plied warps/cm and 10 3 ply-z plied wefts/cm.

Provenience: Tseahatso, general digging (Pueblo II-III).

Several fragments of historic loom-woven cloth were recovered in 1963.

13515: 2 fragments of a white cotton flour sack with the words "...ECONOMY...WHEAT...--ATON & CO...--ON, COLO." printed in blue on one piece, and a floral motif and the words "CIT...LS...EXTRA...XXX...FLOUR" printed in blue on the other.

Provenience: Pictograph Cave, surface, disturbed Navajo burial (historic).

13516: corner of a cotton (?) blanket bound with heavy blue
bias tape.

Provenience: Pictograph Cave, surface, disturbed Navajo burial (historic).

13523a, b: blanket fragments, indigo dyed, further described in Appendix 3.

Provenience: Trail Canyon Cave 1, disturbed burial from Navajo storage cist (historic).

Metal and Glass

Several artifacts were surface collected at an abandoned Navajo hogan in 1963.

13532: two metal arrowpoints, cut from sheet metal and ground smooth.

Provenience: Hogan No. 2, surface (historic).

13533: metal nail. Not examined.

Provenience: Hogan No. 2, surface (historic).

13534: 2 matching fragments of a glass Vaseline jar.

Provenience: Hogan No. 2, surface (historic).

Corn

As well as forming a staple food from the Basketmaker II period until the end of the Puebloan occupation of Canyon del Muerto, edible and non edible portions of the maize plant were used in a number of artifacts. Chopped or shredded leaves were mixed with mud for plaster and mortar, whole leaves were used as liners in winter sandals (Fig. 108a), and corn cobs and pith were used in the manufacture of secular and ceremonial artifacts. Occasionally, cobs and leaves were used to seal openings in cists.
Fig. 108. Artifacts made from corn cobs, leaves and shanks.
Ears

The corn has not been analyzed by a botanist. Dimensions and descriptions of individual cobs and grains are listed in Table 1.

2367 (Fig. 108c): 5 ears of corn with kernels, found together.

Provenience: Trail Canyon Cave 2, general digging.

2525 (Fig. 108d): 3 ears of corn with kernels, found together.

Provenience: Tseahatso, general digging.

2526: 14 ears of corn bearing kernels, bound together with 7 turns of 2 ply-s plied yucca rope and one turn of unprocessed yucca leaf. The cobs were not available for measurement.

Provenience: Tseahatso, general digging.

Cob with stick inserted in one end

Similar artifacts occur in sites of Basketmaker III–Pueblo III age (Morris 1980: 139; Cutler 1968: 374-375). They may have been game darts or objects of ceremonial use.

2488 (Fig. 108e): 8-12 row cob, 14.6cm long, with unpeeled twig firmly inserted into stem end. The visible portion of the twig is 19.2cm long.

Provenience: Tseahatso, general digging.

Container made from corn stem

2498: not seen. A similar container is illustrated in Morris 1980 (139: Fig. 91c). An internodal segment of corn stalk is hollowed out from the wall, forming a small cavity.

Provenience: Teahatso, general digging.

String of corn shanks

String of 9 corn shanks, broken off at base of cob, retaining
a few husk-leaves (Fig. 108b). The peduncles are pierced and the shanks are strung on a loosely 2 ply-s plied yucca string about 2.5mm in diameter and 60cm long. The cord is tied into a ring, and a second loop (for hanging?) is formed by folding the longer tail of the string over and tying a half-knot around it with the shorter tail. The weight of the artifact pulls the half-knot against one of the corn shanks, holding the loop firm.

Eight of the shanks are of moderate size and the pale yellow color of modern dry cornstalk. The ninth is markedly more narrow, smooth and hard, and is a reddish-brown color.

The artifact is uncatalogued, but is curated in the del Muerto collection with the label "Canyon del Muerto, Pueblo I".

Provenience: Canyon del Muerto.

Corn pith female figurines

Rectangular plaques of corn pith, each with a simple bifurcation at one end to represent legs (Fig. 109). No other physical features are represented. Each is clothed in a miniature apron made by wrapping a belt of 2 ply-s plied cord around the figure, fastening unspun yucca fiber strands to the upper cord, passing the fiber through the cleft and tacking it under the belt at the back. The head end of both figures is eroded, and they may have originally been much taller.

Carlson (Notes, 1963) has suggested that in view of the material and the clearly female gender of the figures, they might reasonably be interpreted as "corn mothers" employed in increase ceremonies.

2628 (Fig. 109a,b): height, 7.2cm; width, 2.1cm; thickness, 0.9cm. The apron is made by wrapping a length of fine 2 ply-s
Fig. 109. Female figurines made of corn pith, wearing juniper bark aprons, actual size.  

*Figures a, b, obverse and reverse, UCM2628.*

*Figures c, d, obverse and reverse, UCM2629.*

Basketmaker III.
plied cord 8 times around the present midsection, tying the cord in a square knot at the top of the wrapping. Four strips of unspun yucca fiber, the middle two dyed red, are tied over the uppermost cord in lark's head knots in the order (from left to right) of obverse, reverse, obverse, reverse. The fiber strands are drawn through the cleft, pass over the cords at the back, and are tucked down under them.

2629 (Fig. 109c,d): height, 4.9cm; width, 2.2cm; thickness, 0.4cm. A belt of 2 ply-s plied cord is wrapped 6 times around the midsection. It is tied in a square knot at the top, and a second square knot is present at the next to the lowest wrapping. The cord is loose in the lowest wrapping, and the lower square knot may represent mending of the artifact. The apron consists of 4 strips of undyed yucca fiber tied over the uppermost cord in lark's head knots in the order (from left to right) obverse, reverse, obverse, obverse. The apron is finished in the same way as 2628.

Provenience of 2628, 2629: Tseahatso, Cist 5, Burials 14 and 15 (Basketmaker II-III).

Squash and Gourds

Gourd bottles

Complete bottles and neck fragments of bottles made from various shaped gourds (Lagenaria sp.). Holes are ground at the stem end, and all seeds and residues are emptied.

2573: not located.

Provenience: Pictograph Cave, Burial 4 (Basketmaker II).

2611: gourd vessel in pot net (net described in section on
Yucca). 11.4cm in height, 10.5cm in maximum diameter. The opening is oval, 1.86cm by 1.75cm in diameter, and is slightly bevelled.

Provenience: Tseahatso, Burial 7 (Basketmaker III).

2497/500, 501: necks of two gourd bottles. The opening of 2497/500 is roughly made but smooth from use, 1.8 by 2.2cm in diameter. The opening of 2497/501 is circular, 1.8-2.0cm in diameter, and is carefully smoothed at the rim.

Provenience: Tseahatso, general digging.

13525: 3 whole bottle gourds, unaltered.

Provenience: Pictograph Cave, surface (recent).

Squash

2494: burial offering of 70 squash seeds (Curcurbita pepo) in a small fingernail indented jar.

Provenience: Tseahatso, Burial 2 (Pueblo II).

2618: burial offering of a mass of squash seeds and rind in a yucca ring basket.

Provenience: Tseahatso, Burial 11 (Pueblo II).
CHAPTER VI
EVERYDAY LIFE IN CANYON DEL MUERTO,
BASKETMAKER II - PUEBLO I

In keeping with tradition (Kidder and Guernsey 1919, Guernsey 1931, Amsden 1949, Morris 1959) an ethnography of the people of Canyon del Muerto during the Basketmaker II and III and Pueblo I phases is presented. The model is materialist and ecological, with a strong normative bias. The purpose, beyond a desire to explain some of the variation between phases, is to return the thesis to a history of people rather than things.

The People

El Najjar (1974) examined 229 crania of Basketmaker II-III and Pueblo I age. The majority of these were obtained from Morris's excavations in Canyon del Muerto in 1923 and 1924 for the American Museum of Natural History. The results of the analysis suggest that the people of Canyon del Muerto represent a generalized segment of the Southwest Plateau Indian variety hypothesized by Seltzer (1944; El Najjar 1974: 164).

General health

With the exception of outstandingly high incidences of porotic hyperostosis and antemortem tooth loss, general health during the Basketmaker II and III periods appears to have been similar to that of contemporary Anasazi groups in other parts of the San Juan region (El Najjar 1974: 165). Slightly higher incidences of porotic hyperostosis and caries are present in later periods, but
the differences are not statistically significant. El Najjar (1974: 112, 113-114, 165-166) has suggested that these pathologies may be related to protein and iron deficiencies associated with over-reliance on maize. Experimental studies have shown that maize grown in canyon bottoms is more successful than that grown in upland regions (Lindsay 1969). The people of Canyon del Muerto may have relied on maize to a greater extent than other groups, particularly during later, more sedentary cultural periods. Support for the hypothesis is seen in the increasing occurrence of the pathologies over time.

Diet

An increasing reliance on maize agriculture has been suggested. While maize has been recovered from only a few Basketmaker II burials in Canyon del Muerto, large quantities of stored maize are found in Basketmaker III and later contexts. Maize from a Basketmaker III cist in Mummy Cave is similar to modern day Pima-Papago maize (Anderson and Blanchard 1942). In endosperm and pericarp color, it is identical to maize recovered by Guernsey and Kidder from Basketmaker II caves in the Kayenta area (1919: 41-42); however, a much greater proportion of the del Muerto corn is floury. This difference in texture is genetically minor, involving only a single gene. It is, however, culturally significant: first, it indicates that the del Muerto corn is probably culturally more recent than that recovered by Guernsey and Kidder; second, that a certain amount of cultural selection was occurring; and finally, since flour corn is considerably easier to grind than flint corn, more meal could be prepared for
consumption for less expended energy.

In addition to maize, squash (Cutler and Whittaker 1961) and beans are present in Basketmaker III contexts. Of uncultivated plant foods, pinyon nuts were present in abundance in some of the Basketmaker II and III burials excavated at Mummy Cave in 1923. Stores of chenopods and amaranths are reported from sites of comparable age elsewhere, and it is reasonable to assume that the seeds of these common plants were gathered and consumed in Canyon del Muerto, although there is no direct evidence from the Morris excavations. A cactus seed lodged in a rear molar of one of the Basketmaker III mummies suggests that the fruits of these plants were collected and eaten (Morris 1939: 15), and common sense suggests that other wild fruits and seeds would have been gathered in season.

Remains of animal food are weakly represented. Tools made from the long bones of deer, fetal antelope hoof tinklers, and the presence of leather artifacts suggest that large ungulates were sometimes taken. Rabbit fur-string robes and rodent skin bags indicate that smaller mammals were caught; these animals were probably consumed in far greater numbers than indicated by the bony evidence. No changes over time in degree of hunting activity or kinds of fauna exploited are seen in the material recovered from the del Muerto excavations.

Material Culture

Basketmaker II

Daily life during the Basketmaker II period is inferred from burial data. The habit of interring articles of secular and
non-secular use with the dead, combined with the excellent preservation afforded by the dry cave environment, allows a greater degree of reconstruction of the way of life than could be expected from sites of other cultural periods and in other kinds of localities.

Hunting

Tools related to hunting include atlatls, atlatl darts, and snares. Nets and curved throwing sticks ("rabbit sticks") were not recovered in Canyon del Muerto. These artifacts are found in sites of similar age (Guernsey and Kidder 1921: 77-79; Nusbaum, Kidder and Guernsey 1922) and may have been used by the del Muerto Basketmaker II people as well.

Gathering

Large conical burden baskets with carrying bands, tray baskets and digging sticks constitute the tools necessary for the gathering of wild plant food, and to some extent, the harvesting of cultivated plant food. Canyon del Muerto burden baskets differ in shape and decoration from those recovered from the Segi, Grand Gulch and Mesa Verde areas. Morris and Burgh (1941: 36; Fig. 10B-3) classify the particular form and decorative style as Basketmaker III; however, one such basket (UCM 2558) was recovered as a part of the burial coverings of a Basketmaker II burial (Pictograph Cave, Burials 3 and 4, 1924). No digging sticks were recovered from specifically Basketmaker II contexts, but since they have a worldwide distribution of great time depth, and are one of the hallmarks of the gathering stage in most known cultures, their presence is inferred.

Food and raw materials needed for the manufacture of
artifacts were gathered. Pinyon nuts, possibly gathered on a seasonal basis by large groups as in the ethnographic pattern, are the only gathered foods for which there is direct evidence. It may be that the many rabbits utilized in the manufacture of fur string, and presumably for food, were taken on gathering expeditions. Smoking material, medicines and other ritual-related material were also gathered. Gathered raw materials include wood, bark, grass, flexible withes for basketry construction and stone suitable for chipping. Among the major categories of gathered material is yucca.

Agriculture and domestication

Corn and corn meal were recovered from a few Basketmaker II burials. It is not clear whether squash was grown in Canyon del Muerto at this time, but gourds, whether cultivated or wild, were in use as containers.

The feathers of turkeys were used in feather-string robes, indicating that turkeys were encouraged, if not domesticated. No turkey pens were located, and layers of turkey dung, conspicuous in later sites, are absent in Basketmaker II levels.

Food processing

No artifacts related to food processing were recovered from specifically Basketmaker II contexts. Since ground corn meal is present, some variety of seed grinding equipment is indicated.

Raw material processing

Forked stick and bone tipped wooden flakers were used in the manufacture of chipped stone tools. Ground and drilled stone pipes indicate the use of abraders and drills. Wood was cut, requiring ground or chipped stone blades, and finished by grinding
and polishing. Large animal bone was cut and ground, and leather was tanned, or used raw with the fur left on. Turkey feathers were stripped for feather-string blankets. Fabric and cord constructions recovered from Basketmaker II burials are commonly made of yucca fiber cordage, although at least one unidentified fiber is present. Raw yucca leaves clearly were processed in quantity, but the tools used for this are not represented. It may be that yucca fiber was not processed in the rockshelters, or the leaves may have been stripped with the teeth as reported by Stevenson (1915: 78-79) among the ethnographic Zuni.

Storage

Slab-lined cists and pits in which burials were made may have previously been used for food, raw material or artifact storage.

Houses

No habitation structures were found in the rockshelters.

Clothing

Hollow toed (Type II) cordage sandals are on the feet of all Basketmaker II burials recovered from the del Muerto rockshelters. One or more extra pairs are generally present among the mortuary offerings. Very few Type II cordage sandals were recovered from non-burial contexts, and it cannot be said with certainty that this particular type of sandal was worn during life. Almost certainly some sort of sandal was worn.

Fur and feather string blankets were worn in cool weather, possibly in the form of short capes since none of those recovered are large enough to wrap an entire body. Leather caps, boot-like moccasins, and wraps were recovered from several burials of males. Some of the many cordage and fiber menstrual aprons recovered from
the general digging were probably deposited during the Basketmaker II period. It is not known whether aprons were worn habitually or only as required. In common with the people of other Basketmaker II sites, it appears that the Basketmaker II population of Canyon del Muerto wore very little in the way of clothing.

Jewelry made of marine shell, stone and wood was worn by adult males, adolescents, children and infants, and presumably by females. A bracelet of marine shell beads was generally placed on the left wrist of the dead, and additional bracelets and necklaces are common burial inclusions. Since many of the beads show wear and patination from long use, this jewelry was probably worn during life. Hair ornaments made of wood, cordage, feathers, and in one case, rattlesnake rattles, were worn by adult males.

Leisure

A set of bone gaming pieces was recovered from the burial of an adult male at Mummy Cave in 1923. Flutes may have been played in secular as well as religious activities.

Trade

Marine shell used in jewelry originated in the Gulf of California and the Pacific Coast (Appendix 2), and Golden Barrel cactus spines used in a non-utilitarian construction originated far to the south and west of del Muerto. These occurrences during the Basketmaker II period. Marine shell of the same origins has been recovered from an Archaic (Desha Complex) burial (Lindsay et al. 1968), indicating that such trade into the San Juan region is of long standing. No evidence as to whether trade was direct or indirect, or what was being traded in return, is present.

Alternatively, shell gathering trips may have been made by
Alternatively, shell gathering trips may have been made by groups or individuals; the ethnographic Hopi claimed that their ancestors made such expeditions every four or five years (Nordenskiöld 1893: 138).

**Social organization**

Few burials of Basketmaker II females were recovered in the excavations, and of these, all were recovered for the American Museum of Natural History. The inclusions could not be examined in this study. The sexes are approximately equally represented in other sites of Basketmaker II age, and it seems likely that sampling error rather than cultural bias is responsible for the situation in Canyon del Muerto.

Similar burial treatment of infants, children, adolescents and adults suggests that all members of society were considered to be of value, and that the same sort of afterlife awaited each of them. New sandals on the feet and one or more extra pairs among the burial offerings of adults, adolescents and older children suggest that the dead were expected to travel. Since the sandals are the same regardless of age or other inclusions, it seems likely that each person was travelling toward the same destination. The suggestion is reinforced by the presence of adult males and infants in the same grave.

No evidence of craft specialization was noted beyond that expected by gender (e.g. hunting by males) is found among the burial inclusions. While it is possible that the abundant and expertly made textiles were fashioned by specialists, no evidence for or against this is present.

In most cases, inclusions appear to be the sort of articles
that the individual would have used, or earned the right to use
during life. Adults and adolescents are often accompanied by
articles of ceremonial or non-utilitarian nature, such as flutes
and feather constructions. The burials of younger children lack
such inclusions; it is therefore suggested that group members were
initiated or otherwise inducted into adult social and ceremonial
life at adolescence.

Treatment of the dead suggests that the Basketmaker II phase
people were generally egalitarian, with status earned on the basis
of age, ability, and possibly of gender.

Religion

Wood, feather and bone objects of clearly non-utilitarian
nature are present in the majority of burials, particularly those
of adult males. These artifacts probably functioned in ritual,
but in no case can the form of the ritual be inferred. Some of
the feather artifacts are similar to ethnographic pahos which
suggests considerable antiquity for these objects; however, use in
the past may not parallel use in the present. Flutes and gaming
pieces may relate to religious or to secular activities.

Sandals have already been mentioned. Their nearly invariable
inclusion, both on the feet and as extra pairs implies that the
dead were travelling to some form of new life.

Pictographs depicting large, broad-shouldered anthropomorphs
are on the walls of several of the rockshelters. Near identical
pictographs and petroglyphs of this motif are found in or near
Basketmaker II sites throughout the San Juan region, and may be
considered to represent a regional shamanistic/religious tradition
that was shared in common among Basketmaker II period people. The
assumption of a regional religious tradition is strengthened by the similar manner of burial and of burial inclusions throughout the San Juan region.

**Basketmaker III-Pueblo I**

The Basketmaker III and Pueblo I periods are combined. There appears to have been no hiatus between periods, but rather an in situ development from Basketmaker III into Pueblo I. Daily life is inferred from both burials and habitations.

**Hunting**

No atlatls or darts are found in Basketmaker III burials or architectural features, and it is assumed that at some point during the period the atlatl was replaced by the bow. A single bow fragment was recovered from the general digging in Pictograph Cave, but the artifact cannot be attributed to any particular period. An atlatl dart mainshaft was found in association with reed arrows in the same rockshelter, which suggests that replacement was gradual. No other hunting equipment was recovered, but sites of similar age have produced nets and snares, and these may have been used in Canyon del Muerto as well.

**Gathering**

Burden baskets, tray baskets and digging sticks remained in use throughout the Basketmaker III and Pueblo I phases. By the end of the Basketmaker III phase, the large conical Basketmaker II style burden basket was replaced by a somewhat smaller wedge-shaped basket. With the addition of clay for pottery making, the same range of food and raw materials continued to be gathered as during the Basketmaker II period.
Agriculture and domestication

To judge from the amount of stored corn, farming was intensified during the Basketmaker III phase. Squash and beans are added to the list of cultigens, and layers of turkey dung in the deposits suggest that turkeys were domesticized. There is, however, no evidence of the turkey pens seen in later periods. Turkeys appear to have been kept for their feathers rather than for their meat; beyond a few whole carcasses, turkey bone was conspicuously absent in refuse deposits.

Food processing

Trough metates were recovered in Basketmaker III contexts by the American Museum of Natural History at Tseahatso in 1924.

Fiber-tempered mudware vessels may have served as liners for parching baskets or as parching trays.

Raw material processing

Tools for the processing of raw material are not well represented in the University of Colorado Museum collection. A number of bone awls and other bone and ground stone tools were recovered for the American Museum of Natural History. These were not examined.

The form of specific tools may have altered somewhat between Basketmaker II, Basketmaker III and Pueblo I. Bone-tipped wooden flakers found in Basketmaker II contexts are absent from the Basketmaker III inventory. These may have been replaced by smaller, hand-held antler and bone flakers. However, the latter were recovered from refuse deposits and no age can be assigned to them.

With the exception of the production of pottery, the methods
and materials required for the manufacture of all Basketmaker III artifacts were in place during Basketmaker II.

Storage

Slab-lined cists are present as individual features and as features associated with dwellings. In most cases the cists resemble those of Basketmaker II age. A number of Basketmaker III cists are roofed with domed pole and mud caps, with access to the interior through a hatchway. Intact hatchways are covered with a shaped stone slab and sealed with mud and vegetation. All of the roofed cists and many of the unroofed cists were empty. Other unroofed cists contained corn, artifacts, raw materials or burials.

Houses

At least two and possibly three forms of habitation structures were in use during the Basketmaker III-Pueblo I period. These have been described and discussed in Chapter IV.

Clothing

Clothing, or the lack of it, appears to be similar to that worn during the Basketmaker II phase. The form of sandals is changed: the hollow-toed Type II sandal present on the feet and among the burial goods of Basketmaker II individuals disappears from the artifact inventory. Finely woven and twined cordage sandals with solid square to concave toes are the norm, and the majority of the worn out sandals in the refuse are of this form. It is my impression that the toe form becomes more curved over time, so that the early Basketmaker III sandal is square toed and the late Basketmaker III-Pueblo I sandal is deeply scalloped. Not enough contextual evidence is present to confirm this, but
radiometric dates made directly on sandals could answer the question, and perhaps provide a series of chronologic markers for other dry cave excavations.

Marine shell jewelry continued to be worn, but in general less jewelry appears in the graves.

Social organization

The standardized manner of burial suggests that individuals were considered to be of equal importance regardless of age or sex. Few of the burials contain anything approaching the wealth placed in the Basketmaker II graves; an exception is the burial of a female (Burial 13, Tseahatso 1924, UCM) who wore an armlet made of 200 olivella shells, turquoise and leather. Burials of males are no longer accompanied by tools or by recognizably ceremonial artifacts. Regardless of age or sex, bodies were generally wrapped in a feather or fur-string robe, the head placed in one basket and covered with another, and the bundle placed in a cist or pit. A marine shell bracelet was usually on the left wrist.

Although a change in social structure is expected when a group becomes more sedentary, little in the Morris excavations bears evidence concerning this question. However, change in social structure as it relates to change in religion is discussed below.

Gross contents of rooms and cists do not suggest craft specialization. However, the structures were not excavated in the same manner as in recent excavations, and it may be that examination of micro-debris would reveal workshop or special item storage areas within the chambers. A group of sandals of very similar form (UCM 2598/813-819) found in a pile on the floor of a
slab and mud house in Tseahatso may indicate craft specialization, but may as easily indicate that the members of each household produced their own footwear. The same reasoning applies to a group of unfinished baskets placed in an infant grave excavated in the West Talus at Mummy Cave. The Basketmaker III female wearing the olivella cuff, mentioned above, was accompanied by skeins and warps of cordage, perhaps indicating that females were the spinners or the weavers.

Trade

No new elements of trade are seen over and above those noted during Basketmaker II. While shell jewelry still appears as burial inclusions, less shell is evident than during the previous period, and abalone shell becomes rare to non-existent. It is suggested that long distance trade may have changed in scope or nature as sedentism increased.

Religion

Several lines of investigation suggest a shift in religious concepts during the Basketmaker III-Pueblo I period. The absence of sandals and ritual paraphernalia from burials implies that the future needs of the people would not depend upon items that they could carry with them.

The large anthropomorphs common in Basketmaker II rock art are gradually replaced by smaller, triangular bodied anthropomorphs shown in groups and sometimes holding hands. New elements include small stick-figure humans engaged in secular activities, bird-headed figures, and flute players, and the rock art generally appears to be less involved with the supernatural than during the preceding period.
Morris and Burgh (1941: 54) have suggested that the small, highly decorated burden baskets, miniature clay burden baskets and clay figurines of females that enter the artifact inventory during this period may represent a regional cult involving fertility and the ensurance of a plentiful harvest. While there is little direct evidence for this other than the artifacts mentioned, the idea is not out of place given the suggested increase in reliance on agriculture. A cult or religion involving the assurance of crop fertility would also consider the fertility of the natural world and of the human population, and a slight increase in the petroglyphic depiction of women and animals may reflect this.

Finally, the appearance of houses in the canyons suggests a shift toward a more permanent community structure. Mechanisms for reducing interpersonal friction in a semi-agricultural hunting and gathering group are not as effective in a sedentary group; investment of time and energy in permanent houses and fields makes it difficult for any individual or group to leave the group, despite personal differences. Social cohesiveness, necessary among sedentary people, is generally considered to be controlled at least in part by ideology. A change in the mechanisms of social control between the presumably less sedentary people of the Basketmaker II period and the more settled people of the Basketmaker III-Pueblo I periods would be expected. It is suggested that religious life during the Basketmaker III-Pueblo I periods gradually became oriented toward community participation, with the importance of the individual subsumed in the importance of the group.
Although chronological information is available through several lines of investigation, no previous systematic effort has been made to date the local phases of the Basketmaker-Pueblo sequence in Canyon del Muerto. Tree ring dates were calculated on architectural timbers recovered from Basketmaker III and Pueblo I structures in Cave No. 1 and the Mummy Cave talus in 1927. However, these timbers were collected not in an effort to date individual structures but as part of a program to gather specimens that would close gaps between floating segments of the tree ring record; many of the samples collected from Canyon del Muerto in 1927 were so utilized in the formation of the Central Pueblo Chronology (Douglass 1936; Morris 1936). Direct dates include two radiocarbon assays made on grave inclusions from Basketmaker II burials in Tseahatso. These absolute dates and the associational dates that may be inferred from them are augmented by approximate dates derived from regional changes in pottery styles.

Chronology and Culture Change

Basketmaker II

A radiometric date of 1695±90 BP (AD 255) was obtained on a sandal accompanying Burial 16B, Tseahatso, 1924 (GX0622). A second radiometric date of 1515±75 BP (AD 435) was made on a
necklace cord that lay over the forearms of Burial 17, Tseahatso, 1924. Both burials were undisturbed, and the manner of burial and the other inclusions clearly indicate the Basketmaker II period. The tray basket and sandals accompanying Burial 17 are more stylistically derived than those of double Burial 16A and 16B, and a more recent date is not unexpected. It is suggested that the local phase of the Basketmaker II stage of cultural development in Canyon del Muerto began as early as the beginning of the third century AD and lasted as late as the end of the fifth century AD.

The following indications of Basketmaker II presence in Canyon del Muerto were noted. Basketmaker II burials were encountered in Mummy Cave, Cave No. 1, Tseahatso, Trail Canyon Caves 1 and 3, Pictograph Cave, and Battle Cove. Morris considered Trail Canyon Cave 2 to have been utilized almost exclusively during Basketmaker II, but all burials had been robbed, and without direct dates the situation is unclear. However, a sandal recovered from general digging among the ruins of the plundered burials is morphologically identical to those recovered from Basketmaker II burials in the Marsh Pass area. San Juan Anthropomorphic Style pictographs (Schaafsma 1980) representing large, broad shouldered humanoids with headdresses reminiscent of the hair ornaments found in Basketmaker II burials are on the walls of Pictograph Cave, and a number of other pictographs are beneath the mud of fallen Basketmaker II cists. More elaborate examples of San Juan Anthropomorphic Style figures are found at Blue Bull Cave (CDM 123) and Ceremonial Cave (CDM 88), both of which were examined but not excavated (Grant 1978).

No habitation structures assignable to the Basketmaker II
period were located. Superposed architectural features thought to be the remains of houses were observed 1m and more below the lowest pottery bearing levels in Stratigraphic Section I, Water Level Cave, 1929 (Morris 1978: 120); these were below the level of the water table and were not examined. While the possibility exists that Basketmaker II houses are present beneath terrace alluvium or beneath Pueblo II-III roomblocks in the rockshelters, the available evidence suggests that no houses were constructed in the caves of Canyon del Muerto during Basketmaker II. Permanent habitation, if it occurred in the canyon at all during this period, took place elsewhere, perhaps on the terraces of the wash.

Utilization of the rockshelters of Canyon del Muerto appears to have been primarily for the burial of the dead. The nature of the associated rock art suggests ceremonial activity, possibly in conjunction with burials, and the presence of burials in slab lined cists suggest that the caves may have also been used for storage of food or other materials. However, no examples of cist-stored material of Basketmaker II age were encountered.

Intensity of utilization of the rockshelters was light in comparison with later periods.

Basketmaker III

The temporal distinction between the Basketmaker III and Pueblo I developmental periods is unclear. Timbers recovered from an unspecified room in the room and cist cluster in the east talus of Mummy Cave produced cutting dates of AD 367, AD 656 and AD 702, indicating the use of standing dead wood or of timbers scavenged from some earlier structure. Two of the youngest (near surface) rooms in the cluster had burned while in use; one contained
pottery and other artifacts typical of the Basketmaker III period, while the other contained neck banded pottery representative of the Pueblo I period. A similar room in Trail Canyon Cave 3 had also burnt while in use. Sandwiched between the roof fall and floor were Basketmaker III artifacts. Timbers recovered in 1927 from the burned PreKiva at Area 14, Trail Canyon Cave 1, produced cutting dates of AD 701 and AD 787; the inventory of artifacts present on the floor where they were abandoned at the time of the fire is prototypically Basketmaker III.

Assuming that beam sections identified as having been recovered from the PreKiva at Area 14 were indeed recovered there, and that the stylistically derived identification of a Basketmaker III artifact inventory is correct, it must be concluded that the Basketmaker III developmental period lasted well into the eighth century in Canyon del Muerto. The presence of both typical Basketmaker III and typical Pueblo I artifact assemblages in pole and mud rooms indicates either that rooms were reused, or that the architectural style was retained over a long period of time. Finally, Basketmaker III artifacts in pole and mud rooms and in PreKivas may indicate that more than one kind of large room was in use, or that the distinction made between the two is illusory.

Basketmaker III burials are present in every cave examined. While counts cannot be exact because of inconsistencies in the kinds of information available for each burial, it appears that the heaviest use of the del Muerto rockshelters as burial sites occurred during Basketmaker III. The form of burial is similar to that of the Basketmaker II period, but sandals no longer are placed on the feet of the dead, and inclusions are few in
comparison with the preceding period. None of the Basketmaker III burials excavated for the University of Colorado Museum contained ceramics.

Schaafsma (1980: 122) has noted change in the style of rock art at Canyons de Chelly and del Muerto from the San Juan Anthropomorphic and Glen Canyon Linear Styles to what she has termed the Chinle Representational Style. While assigning dates to rock art is problematical at best, to all indications the Chinle Representational Style began during the Basketmaker III period. Pictograph panels and individual elements in this style are present in each of the investigated rockshelters with the exception of Trail Canyon Cave 2, where no rock art whatsoever is present. Chinle Representational Style art is far less formalized than the earlier San Juan Anthropomorphic Style. New elements include small humans, often in groups, birds, animals and geometrics. The large costumed anthropomorph typical of Basketmaker II rock art is largely absent, but in a few cases the motif is rendered in the more curvilinear, less formalized later style.

A change the in nature and degree of utilization of the shelters is noted between the Basketmaker II and III phases. Habitation structures appear for the first time, and cists and burials are markedly more abundant. Rock art in the early Chinle Representational Style is present in a far greater number of caves and isolated sites than is art of Basketmaker II age. The increasingly secular nature of the elements and the acts depicted may be related to changes in social and religious organization brought about by increasing reliance on agriculture and a more
settled habitation pattern.  

Pueblo I

Architecture dating to the Pueblo I period has been discussed.

Burials of Pueblo I age have proved difficult to identify. Artificial cranial deformation was apparently not practiced in Canyon Del Muerto during the Pueblo I period, and diagnostic pottery accompanied few burials. Burial 2, Cave No. 1, 1923; Burial 65, Tseahatso 1923; Burials 4, 20 and possibly 21-24, Tseahatso 1924; and Burials 1-3, Trail Canyon Cave 3 1924, are associated with Pueblo I artifacts or structures. The manner of burial in pit or cist, wrapped in fur or feather string blankets and accompanied by baskets appears to continue from Basketmaker III into Pueblo I.  

Pueblo I pottery was recovered from the surface of most sites examined during the University of Colorado Museum Survey of 1963. Styles bridging Basketmaker III-Pueblo I and Pueblo I-II are present in addition to purely Pueblo I pottery, suggesting that occupation or utilization of the canyon and its rockshelters was continuous between the defined developmental stages.  

From the information in the field notes, it appears that the caves examined by Morris were utilized to a lesser extent during Pueblo I than during Basketmaker III. This may be the actual state of affairs, or may reflect the research objectives of the excavator, who was primarily interested in Basketmaker II and III remains. Certainly the abundance of Pueblo I potsherds recovered by the University of Colorado Museum in 1963 suggests that the population of the canyon was stable rather than dwindling.
Pueblo II

No distinction between Pueblo II and Pueblo III masonry architecture was made in the field notes, and only a single burial accompanied by Pueblo II pottery was identified (Burial 1, Tseahatso 1924). It is possible that some of the Pueblo burials recovered for the American Museum of Natural History are of Pueblo II age, but until the inclusions are examined this cannot be verified.

Pictographs continue in the Chinle Representational Style, with rock art of this style reaching its florescence at about AD 1000 (Grant 1978: 171). Petroglyphs in the same style become increasingly common. Motifs in both forms are far less emphatically supernatural than in preceding periods.

To judge from the quantity and variety of Pueblo II pottery recovered by the University of Colorado Museum Survey, the utilization of the shelters during the Pueblo II period was more intense than is indicated by the field notes. Most of the sites recorded by DeHarport (1959) in Canyon de Chelly are of Pueblo II age, and it was estimated that population in that canyon increased from approximately 100 persons during Basketmaker III to 500 persons or more by late Pueblo II (Grant 1978: 50).

Of the sherds recovered in 1963, both the greatest absolute number and the greatest number of distinct pottery styles are recorded for the Pueblo II period. The sherds were recovered from the surface of every Anasazi site surveyed. Styles transitional between Pueblo I and II and Pueblo II and III are present in most of the site collections, again suggesting continuity of occupation between periods.
Pueblo III aggregation is well marked in the canyon. Large, multi-storied villages constructed in Kayenta, Chaco and, in the final stage before abandonment, Mesa Verde style stonework occur in the open and within some of the rockshelters (MacDonald 1976: 57-60). At Mummy Cave, Pueblo III roomblocks, kivas, cists and stairs are present in both alcoves; Kayenta, Mesa Verde and possibly Chaco architectural styles are present. The Kayenta-style rooms are apparently the product of the indigenous population.

DeHarport (1959) has argued that building style is generally conserved and is seldom diffused over great distances; he suggests that Chaco Canyon style masonry at White House in Canyon de Chelly and at Mummy Cave in Canyon del Muerto represents an actual migration of Chacoan people. It should be noted that although the lower unit at White House is built of Chaco style masonry, the structure is not built to a typical Chacoan village plan. (MacDonald 1974: 59). The same may be said of Chacoan masonry rooms at Mummy Cave and Tse-Ta'a (Steen 1966).

Little doubt exists, however, concerning immigration of people from the Mesa Verde area during the last few decades of the 11th century. In particular, the tower and roomblock complex at Mummy Cave is almost certainly the product of the people who built towers and rooms on the Mesa Verde. This is demonstrated by the entirely Mesa Veredean masonry and architectural pattern, by the cluster of construction dates at and around AD 1284, and by the presence of prayer sticks and other ritual peripheraria in the walls of the tower, exactly as they appear in the walls of towers
at Spruce Tree House and Balcony House at Mesa Verde (MacDonald 1975; Morris 1941).

Sherds of Pueblo III age were surface collected from Mummy Cave, Tseahatso, Trail Canyon Caves 1, 2 and 3 and Antelope House during the University of Colorado Museum Survey. These range in age from early to late Pueblo III. Sherds of Mesa Verde black on white bowls and jars were collected at Mummy Cave, Tseahatso and Antelope House.

Rock art is increasingly secular in subject matter and often is more carelessly rendered than in previous periods (Grant 1978: 193). Petroglyphs and pictographs in the Kayenta Representational Style and the Tsegi Painted Style are present at Antelope House, Pictograph Cave, Tseahatso, Mummy Cave and Cave No.1, as well as at numerous sites not examined in this study (Grant 1978; Schaafsma 1980).

The utilization of Canyon del Muerto cave and open sites intensified during the Pueblo III period, but this appears to be a case of amalgamation into fewer and larger habitation sites rather than an increase in size of each earlier site. It is possible that the nature of use of the majority of the rockshelters changed somewhat; previous habitation sites may, at least toward the end of Pueblo III, have instead seen use as storage or other special purpose sites.

Intersite Comparisons:

Basketmaker II and III

Basketmaker II

The most detailed definitions of Basketmaker II material
culture are those derived from excavations in dry caves (Kidder and Guernsey 1919; Guernsey and Kidder 1921; Morss 1927; Guernsey 1931; Lockett and Hargrave 1953; Lindsay et al. 1968). These definitions are directly comparable to Basketmaker II material culture in Canyon del Muerto.

Kidder and Guernsey (1919) presented the following list of 12 typical Basketmaker II cultural traits based on their work in the Marsh Pass area:

1. Undeformed, dolichocephalic skulls
2. No domesticated turkeys
3. Flint corn only (?)
4. Apparently no beans
5. Fine-cord square toed sandals with bottom reinforcement covering the whole sole
6. Guitar-shaped cradles; grass edge and cedar-bark [juniper] cradles abundant
7. Coiled basketry, somewhat coarser than Pueblo
8. Hair string, twined bags and fur cloth common
9. Cotton cloth, loom cloth and turkey feather cloth absent
10. Atlatl
11. Short, squat pipes
12. Pottery rare, perhaps absent

To these may be added the following:

13. Architecture in the form of slab-lined cists
14. No habitations noted within rockshelters
15. Burials in cist or pit lined with grass or juniper bark
16. Bodies tightly flexed, wrapped in blankets and accompanied by baskets, wearing sandals and often accompanied by a second pair of sandals
17. Multiple burials common
18. Polychrome paintings of broad shouldered, near life-sized anthropomorphic figures frequently present on burial shelter walls

It is in the comparison of specific traits, features and
artifacts that the differences and similarities between regional expressions of Basketmaker II culture may be seen.

Canyon del Muerto

The skulls of the Canyon del Muerto Basketmaker II burial population are not artificially deformed.

Only a small amount of corn was recovered from Basketmaker II contexts; to my knowledge it has not been analyzed. Some of the beans recovered during the American Museum of Natural History excavations may be of Basketmaker II age. Squash or gourds are present as an inclusion in at least one burial. The turkey, if not domesticated, was certainly utilized; feather-string blankets are more common than fur-string blankets.

Square toed sandals twined or woven of fine cordage are on the feet of Basketmaker II burials in Canyon del Muerto. I have classified the form of the Marsh Pass/Grand Gulch burial sandals as Type I (Chapter V); Canyon del Muerto Basketmaker II burial sandals are Type II. While no additional construction techniques are incorporated in Type II sandals, their form and decorative style are more complex than those of Type I sandals.

No cradles were recovered from Basketmaker II levels in Canyon del Muerto.

Coiled basketry is present in abundance. Many of the decorated baskets have previously been assigned to the Basketmaker III period (Morris and Burgh 1941), primarily on the basis of decorative style. However, some of these were recovered from otherwise typical Basketmaker II burials, and they have been assigned that age here. Of particular interest is a large conical carrying basket (2558) with polychrome designs and motifs in
Basketmaker III style recovered from an undated Basketmaker II double burial (Burials 3 and 4, Pictograph Cave 1924). Other than the large pitched water baskets found in the Marsh Pass area, most described forms of Basketmaker II coiled baskets are present in Canyon del Muerto. Plaited baskets are absent.

While human hair string and fur cloth are present during the Basketmaker II period in Canyon del Muerto, yucca fiber cord and turkey feather cloth are more common. Twined bags are present, but only one was recovered from a definite Basketmaker II context. Cotton string and loomed cloth are absent.

A number of atlatls and atlatl dartshafts were recovered.

Tubular ground stone pipes are present. Neither of the two in the University of Colorado collection are particularly short and squat.

No pottery is present.

Slab lined cists in the rockshelters of Canyon del Muerto in some cases resemble the circular to oval slab cists in the Marsh Pass area. The method of construction - slabs set on end at a slight outward angle, all seams sealed with mud containing vegetable refuse - is identical. However, Canyon del Muerto Basketmaker II cists frequently take advantage of the faces of natural stones as one or more walls, with slabs filling in the gaps; these cists may be very irregular in form.

No architectural features other than cists were identified. Grass or bark beds are either absent or not recognized.

Burials are made in cists, pits or crevices between large stones. In nearly every case the grave is lined with juniper bark or grass, and one or both materials cover the body. Bodies are
tightly flexed on the back or side and wrapped in a blanket of feather string, fur string or both. Baskets are placed over the body; infants and small children are placed within baskets. Sandals are in place on the feet of adolescents and adults, and one or more extra pairs of sandals are frequently among the inclusions. Bracelets of marine shells are generally placed on the left wrist, and additional shell and other jewelry accompany the body. Utilitarian and non-utilitarian objects of wood, leather, feathers and other materials appear as grave inclusions.

Pictographs of broad shouldered anthropomorphs wearing jewelry and headdresses are on the walls of several rockshelters. Somewhat more elaborate but nearly identical figures pecked into canyon walls at the mouth of Butler Wash, Utah, indicate a widespread but highly integrated ideographic system (Grant 1978: 211; Schaafsma 1984: 114-115, Figs 75,76,77).

Grand Gulch, Utah

Published descriptions of the Grand Gulch Basketmaker excavations are rare (Prudden 1897; McNitt 1966). The following partial trait list derived from letters written by Richard Wetherill, the earliest recorded excavator in the region; the field notes are apparently extant but have not been analyzed (McNitt 1966:66, 76-71).

Skulls of the Grand Gulch Basketmakers are dolichocephalic and undeformed. The people appear to be slightly taller than the later Pueblo people.

Corn, beans, squash and turkeys are not mentioned, nor are cradles, cotton or loom-woven cloth.

In burials, a small coiled basket is usually inverted over
the skull, and pipes are placed in small baskets near the head. Bodies are wrapped in fur-string cloth and placed in large twined bags. Large chipped stone darts, finely made bone awls, and atlatls accompany the bodies within the wrappings. Sandals are in place on the feet. While not all sandals are square toed, all differ from Pueblo period sandals in that there is no toe-jog. All or most of the bodies wore bead necklaces.

Graves are made in egg shaped cists cut into cave earth and plastered internally with mud. There is some indication that slab-walled cists are also present. No habitations were noted (Wetherill 1893-1897 in McNitt 1966: 69-70; Wetherill 1894).

Burials exhibiting mutilation similar to that seen in Burial 17, Tseahatso, 1924 are present (McNitt 1966: 69-70). The body of an elderly male has been slashed around the midsection, then sewn together with yucca cord. Accompanying the body were a pair of feet and legs amputated at the knee, and a pair of hands and arms amputated at the elbow.

Woodchuck Cave, Navajo County, Arizona

Nine burials of male and female adults and adolescents were recovered from slab and mud lined cists in Woodchuck Cave (Lockett and Hargrave 1953). The site is purely Basketmaker II, with no overlying cultural levels.

The burials were treated in a manner similar to other Basketmaker II burials. The perishable artifacts are not as well preserved as those from some of the other dry cave sites, but enough remains to indicate that the artifact inventory is typical of Basketmaker II. Sandals are fragmentary but appear to be Type I, cordage. Two wooden combs or hair ornaments with bone bead
decoration accompanied one burial. These are dissimilar to hair ornaments seen in Marsh Pass and Canyon del Muerto. Coiled baskets, cordage blankets and a set of bone gaming pieces are typical Basketmaker II products. The Woodchuck Cave remains are unusually rich in stored mineral pigments, which appear both as caches and burial accompaniments, and in rodent mandibles (usually woodchucks). These are modified and unmodified and appear as grave inclusions.

Although the major portion of each grave was intact, each had been disturbed prehistorically: all the skulls are missing. This is also seen in Burials 3 and 4, Pictograph Cave, Canyon del Muerto. No explanation is offered for this practice, but since the often rich burial offerings were untouched it appears that the skulls were deliberately recovered for some specific purpose.

_Sand Dune Cave, Utah (NA7523) (Lindsay et al. 1968: 30-101)._  

_Sand Dune Cave_ was used as a habitation and storage area during the Basketmaker II period. The deposit was excavated by arbitrary levels within which cultural strata were later identified. The Basketmaker II deposit is somewhat mixed, but overlies an Archaic level with associated artifacts termed the Desha Complex (Lindsay et al. 1968: 37). The Basketmaker II level underlies a mixed Basketmaker II and Pueblo I-III deposit.

Basketmaker II architecture includes slab-lined cists and bounded areas of thick layers of juniper bark or grass, one of which is bordered with small stones. These areas are defined as beds.

A single burial was excavated. The body of a 12 year old female was placed in a pit dug into refuse. The body was
semi-flexed, lying on the right side with head to the northeast, wrapped in a fur-string blanket and a piece of deer hide. Preservation was poor. The body was accompanied by a number of bone tools including a rodent jaw engraver, and other artifacts. Three large abalone pendants or buttons were under the chest. Coiled baskets were recovered from an area near the burial but are not considered to be associated with it. The grave was lined with juniper bark and additional bark covered the burial.

An atlatl, a fragmentary mainshaft and a number of complete and partial foreshafts were recovered from Basketmaker II levels in Sand Dune Cave. Six of the whole foreshafts are hafted with leaf shaped stone points. The atlatl is a mixed type, similar to UCM 2431 and 2432.

Textiles include fur string and fur cloth, twined bags, a fragment of simple coiled fabric, a woven carrying band and a fragment of hand woven cloth. Sandals are twined and woven of cordage in forms similar to Type I cordage sandals, and one illustrated and two described sandals (1968: Fig. 65c, 91-92) are Type II cordage. Wickerwork sandals are close-twined and woven to produce sandals similar to those described in Yucca and Yucca Fiber wickerwork sandals (Chapter V). Open twined sandals appear in mixed levels from Desha Complex to Pueblo III, but are most commonly recovered from the Archaic Desha levels. Such sandals have been not recovered from other sites of Basketmaker II age.

The majority of the basketry is close coiled over 2 rod and bundle foundation, in the typical Anasazi manner.

Pictographs of large, square shouldered anthropomorphs are on the shelter walls. While similar to those in the San Juan
Anthropomorphic Style, these are somewhat more triangular in outline, and arms are occasionally curved. The anthropomorphs are suggestive of both the San Juan Anthropomorphic and Chinle Representational Styles and may represent a transition between styles. They closely resemble several figures on the walls of Cave No. 1 and CDM 88 (Ceremonial Cave) in Canyon del Muerto.

Lindsay et al. (1968: 102) suggest that the Basketmaker II lifeway may have continued to at least AD 700 in the Navajo Mountain area. Tree ring dates made on wood from a single hearth range in the AD 400-700 period. Additional support for late Basketmaker II survival is seen in the twined bags, which are more similar to Basketmaker III bags, in the presence of Type II cordage sandals, and in the rather "late" appearance of the anthropomorphic rock art.

Discussion

The basic San Juan Basketmaker II pattern of dry cave utilization and material culture in Canyon del Muerto is similar to that seen in other dry cave sites in the region. Two Basketmaker II burials in del Muerto are radiometrically dated at 1695+90 BP (AD 255, Type II cordage sandal, Burial 16B Tseahatso 1924)(GX0622) and 1515+75 BP (AD 435, necklace cord, Burial 17, Tseahatso 1924)(GX0623), suggesting that the Basketmaker II burial form lasts into the approximate time generally assigned to the early part of the Basketmaker III period. The style of sandals included in burials, while not requiring any new or different techniques, is more technologically derived than the style of burial sandals in the Marsh Pass, Grand Gulch and Woodchuck Cave sites. The forms of coiled basketry resemble those found
elsewhere but decoration is more similar to that of Basketmaker III.

Rock art is similar throughout the sites. Large bodied anthropomorphs are present in or near all of the sites mentioned. A later and presumably derivative style of pictographic art is seen at many del Muerto and de Chelly rockshelter sites (Grant 1978) and at Sand Dune Cave, still embodying the large anthropomorph but in a less detailed and less static form.

It is suggested that the main Basketmaker II occupation of Canyon del Muerto began somewhat later than it did at Woodchuck Cave and in the Marsh Pass and Grand Gulch regions. Occupation or utilization from about AD 200 onward was probably more or less continuous, with gradually increasing utilization by a slowly growing population. Besides the shelter provided by the caves, the canyon is a particularly favorable area for the growing of crops, and access to a variety of uncultivated plants and hunting areas is available. Many of the shelter and subsistence requirements of a hunting/gathering semi-agricultural people are thus met; the economic, social and ideological changes seen in the Basketmaker III period may have been somewhat retarded in this area of relative plenty.

However, the Canyon del Muerto Basketmakers did not exist in a social vacuum. The widespread occurrence of rock art involving similar figures in the San Juan Anthropomorphic Style suggests that the Basketmakers of the San Juan region shared in a regional tradition involving the depiction of large human figures. Schaafsma (1980: 117) suggests that "the Basketmaker anthropomorphs not only had ceremonial import, but ... exceed the
realm of the ordinary; they were probably representations either of supernatural beings themselves or of shamans"; further, she suggests that the art is underlaid by a related ideographic system based on shamanic practices (1980: 109). The San Juan region is large, but not so large that seasonal aggregations of regional or subregional groups could not occur. The near identity of the figures portrayed, along with the standardized manner of burial, suggests that the ideologic structure was highly integrated.

**Basketmaker III**

The period is characterized by villages of randomly oriented pithouses with associated slab-lined storage cists and jacal structures, by the introduction of fired pottery along with the continuation of unfired, fiber tempered mud ware, and the gradual replacement of the atlatl with the bow and arrow. Beans are added to the list of cultigens, and turkeys were kept. Fur string continues to be made and used, but feather string becomes the norm. Coiled baskets and twined bags continue as in the Basketmaker II phase, and scalloped toed sandals made of fine cordage replace the earlier forms (Lipe 1978; Woodbury 1979).

Nearly all published reports on Basketmaker III material culture are based on information from open sites (e.g. Roberts 1929; Daifuku 1961). While a number of dry cave sites containing well preserved perishable artifacts have been excavated, few comprehensive reports have been produced. **Basketmaker Caves in the Prayer Rock District** (Morris 1959; 1980) is the only readily available monograph that deals exclusively with Basketmaker III dry cave sites and thus is directly comparable to the Canyon del
The Prayer Rock caves were excavated by Earl Morris during 1930 and 1931, and were considered by him to contain the occupational remains of people culturally identical to the people of Canyon del Muerto (Morris 1951). An examination of the descriptions of artifacts, non-habitation architecture and burials confirms this evaluation; pithouses, on the other hand, are not entirely similar between the subregions.

In terms of ceramics and architecture, the Basketmaker III period in the San Juan region may be subdivided into two subregional variants: east and west. The eastern variant is considered by Elizabeth Morris to be a part of the Four Corners Phase as defined by O'Bryan (1950: 104-105; Morris 1959: 561-563), and includes the Mesa Verde, La Plata, Durango and Prayer Rock Basketmaker III sites. Pottery types include basket impressed fiber tempered mud ware, Lino gray, Chapin gray and occasional polished redware. "Smudged ware" and fugitive red washed pots are present. Decorated wares include Lino black on gray, La Plata black on white, and a small amount of Chapin black on white. Mineral paint is commonly used. Habitation architecture consists of circular to rectangular pithouses with rounded corners, built in the open or in caves. Wing walls, complicated floor features and occasional antechambers are present (Morris 1959: 551, 561-562).

Styles of pithouses and ceramics of Basketmaker III age in Canyon del Muerto conform more closely to the western, or Kayenta portion of the San Juan region. In this subregion, slab-lined pithouses without wing walls, with few floor features and with
rare antechambers are built in caves and in the open (Morris 1959: 551, 570). Pottery styles include basket impressed fiber tempered mud ware, Lino gray, occasional polished redware, Lino black on gray, and in the later part of the phase, Kana'a black on white. Organic paint is commonly used, and a fugitive red wash is sometimes applied to the outside of decorated bowls.

The ceramic complex in Canyon del Muerto is predominantly western, showing limited eastern influence during Basketmaker III, although slightly more eastern influence is present in later periods. Pithouse form conforms to that of the western subregion, with less complicated floor features and lack of antechambers and benches. The Canyon del Muerto area is generally considered to be a part of the Western subregion. The evidence of the 1923–1932 excavations is in agreement with this assessment.
Objectives and Assumptions

The thesis has been written with the purpose of reconstructing the culture history of Canyon del Muerto during the Basketmaker II, Basketmaker III and Pueblo I periods, through analysis of information recovered from dry caves by Earl H. Morris between 1923 and 1932. An implicit objective is to put to use - and to make available to others - this large and hitherto unreported body of data.

The majority of excavated features and artifacts recovered in primary context are associated with burials; this is particularly true of the Basketmaker II period material. The remainder of the artifacts were recovered in secondary context - the general digging in trash deposits in and between cultural features. Basketmaker III and Pueblo I domestic architecture was excavated for the American Museum of Natural History and the Carnegie Institution. Artifacts associated with these structures could not be examined in this study.

Four assumptions essential to the interpretive portions of the thesis arise from this situation. The first assumption is that during all periods burial in the rockshelters was not restricted to any one segment of society; in other words, during all periods the burial population is representative in kind, if not in degree and proportion, of the general population. The
second assumption is that while certain artifacts may have been prepared specifically as burial inclusions, the majority of artifacts recovered from burials are of the general kind in use during the period that the burials were made. Again, this is of particular importance for Basketmaker II. Examination of worn artifacts from trash deposits suggests that the assumption is justified. The third assumption is that artifacts recovered for the University of Colorado Museum in 1924 and 1963 are similar in both range and kind to artifacts recovered for the American Museum of Natural History and the Carnegie Institution. Examination of the field notes and the few published descriptions and photographs of material from these excavations appears to justify the third assumption. The final and most important assumption is that non-technological cultural information can be derived from material culture: the history of a culture must consist of more than a description of its industries.

Summary:

The Culture History of Canyon del Muerto

Physical affinities and health

Throughout the Anasazi occupation of Canyon del Muerto the people were of the general Southwest Plateau Indian type hypothesized by Seltzer (1944; El Najjar 1976). With the exception of extremely high incidence of porotic hyperostosis and antemortem tooth loss, the general health of the occupants of the canyons was good. El Najjar (1976) has suggested that both pathologies may have resulted from an overreliance on maize. The canyon bottoms are a particularly favorable area for maize
agriculture, and the prehistoric occupants may have placed emphasis on the growing of this staple to the detriment of the more varied, and possibly more nutritious, diet of those whose agricultural crops were less reliable.

Basketmaker II

The artifact assemblage representing the material and non-material culture of the people of Canyon del Muerto during the Basketmaker II period is similar in content to assemblages from other dry cave burial sites of that period in the Western Anasazi area (Kidder and Guernsey 1919; Guernsey and Kidder 1921; Nusbaum et al. 1922; Lockett and Hargrave 1953; Lindsay et al. 1968). In each of these sites, including those in Canyon del Muerto, the people were agricultural in the sense of growing at least a portion of their food in the form of maize; the atlatl and dart were used rather than the bow and arrow; ceramics were absent; and the dead were buried in juniper or grass lined slab cists or pits in rockshelters. The dead were flexed and wrapped in fur or feather string blankets, and were accompanied by abundant grave goods including tools for everyday use; ceremonial equipment to which, presumably, the individual had earned the right to use during his lifetime; pipes; marine shell jewellery obtained by trade or expedition; coiled baskets above and below the head and often covering the body; and in all cases a pair of sandals on the feet and in many cases one or more extra pairs laid on the left side of the upper trunk.

Stylistic differences are evident between specific artifact classes recovered from Canyon del Muerto Basketmaker II sites and other Basketmaker II dry cave sites. This is particularly marked
in the textiles. Sandals from Canyon del Muerto Basketmaker II burials appear in the same burial context (i.e. on the feet and as extra pairs) as those reported in other sites, but in all cases the del Muerto Basketmaker II burial sandals are entirely unworn and appear to have been made specifically for use in the burial. Additionally, the form and decorative style are more technically derived than those of sandals in the majority of other examined Basketmaker II sites.

Type II sandals in Canyon del Muerto are dated at AD 274 and by association at AD 435 (GX062, GX0623). Since Type II sandals are an invariable feature of Canyon del Muerto Basketmaker II burials, this suggests that the manner of burial lasted through the period traditionally assigned to Basketmaker II and into that assigned to Basketmaker III. The form of burial is considered to be determined by the belief system of a cultural group, and it is suggested that in Canyon del Muerto the entire Basketmaker II cultural system lasted with minor change at least into the early fifth century AD.

It was suggested that the people living in or utilizing the rockshelters of Canyon del Muerto may have relied on maize to a greater extent than in other, less favorable growing areas. This is not reflected in the small amount of food remains recovered from Basketmaker II contexts. However, as well as providing an area where crops may be grown with more frequent success than elsewhere, the canyons and their surroundings provide ready access to sources of non-agricultural foods and raw materials. It is suggested that life may have been easier in the canyons than in less favorable areas. Cultural conservatism or the retardation of
cultural changes seen elsewhere at this time may be due to a lack of environmental or economic stress.

**Basketmaker III**

The Basketmaker III occupation of Canyon del Muerto appears to have been an outgrowth of Basketmaker II utilization of the canyon as a place for burial and the growing and storage of corn and other materials. Where deposits are stratified, Basketmaker III cultural levels directly overlie Basketmaker II levels. In some cases, Basketmaker II cists were reused by Basketmaker III period occupants of the caves; cist architecture cannot be distinguished between the periods. No changes are seen in the physical nature of the people.

Basketmaker III levels in the caves are defined on the presence of ceramics of known age, including Lino gray, Lino black on gray, La Plata black on white, and Abajo red on orange; on a very few tree ring dates from habitation and storage features; on the presence of domestic architecture with ceramic and other contents of Basketmaker III age or style; and on certain changes in the form of burial.

Burials are less elaborate than those of the previous period, but the practice of interring the dead in grass or bark-lined cists, with the body wrapped in feather or fur string cloth and accompanied by baskets and shell jewellery is continued. Jewellery is less frequent and far less elaborate, and few articles useful in secular or ceremonial life are included. Sandals are no longer placed on the feet of the dead, and the Type 2 burial sandal disappears from the artifact assemblage along with the atlatl.

I have suggested that change in burial practices reflects a
change in the social and religious structure of the cultural group. The presence of habitation architecture in the form of pithouses indicates that the people were settling in the canyon on a more permanent basis than during the preceding period. A more permanent settlement is generally thought to indicate a different social organization than is seen among less sedentary groups.

Changes in religious and social organization are further reflected in a shift in rock art styles from the San Juan Anthropomorphic Style to the Chinle Representational Style (Schaafsma 1980). In general, the rock art of the Basketmaker III period is less involved with the supernatural and more involved with smaller humanistic elements than is rock art of the Basketmaker II period. Occasional overlap in style may indicate the effects of regional and local social and religious organization.

Pueblo I

The Basketmaker III and Pueblo I periods proved impossible to differentiate using the information in the field notes and the artifacts from the University of Colorado excavations. Pithouses used during the Pueblo I period are similar to those used during Basketmaker III. Burials were treated in the same manner as during Basketmaker III, and in those few burials in which ceramics were among the grave goods, ceramic styles overlapped the periods. Additionally, ceramic styles transitional between Basketmaker III and Pueblo I are well represented in the sherd collection made in 1963, as are distinct Pueblo I styles and those transitional between Pueblo I and Pueblo II. The physical nature of the people is the same as that of the preceding period, and artificial
cranial deformation was not practiced. It is concluded that in Canyon del Muerto Pueblo I developed directly out of Basketmaker III, and in the early part of the period is indistinguishable from it.

Pueblo II-III

Very little in the field notes and the artifact assemblage collected for the University of Colorado in 1924 deals directly with the Pueblo II and III occupations of the rockshelters. Sherd collections made during the University of Colorado Survey in 1963 indicate that Pueblo II utilization of the sites was more intense than during any of the preceding periods. Ceramic styles represented include those in use from Pueblo I into Pueblo II, purely Pueblo II styles, and those that appeared during Pueblo II and lasted into Pueblo III. The majority of the sherds show relationships with the Western Anasazi area.

Very late in the Pueblo occupation of Canyon del Muerto, Mesa Verde style ceramics appear. It was not determined whether these were local products in Mesa Verde style, or whether they were imports into the region from the Eastern Anasazi area. The rather sudden appearance of Mesa Verde style architecture and village plans, notably at Mummy Cave, suggest an actual influx of people from the Mesa Verde area.

Summary

Analysis of the field notes and artifacts indicate that the rockshelters of Canyon del Muerto were utilized or occupied continuously from Basketmaker II through Pueblo III. The developmental periods seen elsewhere in the Anasazi Southwest are present in local form, with the majority of external cultural
influences derived from the western part of the Anasazi region.
Local phases of the Basketmaker II and III cultural periods may have continued into later times than in other regions, perhaps as a result of the favorable agricultural environment and ready access to non-agricultural needs.
APPENDIX 1

Insect Contents of Small Bag UCM 2633

Url Lanham, Associate Curator of Entomology
University of Colorado Museum

Dried remains of 30-50 individuals of the yellowjacket wasp, or hornet, Vespula pennsylvanica (H. de Saussure). The consistency of the preparation suggests that it was made by drying the wasps thoroughly, then crumbling them with the fingers. The fact that wing membranes are broken up and dispersed suggests that the crumbling was not caused by crushing the bag that contains them. Also, the fact that a large number of head capsules (31) are more or less intact suggests that the crumbling was deliberately done lightly enough to not destroy the identity of the preparation. There is no evidence that only parts of the insects were selected.

Contaminants were 3 dermestid skins (no significant damage to the preparation by these museum pests) and the head capsule of an ant.

Vespula pennsylvanica occurs in the western half of the United States, where it is common, mainly in the Transition Zone and in mountains as high as 8000 feet (2440m). It is social, with large colonies nesting in the ground, and would be well known to residents as a painfully stinging insect.
APPENDIX 2

Canyon del Muerto Shell Artifacts

C. J. McCoy, Jr.
Carnegie Museum, Pittsburgh, Pennsylvania

UCM 2423: rectangular pendant cut from nacreous layers of shell *Haliotis rufescens* (Swainson), 76mm long, 60.5mm wide, pierced at two places on the long side.

UCM 2429: 20 large shells of *Oliva incrassata* (Solander), decollated, and strung with a large flat disc bead of shell.

UCM 2430: 17 shells of *Olivella dama* (Wood), and 8 thin, slightly curved shell disc beads.

UCM 2457: 57 pieces of shell probably cut from the lips of *Glycemeris gigantea* (Reeve), approximately 40-60mm long by 5-8mm wide and slightly curved, well rounded at the ends and pierced at one end.

UCM 2458: string of 18 rings made from ground shells of *Glycemeris gigantea*, average 70mm in diameter by 5mm thick.

UCM 2459: rectangular pendant cut from shell of *Haliotis rufescens*, roughly 45mm long by 28mm wide, pierced in one corner.

UCM 2460: sub-rectangular pendant cut from shell of *Haliotis rufescens*, approximately 42mm long by 27mm wide, pierced in one corner.

UCM 2461: trapezoidal pendant cut from shell of *Haliotis*, probably *H. rufescens*, 51mm by 59mm by 60mm by 36mm, pierced approximately in the center of the short side (specimen not seen) [photograph only].

UCM 2465: string of mixed flat thin shell beads and thick pink shell beads, the latter probably cut from shells of *Haliotis rufescens*, all approximately 6mm in diameter.

UCM 2562: string of 4 decollated shells of *Olivella cf. dama*, 48 slightly curved thin shell beads, and 4 thick pink shell beads, probably from shells of *Haliotis rufescens*.

UCM 2563: 51 shells of *Olivella dama*, well worn and decollated.

UCM 2564: shell of *Turitella sp.*, badly worn, body whorl pierced
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and spire broken, possibly subfossil.

UCM 2565: 14 pieces of shell ground into various shapes, some pierced at one or two ends, probably pendants.

UCM 2570: string of 5 decollated shells of Olivella dama and 7 thin, slightly curved shell beads approximately 5mm in diameter.

UCM 2614: string of 50 thick white shell disc beads and one decollated shell of Olivella dama.

UCM 2623: series of 200 Olivella dama shells decollated and strung in 10 rows of 20 each to form a mat.

UCM 2631: 153 decollated shells of Olivella dama, and 4 Olivella shells, basal parts only, with the spire cut off at the middle of the body whorl. 66 thin and slightly curved shell beads, and 23 thick shell beads from Haliotis rufescens, all approximately 6mm in diameter. 46 flat shell discs cut from nacre of Haliotis rufescens, 8.8-16mm in diameter, pierced in the center. 1 thick flat shell disc, approximately 24mm in diameter, pierced slightly off center.

Uncatalogued: 1 large valve of Laevicardium elatum (Sowerby), 138 by 132mm.

This collection of shells is remarkable in the frequency of worked shells, beads, and pendants, and in the variety of techniques indicated in the worked material. The Olivella shells have been prepared for stringing by both decollation and by actual bisection across the body whorl. Shell beads of two kinds are present from abalone, Haliotis rufescens, and at least two other kinds of shells were used in the manufacture of flat disc beads. The shells of Glycemeris were ground into rings, into the slender curved pendants, and undoubtedly used in the production of some of the irregular pendants that could not be identified to species. The nacreous inner layer of Haliotis shells was cut into rectangular pendants that were either hung from a corner or doubly pierced and suspended from one side. Of this rather large collection only two examples are unworked shells.

The provenance of the shells represented in this material is
a complex problem. The assemblage of Olivella dama, Oliva incrassata, and Glycemeris gigantea is typically Gulf of Californian. Olivella dama and Oliva incrassata reach their greatest abundance in the Gulf and Glycemeris gigantea is restricted to the Gulf of California. Laevicardium elatum is known from southern California to Panama, but according to Keen (1958: 120) is most common on mud flats in the Gulf of California and along the outer coast of Lower California. The single specimen of Turritella appears to be a subfossil. If it actually is a fossil, it may well have come from one of the Pleistocene coquinas along the northern shores of the Gulf of California where Turritella is extremely abundant and weathers out to mix with recent beach shells. The Oliva, Olivella, Glycemeris, Laevicardium, and Turritella represented in this collection almost surely originated in the northern Gulf of California area.

The presence of Haliotis rufescens among the shells, however, adds an element of complication. Haliotis is not recorded from the Gulf of California, although it is known from the northwestern coast of Lower California and from Guadalupe Island. All of the abalone material in the collection is thoroughly altered. The pendants have not only been shaped and pierced, but the prismatic layers of the shell have been ground away to leave only the nacre. The thick pink shell beads also are the result of elaborate preparation. It seems likely that the Haliotis shell materials originated on the Pacific coast of California or northern Baja California, but it is suggested that they reached the Canyon del Muerto area as worked ornaments, rather than as raw shells.

In summary, the Canyon del Muerto shells clearly show a dual
provenance. Most of the shells are common beach and mud flat species of the northern Gulf of California and undoubtedly came from that area. The Turritella may have originated from Pleistocene deposits in the same area. The material of Haliotis must have had a different source, probably the Pacific coast of California. It seems likely that the abalone shell ornaments reached the Canyon del Muerto area as finished pieces, rather than as raw shell.

REFERENCE

Keen, S.

APPENDIX 3
Blanket Fragments from Trail Canyon Cave 1,
Canyon del Muerto

Kate Peck Kent

History. The fragments described below were collected in 1963 from a Navajo storage cist in Trail Canyon Cave 1. The cist had contained a burial which had been disturbed, leaving these pieces behind (UCM 13523 a and b).

Description. The finds consist of some twenty fragments of what appears to have been a plain weave tapestry blanket with a pattern of weft stripes in indigo blue, natural white and natural blackish-brown. All weaving yarns are single-ply z-spun. Warps are white, with the exception of one fragment, in which brown warps appear. Wefts are mostly indigo blue, the blue field being broken by narrow (1/8" to 1/2" [3mm to 13mm]) brown stripes. Three small bits contain white weft stripes about a half inch wide.

Finely-spun warps number from 11 to 15 to the inch, 12 being about average; blue wefts, also fine-spun, number from 35 to 50 to the inch, with an average count of around 42. White and brownish-black wefts tend to be coarser in appearance, numbering from 28 to 34 picks per inch.

Three small portions of weft selvage remain. Selvage strings are brown, 3-ply, z-spun, S-twisted. They are S-twined along the edge of the cloth, three or four wefts looping over one of them.
between each twist.

The tiny remaining bit of warp selvage consists of two blue strings, Z-twisted along the edge, with a warp looping between them after each twist. Each selvage string is 2-ply (Z-spun, S-plied).

One complete corner tassel, and the start end of a second, remain. To construct these, extra blue strings similar to those in the warp selvage were looped through the corner of the fabric. The ends of these strings, plus selvage threads, were combined into a braid. It is difficult to be certain of the number of added strings, but it appears to have been two in one case and three or four in the other. The one complete tassel, or braid, is about 1 3/4" in length, with the ends of the strings tucked neatly back into the braided portion.

Discussion. The fragments look like bits of a "Moqui pattern" or "banded background" blanket. This style was woven by Navaho, Pueblo and Rio Grande Colonial weavers alike in the first three-quarters of the 19th century. In all probability simple striped patterns employing indigo blue, natural browns and white were characteristic of Navaho-Pueblo wearing blankets long before 1800 - certainly back into the early 1700s judging from some bits from the Gobernador area of northwestern New Mexico dated between 1730 and 1750. The typical Navaho-Pueblo selvage and corner tassel rule out the manufacture of this particular piece by Spanish Colonials, but it could be either a Navaho or Pueblo product. The fragments resemble other remains from Canyon del Muerto and Canyon de Chelly dated (some quite tentatively) to the early 1800s. The lack of any distinctive quality of weave
technique, design or color combination makes it impossible to pinpoint the time or place of manufacture of the Trail Canyon fragments, other than to say that they were probably woven in the early 19th century, but may be somewhat earlier than that.

Mera, H. P.

For a description of Navaho-Pueblo textile remains dating to before 1850 see:
Kent, Kate P.
Appendix 4

Identification of

Hair Sample From Cord UCM 2431a

Larry Titus, Simon Fraser University

Hair Sample #35.

Dry examination, macro. Mostly fines, unpigmented, generally less than 10mm in length.

Wet examination with Nikon S-Kt binocular microscope 40 - 400X.

- widest hairs have multiserial ladder medulla indicating Rodentia or Lagomorpha
- shaft varies from thin to medium width along its length with no obvious shield or strictures - shaft straight with only minor waviness
- tips and bases mostly missing - some end and shaft damage probably from microbiological (bacterial) degradation and some damage from bending - shaft fractures usually caused by handling
- unpigmented and unstained except for one hair which had a red/brown pigmentation in the tip
- medulla very wide and where multiserial there is some interweaving of the rows of medullary cells - Lagomorpha
- one specimen with small rounded base and fine tip (pigmented)
- fines are uniserial ladder type of medulla with chevron scales in wider section and coronal scales with no medulla at tip
scales on wider sections mostly simple edged and near

**Conclusion**

Sample #35 is from the Order Lagomorpha and the Family Leporidae (hares and rabbits). Species and race identification is difficult due to the great deal of overlap in identifying characteristics from one species to the next. However, based on the unpigmented character of the majority of these hairs, with the exception of one which was lightly pigmented, I would suspect the sample comes from *Lepus* sp. (jackrabbit, snowshoe rabbit or varying hare) during its winter phase.
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