

CANNIBALISM, WARFARE, AND DROUGHT IN THE MESA VERDE REGION DURING THE TWELFTH CENTURY A.D.

Brian R. Billman, Patricia M. Lambert, and Banks L. Leonard

The existence of cannibalism has emerged as one of the most controversial issues in the archaeology of the American Southwest. In this paper, we examine this issue by presenting the results of our investigation at 5MT10010, a small early Pueblo III habitation site in southwestern Colorado. Battered, broken bones from seven individuals were discovered in two adjacent pithouses at 5MT10010. Mixed and incomplete remains of four adults and an adolescent were recovered from the floor and ventilator shaft of one pithouse; the remains of two subadults were found on the floor and in various subfeatures of the second. Cut marks and percussion scars implicate humans in the disarticulation and reduction of these bodies. Evidence of heat exposure on some bone fragments and laboratory analyses of a human coprolite recovered from one of the pithouses support the interpretation that people prepared and consumed human body parts. The discovery of disarticulated human remains at 5MT10010 is one of a number of similar finds in the northern Southwest. Analysis of cases from the Mesa Verde region indicates a sharp increase in cannibalism around A.D. 1150, a time of drought and the collapse of the Chaco system. The causes, consequences, and nature of this apparent outbreak of cannibalism are examined in light of 5MT10010 and other recent finds.

El debate sobre la existencia del canibalismo se cuenta entre las cuestiones más controversiales en la arqueología del suroeste norteamericano. En el presente estudio, lo examinamos al presentar los resultados de nuestros estudios en el sitio 5MT10010, un poblado pequeño del periodo Pueblo III, ubicado en la parte suroeste del estado de Colorado. Se hallaron los huesos rotos y golpeados de siete individuos en dos viviendas subterráneas vecinas en el 5MT10010. Los restos parciales de cuatro adultos y un adolescente se encontraron mezclados sobre el piso y dentro del pozo de ventilación de una de las viviendas; en la otra se encontraron los restos de dos subadultos sobre el piso y en otras partes de la estructura. Las huellas de cortes y marcas de percusión en los fragmentos óseos implican que actores humanos desarticularon y redujeron a los cuerpos. Evidencias de cocción parcial en algunos fragmentos y análisis en laboratorio de un colprolito encontrado en una de las estructuras implican que varios elementos corporales fueron preparados para el consumo alimenticio humano. El descubrimiento de restos humanos desarticulados en 5MT10010 es sólo un caso entre numerosos hallazgos semejantes en el suroeste norteamericano. El análisis de casos en la región de Mesa Verde revela una concentración temporal de incidentes canibalísticos hacia A.D. 1150 d.c., un lapso durante el cual la región sufrió una sequía prolongada y también cuando el sistema Chaco sufrió un colapso. Las causas, consecuencias y naturaleza del aparente brote de canibalismo se examinan mediante los hallazgos recientes de 5MT10010 y de otros lugares.

Around A.D. 1150, a violent sequence of events took place at a small Puebloan habitation site (5MT10010) in southwestern Colorado. Seven individuals—men, women, and children—were systematically dismembered and defleshed. Body parts of at least three individuals were placed on a fire and roasted. After processing and discarding these remains, the perpetrators walked away, leaving human remains and tools scattered on the floors of two pithouses.

The possible existence of cannibalism has emerged as one of the most controversial issues in

southwestern archaeology. Disarticulated, broken, and cut-marked human bone assemblages have been reported in the northern Southwest for nearly 100 years (Turner and Turner 1992). Many investigators have proposed that at least some of those assemblages resulted from cannibalism (Dice 1993a, 1993b; Malville 1989; Minturn 1994; Nass and Bellatoni 1982; Turner 1983, 1989, 1993; Turner and Turner 1995, 1999; White 1992). Turner and Turner (1995) have reviewed data from 40 sites in the American Southwest with disarticulated assemblages, and concluded that 32 sites meet their proposed criteria

Brian R. Billman ■ Department of Anthropology, 301 Alumni Bldg, CB 3115, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3115, E-mail: bbillman@email.unc.edu

Patricia M. Lambert ■ Department of Sociology, Social Work, and Anthropology, Utah State University, Logan, UT 84322

Banks L. Leonard ■ Soil Systems, Inc., 1121 North 2nd St., Phoenix, AZ 85004

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for the presence of cannibalism. Explanations for the occurrence of cannibalistic behavior in the American Southwest include starvation (Fetterman and Honeycutt 1990; Hough 1902; Kane 1986; Nickens 1974), pathological acts by deranged individuals (Turner 1983; 1989; 1993), or social control (Baker 1990; Turner 1993; Turner and Turner 1995, 1999). In contrast, others have proposed that these assemblages may have resulted from extreme violence or mutilation of the dead (Bullock 1991), the disturbance of secondary burials (Bullock 1991), or the destruction of witches (Baker 1990; Darling 1998; Nass and Bellatoni 1982).

Resolution of this controversial issue requires investigations at three scales of analysis. At the site level, fine-grained analyses of the condition and distribution of human remains and associated artifacts and ecofacts are required to reconstruct the formation processes that created and modified the assemblages. Next, settlement pattern data drawn from local surveys and the excavation of nearby contemporary sites are needed to examine the social context of the occurrences at the community level. Finally, regional analysis of the spatial and temporal distribution of similar assemblages is required to understand the historical development of the phenomenon. Both fine-grained studies of individual assemblages and reviews of their regional occurrence have been conducted (see for example Dice 1993a, 1993b; Errickson 1993; Lambert 1999; Leonard et al. 2000; Minturn 1994; Turner 1983, 1989, 1993; Turner and Turner 1995; White 1992). However, information on the local social context of these finds has been lacking, even though such data are essential for bridging the gap between site-specific and regional scales.

In this paper, we examine this issue by presenting the results of our investigation of 5MT10010 (a small Early Pueblo III habitation site in southwestern Colorado), the local settlement context of that site, and distribution of similar possible incidences of cannibalism in the Mesa Verde region. The results of our analysis of the battered, broken remains of seven individuals and associated artifacts recovered from the site implicate humans in the disarticulation and reduction of those bodies. Evidence of cooking of the human remains, blood residue found on associated tools, and analysis of an associated coprolite support our interpretation that people prepared and consumed human body parts. Local settlement pat-

tern data indicate that 5MT10010 was part of a small community that may have been extinguished in a single, violent episode of raiding and cannibalism. Further, our review of well-documented cases of disarticulated and modified human remains in the Mesa Verde region points to a sharp increase in cannibalism around A.D. 1150, a time of drought and the collapse of the Chaco system. We propose that, faced with severe environmental stress, food scarcity, and sociopolitical upheaval in the mid A.D. 1100s, certain groups in the Mesa Verde region used violence to terrorize or even eliminate neighboring villages, and that cannibalism was part of this pattern of violence. This apparent outbreak of cannibalism subsided as rapidly as it began. No possible cases of cannibalism postdating A.D. 1200 have been reported in the Mesa Verde region, and few cases have been documented anywhere in the American Southwest after that date.

Numerous cases of cannibalism have been documented over the last 200 years in many different cultures throughout the world (Sagan 1974; White 1992:15–17; cf. Arens 1979). Reasons for the occurrence of this practice range from ancestor worship, starvation, deviant acts by deranged individuals, or political terrorism (see for example Brown and Tuzin 1983; Grayson 1990; Keenleyside et al. 1997). Although cannibalism apparently holds a macabre fascination with a wide segment of contemporary European and North American society—note the amount of media attention garnered by this issue in recent years—the occurrence of cannibalism in the American Southwest prior to European contact is not necessarily an issue of great importance in anthropology. However, the documentation of an outbreak of cannibalism and violence in the Mesa Verde region in the mid A.D. 1100s and the subsequent suppression of that behavior does raise questions of profound anthropological importance. Under what circumstances do groups of individuals turn to terroristic, violent, or genocidal; and under what circumstances do they turn away from it? In this paper we hope to move the debate from the issue of whether or not cannibalism occurred in the prehistoric Southwest to questions of broader anthropological significance.

5MT10010

5MT10010 was excavated as part of the Ute Mountain Ute Irrigated Lands Archaeological Project (UMUILAP) conducted by Soil Systems, Inc. (SSI)

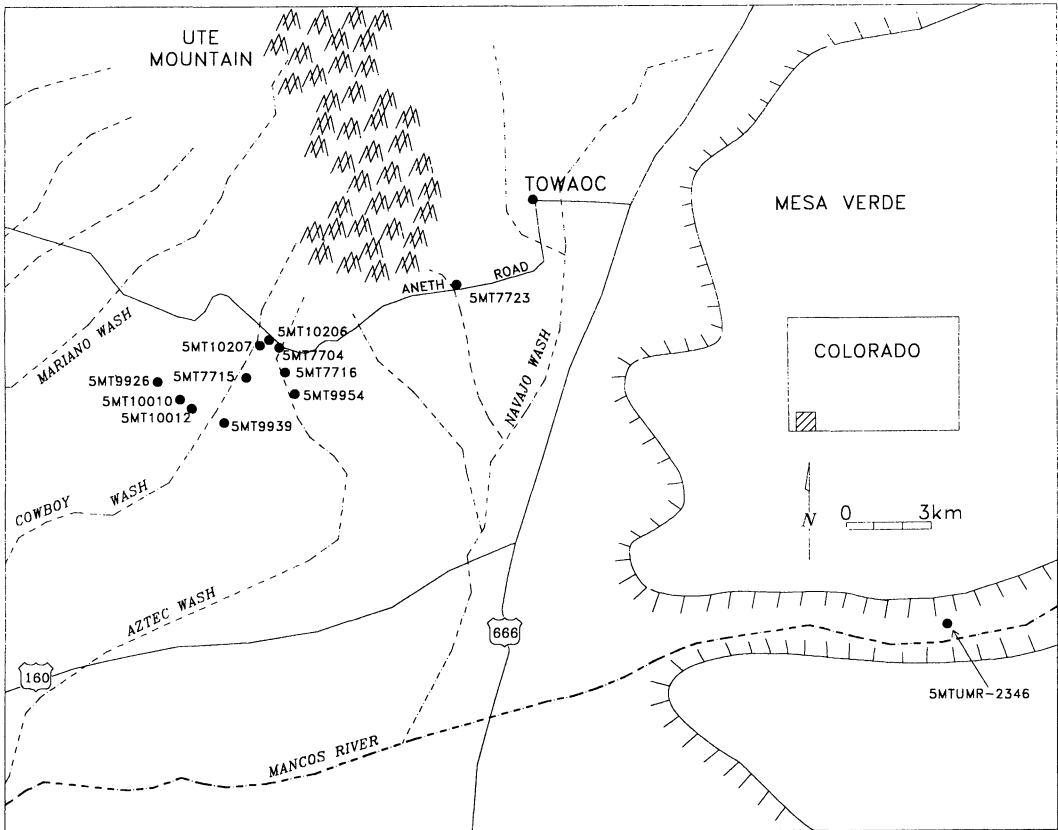


Figure 1. Map showing the location of the Cowboy Wash and 5MT10010.

between 1992 and 1998. Fieldwork involved data recovery at 42 Puebloan sites, 16 Archaic sites, and 5 historic Ute sites to mitigate the impact of the construction of approximately 7,600 acres of irrigated fields on the Ute Mountain Ute Reservation (Billman 1997, 1998, 1999).

5MT10010 was located on the open floodplain of Cowboy Wash at an elevation of 1,654 m (5,428 ft) on the southern piedmont of Ute Mountain (Figure 1). The piedmont extends south from the base of Ute Mountain toward the Mancos and San Juan rivers. The natural vegetation of the piedmont belongs to the Plains and Great Basin grassland biotic community (Brown 1982). Pinyon-juniper woodlands lie just above the piedmont on the lower slopes of Ute Mountain. The southern piedmont was and is a marginal, arid environment. Receiving insufficient rainfall for dryland farming, prehistoric horticulturalists in the project area depended on floodwater irrigation, and therefore were susceptible to frequent droughts and flash floods (Fuller 1988:100–101; Huckleberry and Billman 1998). Several large

washes with broad alluvial floodplains, such as Cowboy and Aztec washes, cross the piedmont and were the focus of prehistoric floodwater irrigation. No permanent streams cross the piedmont, and only a few small springs are present. Consequently, prehistoric inhabitants of the piedmont were largely dependent on intermittent, seasonal flow of washes for farming and domestic needs. At 5MT10010 the nearest natural permanent water source (Cowboy Springs) is located approximately 3 km to the northeast.

Because all of 5MT10010 lay within a proposed agricultural field, the goal of fieldwork was to identify and excavate all structures, features, and human burials at the site. Systematic backhoe trenching was conducted to identify all subterranean structures. Extramural areas were stripped mechanically or by hand to expose all preserved extramural features. After a sample of the middens was excavated by hand, those areas also were systematically stripped to expose all burials and other features. Ultimately, nearly all cultural features identified at the site were completely excavated, except for 11 postholes that probably rep-

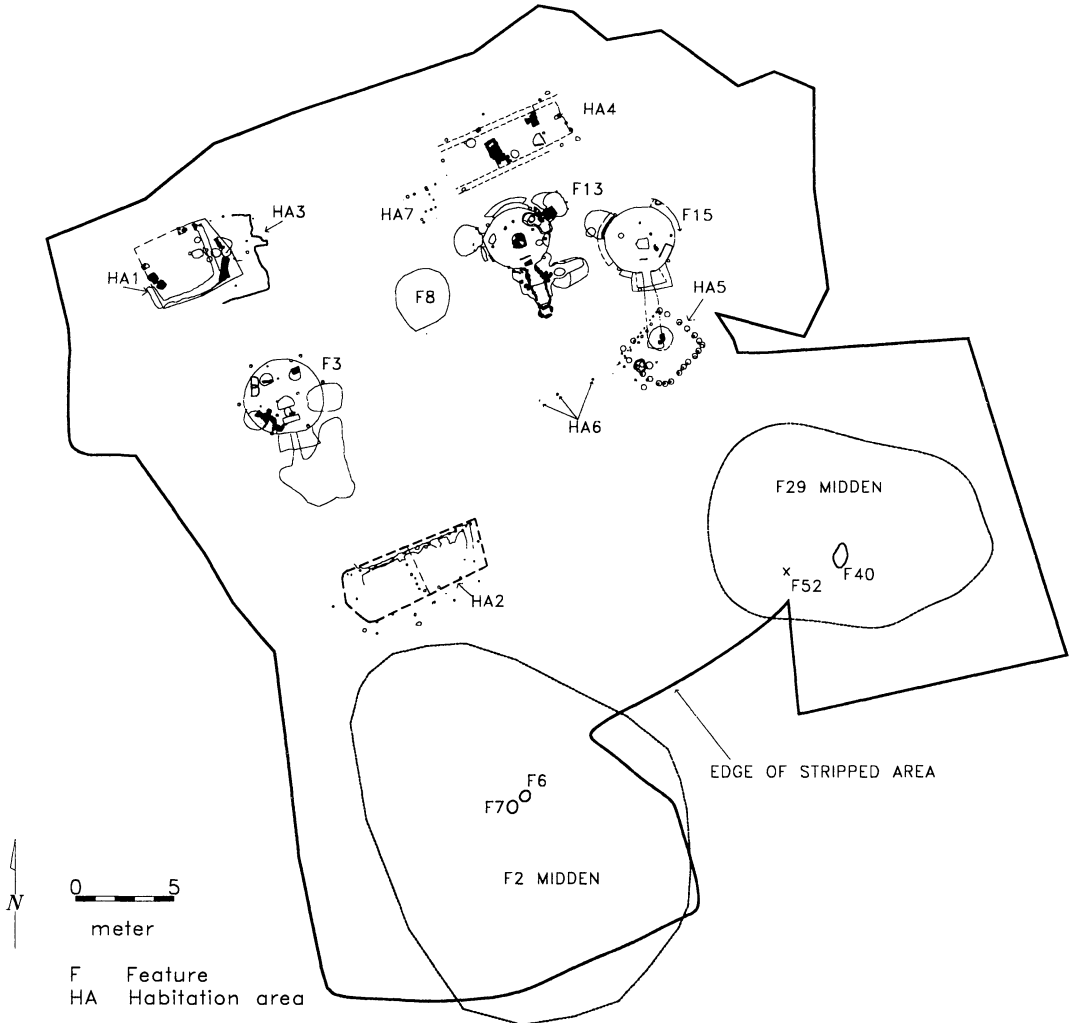


Figure 2. Plan of site 5MT10010.

resented a jacal structure (Habitation Area 7) and 14 small extramural pits (Leonard et al. 2000).

The site was relatively small, measuring approximately 50 m east-west by 60 m north-south (Figure 2). Three residential pithouses (Features 3, 13, and 15) and a nonresidential pitroom (Feature 8) were arranged roughly northeast-southwest. Southeast of the pithouses were the remains of three jacal structures (Habitation Areas 2, 5, and 6). Northwest of the pithouses were the remains of a series of superimposed surface structures. The earliest of those structures were probably jacal (Habitation Areas 3 and 7), and subsequently were replaced by two small masonry roomblocks (Habitation Areas 1 and 4), with a total of at least three rooms and a ramada at

the time of site abandonment. Thirty-six extramural features were distributed among the architectural remains. Two separate midden areas (Features 2 and 29) on the south and southeast site margins contained another six extramural features, including the only formal burials at the site. Five individuals (two adults and three young children) were interred in four separate burial pits (Features 6, 7, 40, and 52).

The three pithouses had several similar architectural features. Each had benches, a southern recess, a ventilation system, and plastered earthen walls with at least some masonry lining around their ventilator openings. Each structure had a slab-lined central hearth and juniper roof-support posts. The presence of domestic artifacts, storage features, and mealing

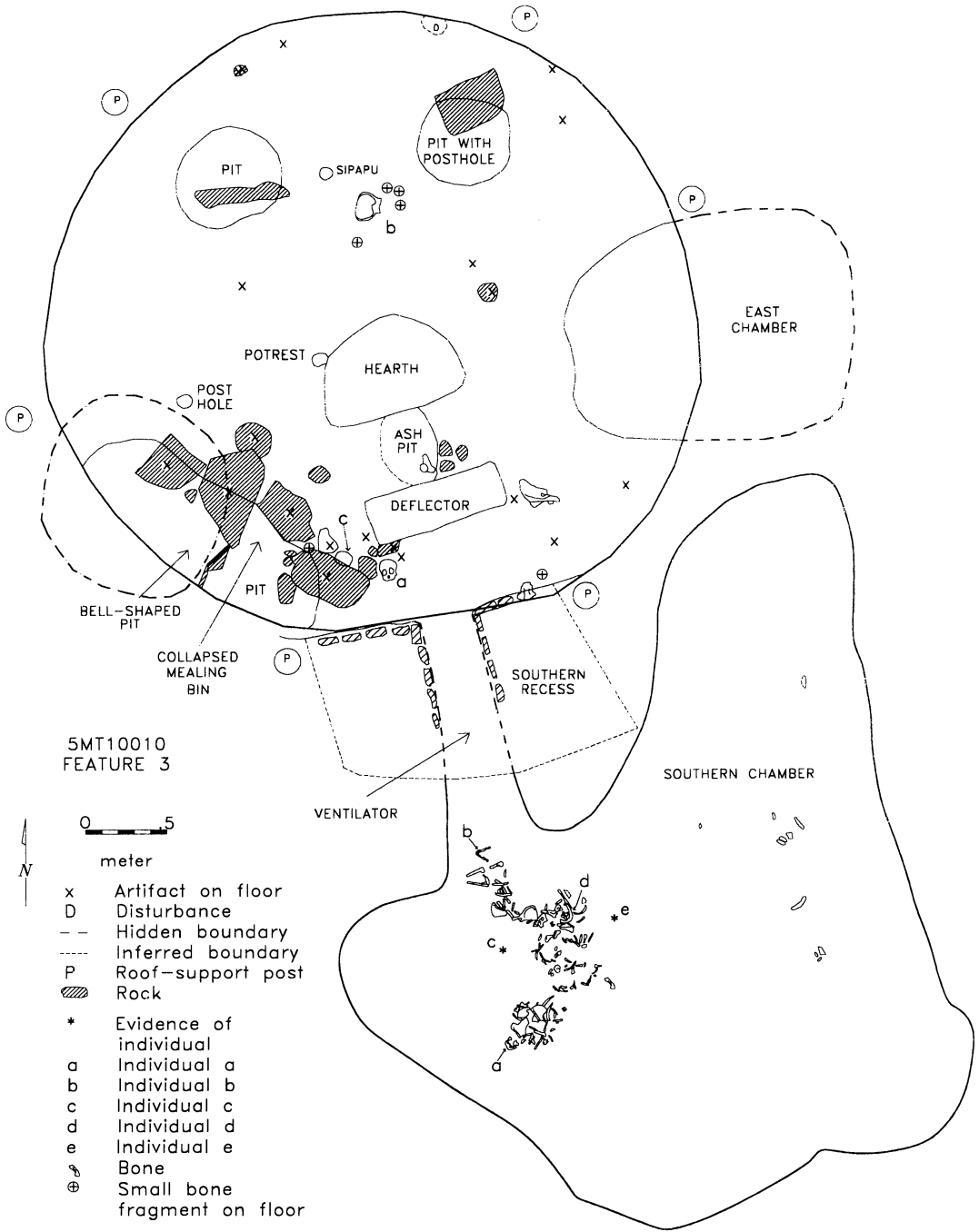


Figure 3. Plan of pithouse Feature 3, 5MT10010.

bins indicate residential use of the pithouses. In contrast, the surface structures contained few interior features; hearths were small, informal constructions; and no mealing bins were identified. Consequently, the surface structures were probably used seasonally

for a narrower range of activities than the residential pithouses. Disarticulated human remains were found only in the residential pithouses (Leonard et al. 2000).

The site was probably a year-round or multiseasonal habitation. The presence of central hearths,

Table 1. Artifacts from Abandonment Contexts, Feature 3, 5MT10010.

Artifact type	Floor and Bench Surfaces	Floor and Subfeature Fill Contexts	Total
Shaped slab vessel lids ^a	4	2	6
Other shaped slabs	3	—	3
Isolated sherds ^b	7	—	7
Sherd stacks	2	—	2
Corrugated jars	—	1	1
Manos	1	5	6
Slab metates	1	—	1
Abrading stones	—	1	1
Hammerstones	4	3	7
Cores and core tools	1	2	3
Stone beads	—	37	37
Bone awls	2	7	9
Ladle handles	1	—	1
Worked sherds	—	1	1
Polishing stones	—	2	2

^a One of the shaped slab vessel lids from the floor was fragmentary. Data are from Leonard et al. (2000).

^b Isolated sherds and unmodified flakes not found in contact with floor, bench, or southern recess surfaces are not included in the data

ventilator systems, and large interior storage features in the pithouses implies occupation during winter and fall. The location of the site adjacent to arable land and the presence of outdoor activity areas are consistent with summer use as well (Gilman 1987; Jewett and Lightfoot 1986; Powell 1983, 1988, 1990; Schlanger and Orcutt 1986).

Pithouse Feature 3

Feature 3 was the largest pithouse at the site, with a floor area of 12.5 m² (Figure 3). The floor features were a hearth with an associated ash pit and pot rest, a masonry deflector, a sipapu, two postholes of unknown function, a bell-shaped floor pit, three other floor pits, and a collapsed mealing bin. Only the sipapu had been filled and sealed prior to abandonment of the structure. The structure had a large chamber in its east wall and an even larger chamber at the south end of the ventilator tunnel. The southern chamber was added during a remodeling episode and was apparently entered from inside the structure only through the ventilator tunnel. The disarticulated remains of five individuals were found in this structure on the floor and in the southern chamber.

Numerous artifacts were left in Feature 3 at abandonment (Table 1). On the floor were four shaped-slab vessel lids, two stacks of sherds, and a bone awl (Figure 3). A collapsed mealing bin on the floor contained three shaped slabs, a metate, a two-hand mano, four hammerstones, and a core tool. The east chamber had a trash deposit associated with the final use of the structure that contained 46 sherds from a sin-

gle corrugated vessel, 4 two-hand manos, 2 bone awls, 2 hammerstones, 1 polishing stone, charred plant remains, sherds, and pieces of debitage. A ladle handle and a bone awl were found on the only intact segment of bench. The floor fill (defined as the fill 0 to 10 cm above the floor) was deposited before the roof collapsed and consisted of alluvial sediments and sections of collapsed benches and southern recess. Consequently, many artifacts found in the floor fill were probably originally located on the benches and southern recess. Artifacts recovered from the floor fill included two core tools, two shaped-slab vessel lids, four bone awls, an abrading stone, a worked sherd, lithic debitage, and unmodified sherds. Another bone awl, a polishing stone, a hammerstone, and a two-hand mano were recovered from floor pits that were open at abandonment.

The assemblage of tools and vessels from final abandonment contexts (the floor, benches, floor fill, and interior features open at abandonment) appears to represent ongoing and routine domestic activities. The only nonutilitarian artifacts in Feature 3 were 37 polished stone beads, which were found in a tight cluster in the floor fill within 1 cm of the floor. The beads were located near a cluster of human cranial fragments and an atlas vertebra, and may have been from a necklace associated with that individual.

Pithouse Feature 13

Feature 13 was the smallest pithouse at the site, with a floor area of 8.6 m² (Figure 4). The floor features were a shaped-slab deflector, a central hearth with

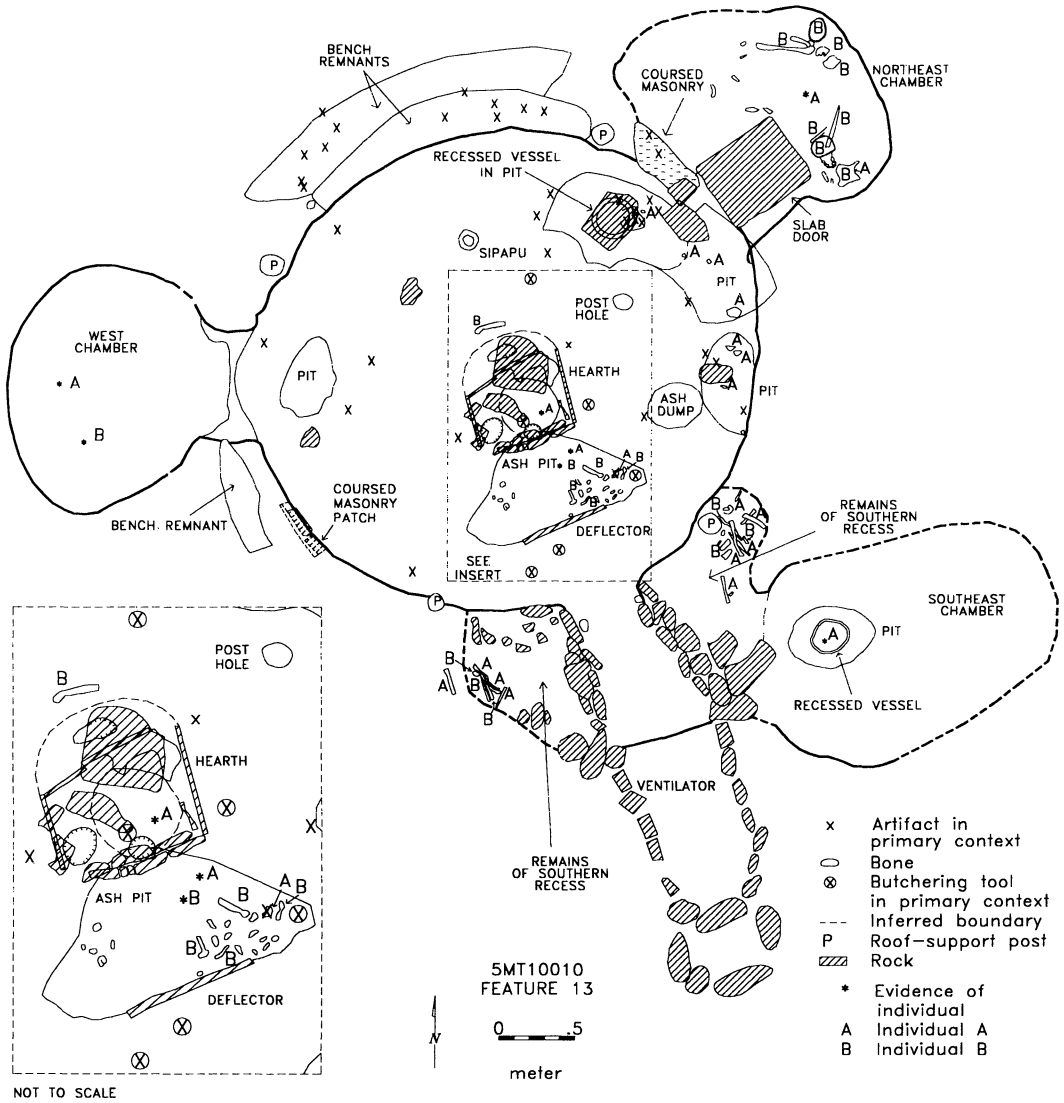


Figure 4. Plan of pithouse Feature 13, 5MT10010.

an associated ash pit, a sipapu, a recessed vessel, a posthole, and two unburned pits. The sipapu, the recessed vessel, and one of the unburned pits had been refilled and sealed during one or more remodeling events and were not in use when the structure was abandoned. Two ash deposits on the floor were associated with the last use of the hearth. One deposit overflowed the ash pit and was banked up against the deflector. The other, smaller deposit was located on the floor southeast of the hearth (see ash dump in Figure 4).

Feature 13 evidently had upper and lower benches that were well preserved only on the north wall. A

sealed niche was present in the north wall below the benches. In addition, two side chambers were located in the west and northeast walls. The northeast chamber opening had been partly closed off with a section of masonry, and a shaped-slab door was found lying in the entryway. A third side chamber was accessed through an opening in the east side of the southern recess and had a recessed vessel set into its floor. The remains of at least two individuals were found in Feature 13.

In Feature 13, 38 artifacts were found in the hearth and ash dumps and on the floor, southern recess, and bench surfaces. Excluding nonrefitting, unmodified

Table 2. Artifacts from Abandonment Contexts, Feature 13, 5MT10010.

Artifact type ^d	Primary Contexts				Naturally Redeposited Contexts					Total
	Floor, Hearth, Ash Dumps	Bench and S. Recess	Masonry Shelf ^a	Total	Floor Fill	Slumped from Bench, S. Recess	W. Chamber Fill ^b	S.E. Chamber Floor ^c	Ventilator	
Vessel lids ^e	1	—	—	1	—	—	1	—	—	1
Shaped slabs	1	—	—	1	—	3	—	—	—	3
B/w bowls	1	—	—	1	—	2	—	—	—	2
B/w ladles	2	—	—	2	—	—	—	—	—	0
Pukis	2	—	—	2	—	—	—	1	—	1
Manos ^c	1	—	—	1	2	3	1	—	—	6
Palette	1	—	—	1	—	—	—	—	—	0
Hammerstone	—	—	—	0	—	1	—	—	—	1
Choppers	2	—	—	2	—	—	—	—	—	0
Cores	4	2	—	6	—	1	1	1	—	3
Core tools	1	3	—	4	—	—	—	2	—	2
Unmod. flakes	3	7	—	10	—	—	—	—	—	—
Ret. flakes	—	—	—	0	—	—	—	3	—	3
Axes	2	—	—	2	—	—	—	—	—	0
Tchamahias	—	1	—	1	—	2	—	1	—	3
Sandal last	1	—	—	1	—	—	—	—	—	0
Ornaments ^f	—	1	—	1	—	1	—	—	—	1
Bone awls	2	—	2	4	1	3	3	2	—	9
Worked bone ^g	—	—	—	0	—	2	—	—	1	3

^aMasonry shelf refers to the top surface of a masonry wall section that partly closed the northeast chamber entry.

^bThe artifacts from the west chamber apparently were transported by natural, postabandonment erosion from the structure floor into the chamber.

^cBecause of poor preservation of the southeast chamber floor, it could not be determined whether artifacts from that context were in direct floor contact. Therefore, they were not included in the primary context category.

^dIsolated sherds and unmodified flakes not found in contact with the floor, bench, or southern recess surfaces are not included. The two recessed vessels in Feature 13 are not included. Data are from Leonard et al. (2000).

^eThe vessel lid from the west chamber and one mano from the floor fill were fragmentary. All other groundstone and shaped slab artifacts were intact.

^fThe ornaments were a polished quartzite bead found on the lower northern bench surface and a polished quartzite pendant found among the slumped remnants of the eastern bench or benches.

^gThe worked bone artifact from the ventilator was a unusually large flesher or spatula encountered at the south end of the tunnel directly below the shaft.

sherds and lithic debitage, 40 artifacts were recovered from floor fill and other contexts associated with abandonment (Figure 4; Table 2). Both the quantity and diversity of tools were greater than in Feature 3 (compare Tables 1 and 2). More finely worked and seemingly valuable items, including tchamahias¹, a sandal last, and two ornaments, were present. The combination of ceramic forms (three bowls, two ladles, and three pukis²) and the notable absence of jars and larger containers are unusual. Of particular interest are seven artifacts (a large chopper, three flakes, two ground axes, and a chopper-like cobble tool) that may have constituted a tool kit for processing human remains. The large chopper and two flakes were located south of the deflector, and the other flake, the ground axes (one with a battered bit), and the cobble tool were near the hearth.

All seven artifacts were located on the floor or atop ash deposits.

Blood residue analysis was conducted on six of the artifacts in the possible tool kit (one flake was not tested) and eight other artifacts from the floor (four sherds from broken vessels and ladles and four cores) (Newman 1996). One axe and one of the cores tested positive for rabbit blood. The two flakes—the only sharp cutting tools tested—both tested positive for human blood.

Pithouse Feature 15

Feature 15 was intermediate in size to the other pithouses, with a floor area of 10.1 m² (Figure 5). The floor features were the central hearth, a shaped-slab deflector, a sipapu, a slab-lined mealing bin, and a recessed vessel. A single side chamber, which had been

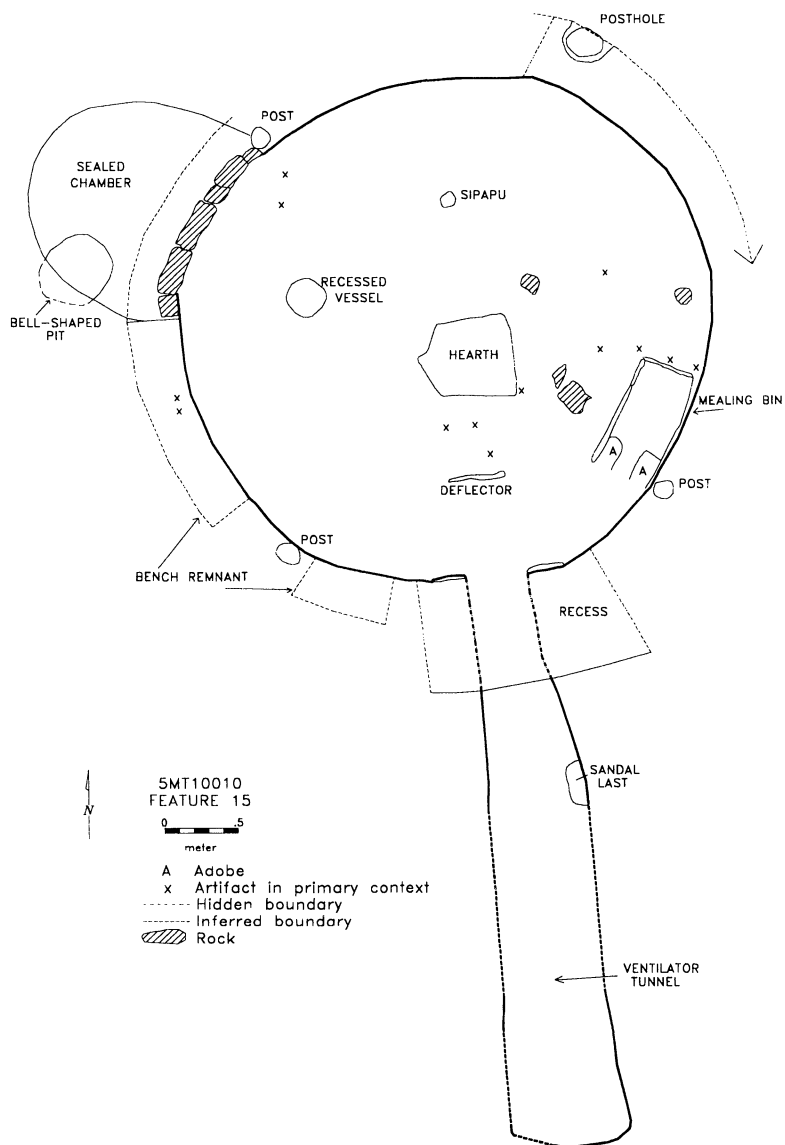


Figure 5. Plan of pithouse Feature 15, SMT10010.

filled and sealed during a remodeling episode, was present in the northeast wall. Inside the chamber was a bell-shaped pit. In contrast to Features 3 and 13, only two human bone fragments were found in Feature 15.

Several artifacts were left on the floor and benches of Feature 15 at the time of abandonment (Figure 5; Table 3). Artifacts on the floor included two heavily burned sandstone slab fragments that may have been used as vessel props in the hearth, a large worked sherd, half of a shaped-slab vessel cover, and a polishing stone. Also, the sherds of a single corrugated cooking jar were found scattered over the floor and in

the opening of the ventilator tunnel. The distribution of these sherds suggests that the vessel was broken and its sherds scattered very near to the time of abandonment (Leonard et al. 2000). A mealing bin made of three shaped slabs was located in the southeast part of the floor and was intact except that its metates had been removed; however, two metates were recovered from elsewhere in the structure. Three tools (a battered maul and two cores that had been used as pecking stones) lay on the floor along the northeast edge of the bin. A maul also was recovered from inside the bin, and another core tool was recovered from the upper

Table 3. Artifacts from Abandonment Contexts, Feature 15, 5MT10010.

Artifact type ^a	Floor, Hearth, Mealing Bin	Floor Fill	Bench Surfaces	Slumped from Benches	Ventilator Tunnel ^b	Other ^c	Total
Shaped slab lids ^d	1	—	—	1	—	1	3
Other shaped slabs	4	1	—	—	—	—	5
Vessel props	2	—	—	—	—	—	2
Isolated sherds	1 ^e	1 ^f	—	—	—	—	2
Cooking pot ^g	—	—	—	—	—	1	1
Manos	—	1	—	—	—	—	1
Metates	1	—	—	1	—	—	2
Pecking stones	2	—	—	—	—	—	2
Other core tools	1	—	—	—	—	—	1
Flakes	—	—	2	—	—	—	2
Mauls	2	1	—	—	1	—	4
Polishing stones	1	—	—	—	—	—	1
Tchamahias	—	1	—	1	—	—	2
Sandal lasts	—	—	—	—	1	—	1
Polished jet ring	—	—	—	1	—	—	1
Bone ornaments ^h	—	—	—	3	2	3	8
Bone awls	—	1	—	—	—	1	2

^a Unmodified flakes not found in contact with floor or bench surfaces are not included. The recessed vessel in the floor pit is not included. Data are from Leonard et al. (2000).

^b From the ventilator tunnel, the maul and sandal last were found in primary context; the bone ornaments were found in naturally redeposited contexts.

^c The bone ornaments in the "Other" column may have been originally located either on the floor, the southern recess, or the benches. In the "Other" column, the bone awl and shaped slab vessel lid were found whole in a floor pit that contained a recessed vessel (see text).

^d The shaped slab lid from the floor and the lid slumped from the benches were fragmentary.

^e One of the isolated sherds from the floor had a worked edge, indicating reuse as a tool.

^f Three refitting sherds from a Black-on-white jar that each bore red ochre pigment were counted as one sherd, from the floor fill.

^g The cooking pot was represented by refitting sherds found on the floor, in the floor fill, in the fill of the ventilator tunnel and in the fill of the floor pit containing the recessed vessel.

^h Seven bone ornaments were polished ornamental tubes. Six tubes were turkey bone. One tube from the ventilator tunnel was eagle bone. One bone ornament slumped from the bench was a turkey bone pendant.

fill of the hearth. Thus, tool kits consistent with such activities as mealing, metate maintenance, cooking, and the shaping of unfired vessels were represented. A shaped-slab door for the ventilator was left standing in place when the structure was abandoned. Domestic artifacts recovered from other abandonment contexts included a shaped slab vessel lid, a mano, a bone awl, two other mauls, and a sherd with red ochre residue. Although most artifacts in Feature 15 appeared to represent routine domestic activities, the assemblage also contained intact items of apparent high value (two tchamahias, a large sandal last, a polished jet ring, a turkey bone pendant, six ornamental turkey bone tubes, and one eagle bone tube).

A particularly unusual find encountered in the hearth of Feature 15 was a human coprolite of 30 gm dry weight. The coprolite was found intact in an *in situ* ash deposit formed by the last use of the hearth and therefore is unlikely to have been redeposited into the hearth by natural processes. It was probably either placed in the hearth or deposited directly by a

person. The coprolite was completely unburned and therefore was deposited after the fire had extinguished. This act of defecation into the hearth apparently accompanied the abandonment of the pithouse.

The recovery of a human coprolite from a pithouse hearth, especially a whole, unburned specimen, is rare, perhaps unheard of in the American Southwest (Karl Reinhard, personal communication 1997). The central hearth of pithouse Feature 15 was the center of domestic activity for one of the families occupying the site. Defecating into that hearth undoubtedly was an act of contempt for the residents of the dwelling.

Analysis of Botanical Remains

Botanical remains recovered from 5MT10010 revealed that the site was abandoned during a period of low agricultural productivity. Flotation samples collected from 5MT10010 had the lowest ubiquity of cultigens and the highest diversity of wild plant foods of any of the 17 Puebloan habitation sites at which full data recovery occurred during the

Table 4. Macrobotanical Remains from Flotation Samples Collected from Primary Abandonment Contexts, Features 3, 13, and 15, 5MT10010.

Taxon ^a	Feature 3				Feature 13				Feature 15
	Floor ^b	Hearth	Floor Pit	E. Chamber	Puki Fill ^c	Hearth	Ash Pit	Ash Dump ^d	Hearth
Maize	+	-	-	-	+	-	+	-	+
Squash	+	-	-	+	-	-	-	-	-
Juniper	+	+	+	-	+	-	+	+	+
Cottonwood/Willow	+	-	-	-	+	-	-	-	+
Ash	-	-	-	-	-	-	+	-	-
Yucca	+	-	-	-	-	-	-	-	-
Rabbitbrush	+	-	-	-	-	-	-	-	-
Sagebrush	+	-	-	-	+	-	-	-	-
Saltbush	+	-	-	-	+	-	-	+	-
Prickly pear	-	+	-	-	-	-	-	-	-
Stickleleaf	-	-	-	+	-	-	-	-	-
Winged pigweed	-	-	-	-	-	-	-	-	+
Summer cypress	-	-	-	-	-	-	+	-	-
Squawbush	-	-	-	-	-	-	-	-	+
Cliffrose	-	-	-	-	-	-	-	-	+
Ricegrass	+	-	-	-	-	+	-	-	+
Serviceberry	-	+	-	-	-	-	-	-	+
Bugseed	-	+	-	+	-	+	+	-	+
Tansy mustard	-	+	-	+	-	-	+	+	+
Peppergrass	-	-	-	+	-	-	-	-	-
Bladderpod	-	-	-	+	-	-	-	-	-
Globemallow	-	-	-	+	-	-	-	-	+
Dropseed grass	-	-	-	+	-	-	-	-	+
Ind. ^e Goosefoot	-	+	-	-	+	-	+	-	-
Ind. ^e Cacti	-	-	-	+	-	+	+	+	+
Ind. ^e Chenop-Am	+	+	-	+	-	+	-	+	+
Ind. ^e Grasses	+	-	-	-	-	-	-	-	-
Ind. ^e Borage	-	-	-	-	-	-	-	-	+

^a Presence or absence of macroscopic remains of taxa are indicated

^b The column for floor context in Feature 3 combines the contents of two separate flotation samples collected from different parts of the floor

^c The puki fill sample was collected from a puki located on the floor of Feature 13

^d The ash dump sample from Feature 13 included the entire contents of a pile of ash located directly on the structure floor;

^e Ind. = Indeterminate. Data are from Hansen (1998). See also Leonard et al. (2000) for contextual data.

UMUILAP (Hansen 1999). Further, the botanical assemblages from abandonment contexts in the three pithouses (Features 3, 13, and 15) had the greatest diversity of wild foods and the lowest ubiquity of cultigens of any contexts investigated at 5MT10010 (Hansen 1999). Excluding botanical remains that represented fuel or building materials, flotation samples from five abandonment contexts in Feature 3 collectively yielded remains from 18 taxa, at least 12 of which were wild or weedy food plants (Table 4). The only cultigens were unburned squash seeds and a single, charred maize cupule (Hansen 1999). Flotation samples from four abandonment contexts in Feature 13 collectively yielded remains from 13 taxa, of which 6 were wild or weedy food plants (Table 4). The only remains of cultigens were two maize glume fragments from the fill of a puki on the floor and a

single, charred maize cupule from the ash dump south of the hearth (Hansen 1999). Apart from roofing material, few macrobotanical remains were recovered from Feature 15 (Table 4). However, a flotation sample from the last use-context of the hearth contained remains of 15 taxa, including at least six taxa of wild or weedy food plants. Two charred maize cupules were the only remains of cultigens. Seeds from Chenop-am, tansy mustard, and winged pigweed were the most abundant plant food types from Feature 15. Those taxa would have been available for gathering during spring and were the plants most likely to have been cooked in the hearth during its last use (Hansen 1999).

These macrobotanical remains indicate that the site residents had little access to cultigens just prior to abandonment of the site and were most likely con-

fronting food scarcity. The diversity of wild and weedy food taxa implies that the residents had resorted to gathering emergency food sources in the final days of occupation. The combination of taxa represented in the assemblage suggests that the gathering occurred during early spring (Hansen 1999), which would have been a time of relative food scarcity even under normal conditions.

Supporting the pattern seen in the flotation data, pollen data collected at 5MT10010 revealed a low incidence of maize pollen in pithouse samples (Smith 1999). Samples from elsewhere on the site had a low average number of economic taxa, but the highest ubiquity of Cheno-am pollen for any site studied during the course of the project. These data also imply that the site residents were confronting food shortages (Smith 1999).

Brandt (1993) noted similar characteristics in the flotation assemblages from three nearby sites (5MT7704, 5MT10206, and 5MT10207) that also contained disarticulated human remains and that were abandoned during the same time period as 5MT10010. The assemblages from 5MT10206 and 5MT10207 in particular resembled the abandonment context assemblages at 5MT10010 by having low frequencies of cultigens, high ubiquities and diversities of wild and weedy taxa, and combinations of taxa that suggested late winter or early spring gathering. Similarly, analysis of pollen samples from those three sites yielded high to extremely high Cheno-am frequencies and low to absent corn pollen frequencies (Scott-Cummings 1993).

Date, Occupational History, and Duration of Occupation

The ceramic assemblage recovered from 5MT10010, which consisted of more than 8,600 sherds, dates to between A.D. 1125 and 1175 (Errickson 1998). Unfortunately, none of 14 dateable tree-ring samples collected at 5MT10010 produced cutting dates. The noncutting dates range from A.D. 925 to A.D. 1114 (Leonard et al. 2000). Two sites (5MT10206 and 5MT7704), located within a few kilometers of 5MT10010, had similar ceramic assemblages and yielded numerous tree-ring cutting dates. Those dates point to the founding of those two sites around A.D. 1130 with occupation through A.D. 1147 (Errickson 1993:327–328). Based on similarities in the ceramic assemblages, 5MT10010 also probably dates to that time frame (Errickson 1998:26–28).

The three pithouses at 5MT10010 probably were not constructed at the same time. Feature 3 evidenced much more extensive remodeling than Feature 13 and 15, which indicates a longer period of use. Further, the ventilator shaft of Feature 15 cut through a one-room jacal structure (Habitation Area 5). Consequently, Feature 3 was probably constructed first, and Features 13 and 15 added later. Although the three pithouses at 5MT10010 probably were not constructed at the same time, it is clear that all three were occupied right up until site abandonment (Leonard et al. 2000). All three pithouses refilled with naturally deposited sediments, and no trash deposits were present in the fill. Pithouses in the project area and elsewhere in the northern Southwest that were abandoned while the site was still occupied typically were refilled with trash deposits, or the structure depressions were reused as activity areas (Billman 1999; Schlanger 1985, 1986, 1987; Wills and Windes 1989; Wilshusen 1988). The similar mode of abandonment—roofs left intact and numerous valuable artifacts left in the structure—also points to simultaneous rather than sequential abandonment.

The duration of occupation of 5MT10010 was estimated from pithouse remodeling. Based on tree-ring, archaeomagnetic, and ceramic data from 25 pithouses excavated during the Dolores Archaeological Project, Schlanger (1985, 1986:507) found that the maximum use life of pithouses was 30 years. Given that no residential pithouses were abandoned during the occupation of the site, and that only minor to moderate remodeling of the pithouses occurred, the maximum length of occupation of the site was probably significantly less than 30 years, perhaps between 10 and 20 years. Such an occupational span is consistent with the presence at the site of two well-developed midden deposits containing tens of thousands of sherds.

The presence of three contemporary residential pithouses indicates an occupation of the site by three households. Based on ethnographic and archaeological evidence of household size among native people in the northern Southwest, each household probably consisted of approximately five people (Birkedal 1976; Schlanger 1985, 1986:507), for a total site population near the time of abandonment of approximately 15 individuals.

Mode of Abandonment

Analysis of the condition of roofs, artifact assem-

blages, human waste, and human remains associated with the three pithouses at 5MT10010 revealed that the pithouses were abandoned in a highly unusual fashion. Large quantities of artifacts were left in the structures, including manos, metates, ceramic vessels, and numerous valuable and highly portable ornaments. The recovery of whole pieces of ground stone from prehistoric structures on the piedmont is extremely rare, probably because they were scavenged from structures at or after abandonment. However, at 5MT10010, a total of 11 whole manos and 3 whole metates was recovered from abandonment contexts in three pithouses. Similarly, ornaments were rare finds during the UMUILAP. Investigations at 42 Puebloan sites yielded only 149 stone ornaments (Ellis 1998). Although the project involved excavation of 105 structures and 17 middens at 17 Puebloan habitation sites, nearly half of the stone ornaments recovered during the project were found at 5MT10010. Altogether, 72 stone ornaments were found at the site. Also in the three pithouses at 5MT10010 were 1 palette, 6 tchamahias, 6 axes or mauls, 2 sandal lasts, 8 bone ornaments, 24 bone awls, and more than 10 shaped slab vessel lids. The vast majority of the tools and ornaments left in the pithouses were whole and still useable.

Building stones and finely shaped stone slabs also were not removed from the 5MT10100 pithouses at or just after abandonment, despite the scarcity and value of these building materials in the Cowboy Wash area. The roofs of all three pithouses also clearly were left intact at abandonment. The largest pithouse (Feature 3) had six main roof-support posts; the other pithouses had four each. Segments of all but one of these 14 posts were found *in situ*. One still stood over 2 m tall, and the other *in situ* posts were still intact below bench level. Although some posts had sooted surfaces, none of the posts was burned, and no burned posts or beams were found in the roof-fall stratum in the fill. Finally, in all three pithouses, the roof-fall stratum was separated from the floors or benches by a layer of alluvium and wall-fall, indicating that the roofs had decayed gradually after abandonment (Leonard et al. 2000).

The three pithouses at 5MT10010 differ radically from the patterns of abandonment observed at other structures excavated in the project area. During the UMUILAP, 36 pithouses or kivas, 37 pitrooms, 30 surface structures containing 68 rooms, and 2 towers were excavated at 17 Puebloan habitation sites.

This data set provides detailed information about modes of abandonment in the project area for the time period from late Basketmaker III to late Pueblo III (Billman 1999). The typical pattern of structure abandonment involved removal of virtually all artifacts and materials of value. Manos, metates, ornaments, and unrecused whole vessels rarely were left behind. Structural wood and stone, especially shaped slabs, were routinely scavenged for reuse. In cases where roofing materials were not stripped, the roof was typically set ablaze after useable artifacts had been removed from the structure. Other than 5MT10010, the only clear exception to this pattern was one catastrophically burned, late Pueblo III pithouse that contained a large and diverse floor artifact assemblage. The skeleton of a female adult with evidence of perimortem head trauma also was found on the floor of that structure. However, unlike the remains at 5MT10010, the skeleton was fully articulated and showed no evidence of butchery or heat alteration. In sum, the mode of abandonment of 5MT10010 was distinct from all the pithouses or kivas that were excavated during the UMUILAP. Analysis of abandonment assemblages and roof conditions strongly indicate that the site was abandoned suddenly in a catastrophic fashion.

Description of the Disarticulated Human Remains from 5MT10010

The broken and disarticulated remains from a minimum of seven individuals were recovered from non-burial contexts in two of the three pithouses (Table 5). These individuals were two adult males, one probable adult male, one adult female, two adolescents, and one child. All showed extensive signs of perimortem trauma. In contrast to pithouse Features 3 and 13, only two fragments of human bone were recovered from pithouse Feature 15. Five other individuals—two adults and three young children—were recovered from inhumations located in the middens (Lambert 1999; Leonard et al. 2000).

Pithouse Feature 3 Assemblage

Approximately 1,150 elements and fragments (1 cm+) from a minimum of five individuals were recovered from the Feature 3 pithouse. Hundreds of additional smaller chips, slivers, and fragments were recovered from screenings and flotation samples, but these were excluded from further analysis because many had broken from larger fragments after depo-

Table 5. Individuals Identified at 5MT10010.

Midden Interments			
Feature	Burial/Individual	Age (yrs)	Sex
6	38-1	3.5 +/- 1	?
7	39-1	53 +/- 10	Female
7	39-1.01	2.5 +/- 1.5	?
40	240-1	44 +/- 5	Male
52	259-1	<5	?
Individuals from Pithouses 3 and 13			
Feature	Burial/Individual	Age (yrs)	Sex
3	a	11 +/- 2.5	?
3	b	36 +/- 5	Male?
3	c	>40	Male
3	d	>40	Male
3	e	Adult	Female
13	A	7.5 +/- 2	?
13	B	14 +/- 3	?

sition and few could provide meaningful information that could not be obtained from larger fragments. Approximately 50 percent by count of the 1,150-piece assemblage was composed of pieces of shattered long-bone shafts and other fragments that could not readily be identified to a specific skeletal element. Extensive breakage and mixing made the reconstruction of individuals difficult, and only one individual was reassembled to any degree of completeness. The minimum number of individuals was determined from the most common skeletal element (scapula), and more specific clues to the identity of these individuals were gleaned from metric and nonmetric characteristics of cranial bones, teeth, and long bones. Unique age characteristics enabled the reconstruction of an 11-year-old adolescent.

Of the pieces 1 cm or greater in size, 96 percent of the skeletal material by count was found in a pile located beneath the opening of the vent shaft in the southern chamber. The pile was 5 to 30 cm high, and its highest point was directly under the shaft opening (Figure 3). The pile lay on top of a layer of trash that was deposited well before abandonment. The trash covered the floor of the southern chamber and the south end of the ventilator tunnel. Evidently, the bone in this pile was dumped down the ventilator shaft from the ground surface at the time of site abandonment. The remains resembled refuse from animal foods consumed by the Cowboy Wash inhabitants. Almost all bones were broken, and fracture patterns indicated that the bodies had been processed while the bones were fresh. Evidence for perimortem processing included numerous spiral and other smooth-

edged fractures—breakage patterns that only occur while bone retains the organic components that give it plasticity (Turner and Turner 1995; White 1992). Aside from some superficial root damage, bone preservation was excellent. Bedded silts with low artifact densities that were deposited gradually and naturally after abandonment overlay the bone pile.

Although a minimum of three adults and one adolescent (Individual a) were identified from seven relatively complete scapulae found in this bone pile (three matched pairs and one left bone), various other bones provided evidence that a minimum of five individuals were represented in the southern chamber. Three mandibles documented the presence of an eleven-year-old adolescent (Individual a), a probable adult male (Individual b), and an adult male (Individual d). Three sets of relatively complete arm bones also derived from two adults and one adolescent. One fused pair yielded measurements consistent with a female sex attribution and was therefore determined to belong to an adult female (Individual e). The second set of humeri were arthritic, produced measurements more consistent with a male sex attribution, and probably derived from either Individual c or d. Other bones represented in this collection included two left parietal fragments from a > 40-year-old male (Individual c), a left temporal/occipital bone from a different > 40-year-old male that matched the Individual d mandible, a few additional cranial fragments and teeth, vertebrae, ribs, clavicles, innominates, adolescent leg bones, hand and foot bones, and 533 miscellaneous fragments. Notably, only 19 relatively small fragments of adult leg bones were present in the Feature 3 assemblage. The cortical bone that composes the shafts of adult femurs and tibiae is thick and dense, and can be readily attributed to these bones in most cases even when fragments are small, so this low count is not a product of the extreme fragmentation of the Feature 3 assemblage. Rather, adult leg bones were simply missing from the assemblage.

Only 4 percent of the skeletal assemblage by count was recovered from the floor of the pithouse. Bones were concentrated in the south part of the structure, and most lay directly on the floor or on objects that lay on the floor. Included in this material were cranial elements from three distinct individuals (a, b, and c). Through matching and refitting, these cranial remains were linked to individuals found in the bone pile in the southern chamber (Figure 3). The face of an 11-year-old adolescent found

Table 6. Characteristics of Identified Portion of the Feature 3 Pithouse Assemblage.

Skeletal elements	MNE	NISP	MNI	ENE	PMB	W	CU	CH	PER	BU
Cranium	4	21	4	80.0	100.0	0	0	0	25.0	25.0
Mandible	3	4	3	60.0	33.3	66.7	0	0	0	0
Cervical Vertebra	12	12	3	34.3	100.0	33.3	0	0	0	0
Thoracic Vertebra	21	21	3	35.0	100.0	0	9.5	19.0	9.5	0
Lumbar Vertebra	11	11	2	44.0	100.0	0	0	0	0	0
Misc. Vertebra	—	29	—	—	—	—	0	0	0	0
Sacrum	1	12	1	20.0	100.0	0	0	0	0	0
Sternum	0	0	0	0	—	—	—	—	—	—
Rib	61	227	4	50.8	100.0	0	18.0	3.3	0	3.3
Clavicle	4	7	2	40.0	100.0	0	50.0	0	0	0
Scapula	9	13	5	90.0	66.7	55.6	11.1	0	0	0
Humerus	6	25	3	60.0	100.0	0	66.7	0	33.3	0
Radius	6	16	3	60.0	100.0	0	16.7	0	0	0
Ulna	6	12	3	60.0	100.0	0	16.7	0	33.3	16.7
Carpal	9	9	1	11.3	0	100.0	0	0	0	0
Metacarpal	18	18	3	36.0	16.7	83.0	0	0	0	0
Hand Phalange	60	60	3	42.9	10.0	90.0	0	0	0	0
Os Coxa	4	11	2	40.0	100.0	0	25.0	0	25.0	25.0
Femur	3	12	2	30.0	100.0	0	66.7	0	66.7	0
Patella	1	1	1	10.0	100.0	0	0	0	0	0
Tibia	4	17	2	40.0	100.0	0	0	0	0	0
Fibula	4	7	2	40.0	75.0	0	0	0	0	0
Tarsal	11	11	2	15.7	45.5	36.0	0	0	0	0
Metatarsal	13	13	3	26.0	76.9	23.0	0	0	0	0
Foot Phalange	16	16	2	11.4	6.3	93.8	0	0	0	0
Total	287	(585)	5	32.2	62.4	38.7	8.7	2.1	3.5	1.7

Key: MNE = min. no. elements; NISP = no. individual specimens composing MNE; MNI = min. no. individuals; ENE = % of expected no. of elements (based on MNI of 5); PMB = % elements with perimortem breaks (spiral, hinge, and conchoidal fracturing, crushing, peeling); W = % whole bones (> 90% complete and unbroken); CU = % elements with cut marks; CH = % elements with chop marks; PER = % elements with discrete percussion pits or striae; BU = % elements burned.

on the floor was matched to an adolescent mandible and post-cranial bones from the southern chamber (Individual a). A probable male cranial vault was matched to temporal bones and a mandible from the southern chamber (Individual b). A frontal bone fragment from a > 40-year-old male (Individual c) conjoined with two left parietal fragments from the southern chamber. These cases indicate that the materials found on the floor and in the bone pile in the southern chamber were deposited at the same time and were derived from the same individuals.

Other remains recovered from the main floor included a permanent canine tooth, a burned male innominate fragment, an atlas vertebra, a lumbar vertebra, two fragments of sacrum, a left and right scapula from two different individuals, and some miscellaneous fragments. The context of several of these bones was notable. The atlas vertebra was associated with a cluster of cranial fragments from Individual b, suggesting that this adult male was decapitated while some soft tissue was still present. Particularly intriguing, however, was the symmetri-

cal location of the scapulae to the east and west of the deflector, as if deliberately placed there. It is unlikely that the only two scapulae in this small assemblage (N = 44) came to rest in such a position by chance. Rather, their placement suggests intentionality that could be construed as ritual in nature. If so, this is the only obvious evidence for ritualized behavior involving the placement of mutilated body parts at 5MT10010.

Evidence for human processing activities was common in remains from Feature 3 (Table 6). Most of the reconstructed long bones appear to have been snapped at the proximal and distal ends of the shafts, with the apparent purpose of size reduction and possibly marrow extraction (Figure 6). This breakage pattern is not unique to the 5MT10010 assemblage. Turner and Morris (1970:325) noted that the proximal and distal ends of long bones at Polacca Wash were consistently broken off. The pattern of reduction at 5MT10010 differs in that the long bones appear to have been broken into relatively equal portions. Most other bones also were broken.



Figure 6. Broken humeri.



Figure 7. Cut marks on adolescent femur.

Damage from tools used to process the bodies was apparent in a number of bones (Table 6). Cut marks were present on 25 skeletal elements, including 2 thoracic vertebrae (arch), 11 ribs (external end), 1 scapula (acromion), 2 clavicles (sternal end), 1 innominate (ilium), 4 humeri (shaft), 1 radius (shaft), 1 ulna (shaft), and in the subtrochanteric region of the only 2 femora complete enough to score (Figure 7). In most cases, the cut marks were found at or in proximity to tendon and ligament attachment sites, and probably resulted from efforts to disarticulate and deflesh bodies. Chop marks, percussion pits, abrasions, and other percussion damage in some bones also documented the use of chopping and hammering tools in the postmortem processing of the human remains, although some cranial fractures may have resulted from mortal injuries that preceded mutilation.

A few bones were browned or blackened from fire exposure (Table 6), but most showed no obvious signs of burning. Bones also were examined under low power magnification (10x) for evidence of polish associated with the use of ceramic cooking pots (see White 1992:120–124). No clear evidence of pot-polish was observed, and it should be noted that the analyst spent time in 1997 with Christy Turner, a noted expert on the subject of Anasazi cannibalism, examining pot polish and other evidence of canni-

Table 7. Characteristics of Identified Portion of the Feature 13 Pithouse Assemblage.

Skeletal elements	MNE	NISP	MNI	ENE	PMB	W	CU	CH	PER	BU
Cranium	2	46	2	100.0	100.0	0	0	0	0	100.0
Mandible	2	3	2	100.0	50.0	50.0	0	0	0	100.0
Cervical Vertebra	5	5	1	35.7	100.0	20.0	0	0	0	20.0
Thoracic Vertebra	5	5	2	20.8	100.0	0	0	0	0	20.0
Lumbar Vertebra	1	1	1	10.0	100.0	0	0	0	0	0
Sacrum	0	0	0	0	—	—	—	0	—	—
Sternum	0	0	0	0	—	—	—	0	—	—
Rib	5	9	1	10.4	100.0	0	0	0	0	0
Clavicle	3	3	2	75.0	100.0	0	66.7	0	0	33.3
Scapula	3	4	2	75.0	100.0	0	0	0	0	0
Humerus	4	11	2	100.0	75.0	25.0	0	0	25.0	75.0
Radius	4	4	2	100.0	25.0	100.0	0	0	0	50.0
Ulna	4	4	2	100.0	75.0	100.0	0	0	0	75.0
Carpal	1	1	1	3.1	0	100.0	0	0	0	0
Metacarpal	12	14	2	60.0	100.0	0	0	0	0	0
Hand Phalange	7	7	1	12.5	57.1	14.3	0	0	0	14.3
Os Coxa	2	8	1	50.0	100.0	0	0	0	0	50.0
Femur	4	19	2	100.0	100.0	0	75.0	25.0	25.0	100.0
Patella	1	1	1	25.0	100.0	0	0	0	0	0
Tibia	4	11	2	100.0	75.0	50.0	0	25.0	25.0	75.0
Fibula	3	7	2	75.0	100.0	25.0	0	0	0	66.7
Tarsal	1	1	1	3.6	0	100.0	0	0	0	0
Metatarsal	13	15	2	65.0	100.0	0	0	0	0	15.4
Foot Phalange	0	0	0	0	—	—	—	0	—	—
Total	86	(179)	2	24.2	86.0	19.8	5.8	2.3	3.5	32.6

Key: MNE = min. no. elements; NISP = no. individual specimens composing MNE; MNI = min. no. individuals; ENE = % of expected no. elements (based on MNI of 2); PMB = % elements with perimortem breaks (spiral, hinge, and conchoidal fractures, crushing, peeling); W = % whole bones (> 90% complete and unbroken; measurement pertains to long bone diaphyses); CU = % elements with cut marks; CH = % elements with chop marks; PER = % elements with discrete percussion pits or striae; BU = % elements burned.

balism in a similarly mutilated collection from Chaco Canyon. However, experiments conducted by one of the authors indicate that pot-polish is not a necessary outcome of the stewing process. Fresh lamb bone fragments stewed over medium-low heat for 2.5 hours in a cast iron pan fully rendered the fat from the bone, but failed to produce the (thermally-induced) mechanical stimulation sufficient to move fragments around in the pot; no polishing was evident on these fragments. When White (1992) conducted a similar experiment using more traditional cooking equipment, he was able to induce this type of damage only through vigorous stirring. Hence, while the presence of pot polish can support an argument that bones were cooked and stirred in a pot, the absence of pot polish cannot be taken as evidence that stewing did not occur, only that vigorous, rolling boiling or stirring were not part of the cooking process. On the other hand, the pale color of the bones could have resulted from processing for fat extraction (Turner and Turner 1995; White 1992:118), and may provide another line of evidence

for stewing. Considered in this light, the reduction strategy described above may have served the specific purpose of producing pot-sized segments, as was suggested to explain rib breakage patterns at Polacca Wash (Turner and Morris 1970).

Pithouse Feature 13 Assemblage

A second collection of battered and broken human bones was unearthed in the Feature 13 pithouse (Table 7). Altogether, 479 bones and fragments (1 cm +) from two subadults were recovered. As was the case with the Feature 3 assemblage, hundreds of smaller fragments collected during excavation and screening were not included in further analysis. Like the Feature 3 assemblage, the surface preservation of the bone was excellent. Age differences made it possible to separate out and reconstruct a significant portion of the skeletons of two juveniles: a 7.5-year-old child (Individual A) and a 14-year-old adolescent (Individual B). A total of 179 bones and pieces were assigned specifically to one of these two individuals, and accounted for most of the bone mass in

the assemblage. The other 300 miscellaneous fragments were generally quite small (around 1 cm), but appeared youthful in color, surface texture, and thickness, and probably also derived from these two youths.

Despite the relative proximity of this structure to Feature 3, no mixing of remains between the two pithouses was apparent. No bones or fragments from adults were found in the Feature 3 pithouse assemblage, and no juvenile remains that could not reasonably be attributed to a single 11-year-old (Individual a) were found in the Feature 3 pithouse. Further, all three youths from the two pithouses were relatively complete upon reconstruction, and no extra subadult elements were apparent in either pithouse collection. Differences in the distribution, breakage patterns, and the degree of burning also suggest that the remains were treated differently (Lambert et al. 1999).

Bones in Feature 13 were found in the hearth, in the ash dumps south and east of the hearth, and on the floor of the northeast chamber. A tooth and a right maxillary fragment from Individual A as well as some unidentified small fragments were recovered from the uppermost layer of ash and charcoal in the hearth. Two ash dumps associated with the final use of the hearth just prior to abandonment yielded two teeth from Individual A, several bones and fragments of Individual B (including postcranial elements), another tooth fragment, and small pieces of cortical bone. Remains from Individual B were found in two separate piles on the floor of the northeast chamber. In the northern pile were the mandible, the posterior vault, a fragment of right pelvis, and three left leg bones in a flexed, articulated configuration. The face, part of the left pelvis, and most of the right leg of Individual B were found in the southern pile. Also in the southern pile was the left maxilla of Individual A.

The remaining human bone from Feature 13 had been displaced from original locations by natural, postabandonment processes. Numerous small bones and fragments from both individuals were found scattered in the fill of the northeast and west chambers. These fragments were apparently redeposited into the chambers from the floor of the pithouse. Other bones and fragments appear to have been displaced from their original locations during the postabandonment collapse of the southern recess. Two tangled bone clusters probably originally were

located in two piles or stacks on the southern recess. One cluster was found on and beside a slumped section of recess surface and was largely composed of upper limb elements from both individuals. The other cluster was deposited east of a rubble pile and contained lower limb elements and most of the right maxilla of Individual A as well as a right scapula fragment and upper limb elements from Individual B. The collapse apparently also redeposited the distal left humerus and the broken halves of the mandible of Individual A from the recess into the fill of the southeast chamber.

Most of the bones of Individual A were recovered from the collapsed southern recess. Most of the cranial bones of this child were present, but few were complete. Perimortem trauma was evident throughout the cranial skeleton. The vault was heavily fractured and the anterior upper jaw and teeth were smashed (Figure 8). The external surface of the vault was brown and exfoliating due to heat exposure, and many teeth also were browned and showed signs of heat-related fracturing. The postcranial skeleton was less complete, but included 2 thoracic vertebrae, portions of both scapulae, the right clavicle, 13 hand bones, 6 foot bones, and all of the long bones except the left fibula. Axial skeletal elements from Individual A were notably absent. Evidence of processing was readily apparent in these postcranial bones (Table 7). Many were fractured, and browning from heat exposure was apparent on two arm and three leg bones. Shallow cut marks riddled the surface of the right clavicle, and cut marks were present on the shafts of both femora.

Most of the remains of Individual B were recovered from the northeast chamber, but as noted, several bones were recovered from elsewhere in the pithouse. The cranial remains were relatively complete, and the upper vault and face had been disarticulated but were otherwise largely intact. Perimortem fracturing was evident on both parietals above the temporal bones, on the temporal bones, and on the right portion of the occipital bone. Fire blackened the back of the vault (Figure 9) and caused browning along the margins of the frontal bone. Many teeth showed signs of heat exposure, but the internal surface of the vault showed no signs of direct contact with flames. This pattern of burning suggests that the entire head of Individual B was placed on the fire, with the back of the vault towards the coals, and then disarticulated after heat treatment.

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Figure 8. Tooth ablation, Individual A, Feature 13.



Figure 9. Burned cranial vault, Individual B, Feature 13.

Although the larger postcranial elements of Individual B were relatively complete, the bones of the axial skeleton, hands, and feet were notably under-represented. As was the case with Individual A, evidence for perimortem trauma and processing was abundant (Table 7). Perimortem fractures were apparent in the vertebrae, ribs, clavicles, right scapula, humeri, right radius, right ulna, innominate, all leg bones, and most hand and foot bones. Tool marks included cut marks on the shafts of the right clavicle and left femur and percussion pits and, or, chop marks on the shafts of the right humerus and two leg bones. Browning from fire exposure affected the right clavicle, right innominate, two metatarsals, a phalange, and all of the long bones.

Lambdoidal deformation in both skulls links these juveniles culturally with at least one individual from Feature 3 (Individual b), and with virtually all Puebloan period burials excavated during the UMUILAP. This form of cranial vault modification also links these individuals more broadly with individuals from other contemporaneous mutilated Cowboy Wash assemblages (Dice 1993a) and with similar assemblages from places in relatively close proximity, such as Mancos Canyon (Figure 1) (Nickens 1974; White 1992). Although this form of cranial deformation is ubiquitous in Anasazi remains from the Mesa Verde region, and therefore cannot be used to differentiate local groups, its presence in these mutilated remains does provide evidence that victims were not distinctly foreign to the region.

Pithouse Feature 15 Assemblage

With the exception of two adult femur fragments found in floor fill, the third pithouse excavated at 5MT10010 did not contain human skeletal remains. The femur fragments recovered from this pithouse could not have come from a primary burial at the site, because both of the adults interred elsewhere on the site (in Features 7 and 40) had complete femora. In size and fracture patterns, they were similar to long-bone fragments from the Feature 3 pithouse, although their surfaces were much more weathered. As noted previously, the position of most of the Feature 3 remains beneath the opening of the ventilator shaft suggests that they were processed on the site surface and only later dumped down the shaft. It is therefore possible that the two femur fragments were left out on the site surface after processing, and were subse-

quently washed into Feature 15 by chance sometime after site abandonment.

The Osteological Evidence for Cannibalism at 5MT10010

The osteological evidence for cannibalism at 5MT10010 is essentially the same as that described for an increasing number of sites in the American Southwest (Baker 1990; Dice 1993a, 1993b; Flinn et al. 1976; Luebben and Nickens 1982; Morris 1939; Nass and Bellatoni 1982; Turner 1989; Turner and Morris 1970; Turner and Turner 1992, 1995; White 1992) and elsewhere in the world (Keenleyside et al. 1997; Villa 1992). Turner and Turner (1995:3) summarize the taphonomic features used to identify cannibalism in the archaeological record to include "breakage, cutting, anvil or hammerstone abrasions, burning, missing vertebrae, and fragment polishing." For instance, cut marks on scattered remains of European males from NgLj-2 in the Canadian Arctic provide corroborating evidence of nineteenth-century Inuit accounts of cannibalism among the starving ranks of the British Franklin expedition (Keenleyside et al. 1997). Other common characteristics of these assemblages, as summarized by Turner (1983), include occurrence during "a single, short-term depositional episode, ...good to excellent bone preservation, ...nearly complete disarticulation of elements, ...almost universal breakage of the head, face, long bones, [animal] gnawing on fewer than 5 percent of all specimens..." and a high ratio of breakage to burning and cut marks (White 1992:39). In addition, Villa (1992) notes the lack of evidence for even the most basic attempt at formal burial as an important criterion for distinguishing cannibalistic activities at Fontbregoua Cave in the Provence region of France, a characteristic reported for many Southwest assemblages as well (Flinn et al. 1976). Collectively, these criteria indicate that human remains were treated like those of food animals found in archaeological contexts (Villa 1992; White 1992).

The evidence from 5MT10010 is consistent with these criteria. First, these remains were not intentionally buried, nor is there any indication that they were accorded respectful treatment. The treatment of the disarticulated remains at 5MT10010 was dramatically different from the treatment of most of the Puebloan period human remains recovered during the UMUILAP. As elsewhere in the northern South-

west (Turner and Turner 1995), individuals were interred in a flexed position with vessels and other burial goods, indicating concerned treatment of the dead. Although valuable artifacts were present in the pithouses at 5MT10010, their distribution did not correlate with that of the human remains, and they did not obviously constitute burial goods (Leonard et al. 2000). Feature 3 had few artifacts of apparent value but abundant human remains, while Feature 15 had several apparently valuable artifacts, but no human remains in primary context. In Feature 13, both human remains and apparently valuable artifacts were found in abandonment contexts, but in different parts of the structure (see Table 2). Secondary burial also seems unlikely. Although some North American societies are known to have removed flesh from the bones of the dead as part of the death ritual (Olsen and Shipman 1994), often leaving cut marks as signs of the disarticulation process (Ubelaker 1989), they did not bash up the remains of their dead either before or after doing so. Villa (1992:101) counters suggestions that secondary burial best explains such assemblages, "If...the human bones at Fontbregoua indicate secondary burial, we may conclude that the Fontbregoua people hunted, herded, and butchered, but did not eat food animals and that they gave secondary burial to boars, deer, sheep, roe deer, badgers and marten." The mutilation and haphazard distribution of body parts preclude any notion of respectful treatment of the dead in pithouses at 5MT10010.

Second, evidence of perimortem dismemberment and bone breakage was abundant at 5MT10010, and included the disarticulation of bones at joints and heavy fracturing of skeletal elements. Almost no skeletal elements remained articulated, and perimortem breakage was apparent in many, including the cranial vault bones, ribs, marrow-rich long bones, and fat-laden vertebrae. According to Turner and Turner (1995:7), the underrepresentation of vertebrae in particular may be attributable to their having been "smashed to extract their oily content by boiling."

Direct evidence of the use of tools to process the remains provides a third critical line of evidence. Following criteria detailed in White (1992), marks identified as evidence for tool use included cut marks from sharp-edged knives, and chop marks, percussion pits, and percussion striae from chopping tools and hammerstones. In the 5MT10010 assemblage, cut marks were particularly apparent on the ribs, clavicles,

humeri, and femora in proximity to sites of major muscle and connective tissue attachment, and provide evidence that bodies were processed while still covered with flesh. The distribution of cut marks by element at 5MT10010 is consistent with that observed by White (1992:328) for the Mancos Canyon assemblage. The focus of cut marks at ligament and tendon insertions also is similar to that noted by Keenleyside et al. (1997) for the Franklin expedition remains and by Villa (1992) for both human and animal bones from Fontbregoua Cave. These intersite consistencies support the hypothesis that the human processors in all cases shared a common goal of dismemberment and defleshing. Discrete percussion pits and striae were less common, but the high degree of breakage in the 5MT10010 assemblage is testimony to the extensive use of percussion tools for both disarticulation and bone reduction.

Notably, no canine puncture marks or other signs of carnivore involvement were observed in these remains, despite the presence of such damage on human remains from other sites in Cowboy Wash (Lambert 1999). In other words, carnivores were around and scavenged human corpses when they could, but they obviously did not have access to the bodies (at least, while fleshed) in this case. Their condition therefore cannot reasonably be attributed to the activities of nonhuman scavengers.

Up to this point, a reasonable argument could still be made for mutilation without intent to consume the remains. However, the light color and excellent surface condition of the bones in this assemblage suggests that the flesh was removed from the bones, perhaps through stewing or boiling, rather than left to rot away over time (Nickens 1974; White 1992:118). Even more compelling osteological evidence for the consumption of human remains at 5MT10010, however, is the distinct pattern of burning. Many, if not most, of the burned bones in this assemblage were exposed to fire while still covered with flesh, as the patchy distribution of scorch marks favoring exposed broken ends and thinly fleshed expanses clearly indicates. The absence of burn marks on the internal surfaces of many fire-affected cranial and limb elements further indicates that a second phase of disarticulation and breakage took place after rather than before cooking. It is difficult to argue that disposal was the ultimate goal of fire processing. None of the three pithouses was burned, nor were any of the bones from these structures cal-

cined, as usually occurs with at least a portion of the skeleton in cremation (Ubelaker 1989:33–36). Rather, the browning and occasional blackening apparent in some of these remains is more consistent with limited, controlled exposure to fire for purposes of cooking the flesh.

Overall, the frequency of burning falls well within the range of burning patterns recorded in other archaeological food refuse assemblages. For example, in her Fontbregoua Cave study, Villa (1992:100) reports that neither human nor animal remains showed signs that meat was cooked while still on the bone. For the American Southwest, White (1992:335) cites burning values for faunal assemblages ranging from 2.6 percent to 79.4 percent, and notes that only 6.1 percent of the Mancos artiodactyl assemblage showed signs of burning compared to 21.5 percent of processed human remains (White 1992:335). Despite these relatively low burn rates, artiodactyl and other processed animal remains from archaeological sites are consistently and reasonably interpreted as food refuse, so the infrequent burning cannot be used to negate an interpretation of cannibalism.

Although these lines of evidence indicate that seven people at 5MT10010 were mutilated and processed as though for consumption, the actual cause of death of each individual is obscured by subsequent activities. No projectiles or other weapons were found in association with the remains. Any one of a number of observed blows could have caused death. Establishing if any of the traumatic injuries was the cause of death was not possible.

It is conceivable that these people died naturally from starvation or disease and were cannibalized by other community residents. However, a comparison of age profiles for the 5MT10010 pithouse assemblages to the nonmutilated portion of the UMUILAP sample ($N = 56$) is not consistent with starvation-induced cannibalism. Infants and young children (0 to 5 years) are notably absent from the pithouse assemblages, despite the fact that this age cohort composes 25 percent ($N = 14$) of the nonmutilated UMUILAP sample (Lambert 1999). Mortality statistics for the nonmutilated project sample indicate that young children were at high risk of death due to natural causes, a pattern that should only have been exacerbated in times of stress. Mortality among Donner Party members during the disastrous Sierra Nevada episode of 1847, for example, was highest among young children aged 1 to 4 years (62.5 per-

cent mortality) and for adults over the age of 50 (100 percent mortality). Children between the ages of 5 and 15, on the other hand, survived the Sierran ordeal better than any other age group (16.7 percent mortality) (Grayson 1990, 1993). In the 5MT10010 sample, children under the age of 5 were absent, whereas those between the ages of 5 and 15 composed 42.9 percent of the assemblage, a pattern in opposition to the Donner Party scenario.

The absence of young children from the 5MT10010 pithouse assemblages could be explained in several ways. One possibility is differential preservation, because the fragile bones of infants are more susceptible to decay than those of older individuals (Walker et al. 1988). However, preservational bias seems unlikely in this case because young children were well represented in the nonmutilated UMUILAP sample, and the condition of skeletal tissue in the pithouse assemblages far exceeded that of most primary burials. Another possibility is that fertility in Cowboy Wash communities had declined significantly with the onset of severe and prolonged drought, resulting in fewer infants in the months leading up to abandonment. Although this could be true, it does not explain the absence of individuals between the ages of one and seven years. If the village of 5MT10010 was raided, infants and young children may have been spirited away, spared, or taken captive by aggressors (Turner and Morris 1970:321). If that were the case, the presence of young children and infants in other assemblages indicates that they were not always excluded (e.g., Baker 1990; Turner and Morris 1970; Turner and Turner 1995; White 1992).

Adult mortality in the pithouse assemblages from 5MT10010 is less informative in differentiating warfare models from starvation models of cannibalistic activities. The age of adults in the pithouse assemblages does not differ notably from that of adults in the nonmutilated UMUILAP sample. Also, although males are more common than females in the pithouse assemblages (3:1), this sex bias is consistent with both hunger-induced cannibalism (Grayson 1990) and warfare (Lambert 1994, 1997, 1999). In both cases, males are more likely than females to perish.

Cannibalism at 5MT10010: The Evidence from Ancient Feces

Although various lines of osteological evidence demonstrate that human body parts were butchered

and cooked in the same manner that people prepared food animals for consumption, the bones from 5MT10010 do not document the actual ingestion of human flesh. The only scientific evidence that has the potential to bridge the gap between preparation and consumption is preserved human waste. Such evidence was previously lacking in contexts from which "cannibalized" human remains have been recovered. Thus, the human coprolite found in the hearth of Feature 15 provided a rare opportunity to establish such a link.

Analyses of the coprolite detected absolutely no macroscopic plant remains and found that starch granules and phytoliths were virtually absent (Reinhard 1997a). The absence of starch granules is a strong indication that maize kernels were not present in the meal or meals represented in the coprolite (Reinhard 1997a; Vinton 1997). The absence of macroscopic plant remains is extremely unusual for an Anasazi coprolite (Clary 1984; Danielson 1993; Martin and Sharrock 1964; Minnis 1989; Reinhard 1988, 1992, 1997a, 1997b; Sutton and Reinhard 1995; Williams-Dean 1986). The only pollen present was from *Cheno-am*, low-spine *Compositae*, and trace amounts of *Poaceae* (Reinhard 1997a), all of which could have derived from windblown, ambient pollen during spring. Characteristics of texture, color, and odor in a reconstituted sample of the coprolite indicated that the meal or meals it represented were probably entirely composed of meat (Reinhard 1997b). The size and shape of the coprolite demonstrate that it was of human origin (Reinhard 1997b).

Analysis of the coprolite by ELISA (enzyme immunosorbent assay) revealed the presence of human myoglobin in the coprolite (results of this analysis are reported in Marlar 1998). Myoglobin is an oxygen-carrying molecule that transports oxygen from the surface of the muscle to the energy generating apparatus within the muscle. Myoglobin is found only in skeletal muscles and cardiac muscle cells. Importantly, it is not found in the smooth muscles of the digestive system, in blood, or in vascular tissue (Marlar 1998). Control tests were conducted to determine if human myoglobin is present in normal individuals (25 samples), individuals with blood in their stools (10 samples), or individuals that had consumed cooked beef within 24 hours (4 samples). None of these samples tested positive for human myoglobin. The stool samples from people who had eaten beef did test positive for bovine myoglobin, which

demonstrates that myoglobin can survive the process of cooking and digestion and can be detected in human fecal material. In sum, results of the analysis of the human coprolite are consistent with osteological and artifactual evidence of cannibalism at 5MT10010 and demonstrate that human flesh was not only processed but also consumed at the site. This is the first direct evidence of the consumption of human flesh in the prehistoric Southwest.

Cannibalism on the Southern Piedmont of Ute Mountain

If we are to understand the butchering and consumption of human remains at 5MT10010, we must first understand the local social context of those acts. Fortunately, we are in a unique position to reconstruct the social history and organization of the community associated with the site. After several years of archaeological investigations conducted in the area, the Puebloan occupation of the southern piedmont of Ute Mountain is well documented. Over 31,000 acres have been surveyed in the zone of highest agricultural potential, and over 270 prehistoric sites have been recorded (Errickson 1994; Fuller 1984, 1988, 1989; Mabry 1993; Walkenhorst and Hammack 1989). This extensive survey coverage is complemented by excavations at 71 prehistoric sites (Billman 1997, 1998, 1999; Errickson 1993; Mabry 1998). In other words, nearly all of the area of potential prehistoric cultivation on the southern piedmont has been surveyed and over one-quarter of the 270 known prehistoric sites have been excavated.

Investigations indicate that during the Puebloan era there were five separate occupations of the southern piedmont between A.D. 600 and 1280. During that period, the piedmont was abandoned more than it was occupied (approximately 380 years of abandonment and 300 years of occupation), a fact that attests to the marginal nature of the area. Excavations have been conducted during the UMUILAP and related projects at a sizable number of habitation sites dating to each of the five periods of occupation (Billman 1999; Errickson 1993; Mabry 1998).

The focus of this paper is the occupation between A.D. 1075 and the early A.D. 1150s (Billman 1999). At the start of that period, the pattern of settlement on the southern piedmont changed dramatically. In contrast to the dispersed pattern of occupation in late Basketmaker III (A.D. 600–725) and middle-to-late Pueblo II (A.D. 1050–1075), there was a significant

influx of population and three communities were founded. The formation of these communities represents a third attempted colonization of the southern piedmont and a new colonization strategy. In this period, horticulturalists attempted to colonize the piedmont by establishing communities in the most productive areas of floodwater agriculture. Establishing integrated communities may have provided a means of sharing risk among households.

5MT10010 was located in the Cowboy Wash community, one of the three communities that formed around A.D. 1075. The occupation of the Cowboy Wash community can be subdivided into two periods: a transitional Pueblo II/Pueblo III community dating to between A.D. 1075 and 1125 and an early Pueblo III community dating to between A.D. 1125 and 1150. The transitional Pueblo II/Pueblo III Cowboy Wash community consisted of 17 habitation sites clustered in a 1.5-by-5.5-km area and probably had a population of approximately 65 to 105 people. Eight of the 17 habitation sites in the early community have been excavated. Significantly, no disarticulated human remains were found at any of the sites excavated in the transitional Pueblo II/Pueblo III Cowboy Wash community.

Sometime in the A.D. 1120s the transitional Pueblo II/Pueblo III Cowboy Wash community was abandoned, and after a short hiatus the early Pueblo III community was formed. From A.D. 1125 to the 1150s, 10 habitation sites were occupied in the community (Figure 1). Four of the 10 sites in the early Pueblo III Cowboy Wash community have been excavated (Errickson 1993; Leonard et al. 2000), and 5MT10010 is one of those four. The high percentage of Chuskan ceramic types found on these sites suggests the early Pueblo III community may have been occupied by a different group of people who either originated in the Chuska Mountains or had close exchange or alliance relationships with that area (Errickson 1993:497–498).

Surprisingly, the other three excavated sites in the early Pueblo III community also had assemblages of disarticulated human remains on the floors of structures (Dice 1993a; Errickson 1993). The pattern of modification—cut marks, percussion fractures, and, in some cases, burning—was similar to the pattern at 5MT10010. At 5MT10207, human remains were found on the floor of a pithouse, a surface room, and a subterranean room. At least 13 individuals were represented in the assemblage at 5MT10207, includ-

ing at least three males and three females (Dice 1993a). Ages represented included a neonate, a 3- to 6-year-old, three 7- to 12-year-olds, one 13- to 18-year-old, four adults over 19 years old, and three people of unknown age. Lesser quantities of bone were found at the other two sites (Dice 1993a). At 5MT10206, remains of one adult woman and one adolescent were found on the floor of the main residential pithouse and a surface room. At 5MT7704, nine bones from two individuals (an adult or adolescent and a child) were found in a pithouse. There apparently was no mixing of remains among those three sites; none of the sites had bones from individuals found at other sites (Dice 1993a).

The pattern of abandonment at these three sites also is remarkably similar to that of 5MT10010. The processing of human remains appears to have occurred at abandonment. Numerous artifacts, including whole ceramic vessels, ground and flaked stone tools, a rabbit blanket, a woven mat, and baskets, were left in the pithouses (Errickson 1993). Blood residue analysis indicates that some of the stone tools left behind at abandonment were used to butcher human remains (Newman 1993). Like 5MT10010, contexts associated with the final use of the three sites—*in situ* hearth deposits, floors, and single event trash dumps near the time of abandonment—contained almost no cultivated plant remains (Brandt 1993).

Approximately 24 people are represented in the disarticulated assemblages from the four Cowboy Wash sites dating to early Pueblo III. Both sexes and all ages, from newborns to the elderly, are present, although not in frequencies expected from natural death profiles. At the time of abandonment, seven residential pithouses were occupied at the four excavated sites. Using an average figure of five people per residence (Birkedal 1976; Schlanger 1985, 1986:507), the population of these four sites may have been about 35 people. If the disarticulated remains found at these sites were the site inhabitants and not human remains brought in from elsewhere, these data suggest that many, if not most, of the residents of these sites were butchered at abandonment. Based on the four excavated sites and the surface remains at the other six unexcavated contemporary sites in the early Pueblo III community, the unexcavated sites probably contain one to three residential pithouses. Therefore, the total number of residences in the community was probably between 13 and 25,

for a total population between approximately 70 and 125 people. Even if the six unexcavated sites do not contain butchered human remains—which seems unlikely given that every site in the early Pueblo III community that has been excavated contained such remains—then from one-fifth to one-third of the community's residents may be represented in the disarticulated remains at the four sites.

In summary, all of the excavated sites, and perhaps the entire early Pueblo III Cowboy Wash community³, were abandoned suddenly just after the processing and consumption of humans. Community residents left behind large quantities of high-quality, valuable artifacts, many of which were lightweight and easily transportable. A significant portion of the community appears to be represented in the total assemblage of butchered human remains. Finally, the occurrence of cannibalism on the southern piedmont of Ute Mountain was temporally limited. Despite the excavation of 71 sites, including 29 habitation sites from all of the episodes of Puebloan occupation of the piedmont, only one other possible incident of cannibalism has been found that does not clearly date to around A.D. 1150. That assemblage was recovered from 5MT7723 (Figure 1), which is located on a side drainage of Navajo Wash (Dice 1993a; Errickson 1993). The main occupation of the site dates to between A.D. 1075 and 1125. The disarticulated human remains, however, were recovered from a post-abandonment context in a pithouse, leaving open to question the date of their deposition. In total, 157 human bones from one individual were recovered from the pithouse. Because of the small size of the assemblage, the occurrence of cannibalism at that site could not be demonstrated (Dice 1993a:5.3–5.4).

The abandonment of the Cowboy Wash community around A.D. 1150 corresponds to a period of extreme drought from A.D. 1145 to 1193 (Burns 1983:232–234; Fritts et al. 1965:120–121). Based on tree ring data, Burns has proposed that this was the second worst prolonged shortfall of corn yields in the period from A.D. 652 to 1968. Ethnobotanical evidence from the four sites likewise confirms that crop yields were probably very low and that stored domesticated foods probably were severely diminished at abandonment. The correlation of this outbreak of cannibalism at Cowboy Wash with the second worst regional drought in the tree-ring record surely is more than mere coincidence.

Cannibalism in the Mesa Verde Region

If the events at Cowboy Wash were isolated occurrences in the northern Southwest, it would be easy to dismiss them as the pathological acts of a small group of demented individuals or a rare case of starvation induced cannibalism. However, these sites are but four of 32 sites in the northern Southwest that have yielded similar assemblages of cut, battered, disarticulated, and partially burned human remains (Baker 1990; Turner and Turner 1995, 1999; White 1992). In order to place the Cowboy Wash sites in the context of the prehistory of the Mesa Verde region, a subset of Turner's 32 possible cannibalism sites (Turner and Turner 1995) was reviewed. This review was limited to sites in the Mesa Verde region that are well documented and well dated, thus reducing the number of sites from 32 to 18 (Table 8).

Our review of primary sources on those 18 sites revealed two interesting patterns relevant to understanding the events that occurred at the abandonment of the Cowboy Wash sites. First, there is a cluster of occurrences of cannibalism in the Mesa Verde region around A.D. 1150, the time of abandonment of the Cowboy Wash sites. Of the 18 sites, nine date to the period between A.D. 1125 and 1175 (Table 8). At eight of the nine sites, processing of human remains occurred at abandonment, which further narrows the dates of occurrence to a remarkably short time period, sometime between A.D. 1150 and 1175. At the other site, 5MTUMR2346 in Mancos Canyon (Figure 1), processing occurred sometime during the two occupations of the site between A.D. 1125 and 1175. Although it is not clear exactly when these acts took place at 5MTUMR2346, several lines of evidence indicate that it was during the later occupation between A.D. 1150 and 1175. What these data suggest is that half of the well-documented, well-dated disarticulated assemblages from the 1,300-year Puebloan occupation of the Mesa Verde region occurred during a 25-year period between A.D. 1150 and 1175. The other nine sites date to between A.D. 850 and 1125. Although there apparently was a severe outbreak of cannibalism between A.D. 1150 and 1175, cannibalism may have occurred periodically for several hundred years prior to that outbreak. In other words, these data suggest that, although occurrences were rare prior to A.D. 1150, there may have been an existing local precedent for cannibalism in the Mesa Verde region.

Table 8. Sites from the Mesa Verde Region with Assemblages of Disarticulated and Modified Human Remains.

Site	Date (A.D.)	Reference
Verdure Canyon	900–1100	Fink 1989; Fetterman and Honeycutt 1990
Cottonwood Wash	880–910	White 1988, 1991
Sambrito Village	950	Dittert et al. 1966; Minturn 1994; Turner 1983
Burnt Mesa	950	Flinn et al. 1976; Turner 1983
Yellow Jacket (SMT1)	950–1050	Malville 1989
Yellow Jacket (SMT3)	1025–1050	Malville 1989
Rattlesnake Ruin	1050–1100	Baker 1990
La Plata 41	1100	Morris 1939
5MT7723	1075–1125	Dice 1993a; Errickson 1993
Mancos Canyon	1150–1175	Nordby 1974; White 1992
Grinnell Site	1135–1150s	Luebben and Nickens 1982
Marshview Hamlet	1150	Turner 1988; Wilshusen 1988
5MT10010	1125–1150s	Leonard et al. 2000
5MT7704	1130–1150	Dice 1993a; Errickson 1993
5MT10206	1130–1150	Dice 1993a; Errickson 1993
5MT10207	1130–1150	Dice 1993a; Errickson 1993
Seed Jar Site	1130–1150	Linda Honeycutt, personal communication 1996
Hanson Pueblo	1130–1160	Dice 1993b; Morris et al. 1993

The second pattern revealed by the review of literature relates to the types of sites where cannibalized assemblages were found. In the Southwest, sites with these kinds of human remains can be divided into three distinct types: isolated assemblages found away from habitation sites, habitation sites with dumped secondary deposits, and habitation sites with *in situ* floor deposits. Isolated assemblages have been reported from a few locations in the Southwest (e.g., Turner and Morris 1970), including one of the 18 sites in the Mesa Verde region (Fetterman and Honeycutt 1990; Fink 1989).

At sites with secondary deposits, butchered human remains are located in pits, trash deposits, or the fill of abandoned rooms, but not on the floors or other use surfaces of structures. This pattern suggests that human bodies were processed at the site, after which the butchering areas were cleaned and the remains dumped elsewhere on the site with no effort at formal burial. Of the 18 Mesa Verde sites, only 5MTUMR2346 in Mancos Canyon may fit this pattern (Nordby 1974; White 1992). Assemblages of this type have been reported commonly in areas such as New Zealand (Davidson 1984; Sutton 1990) or Fiji (Best 1984; Gifford 1951; Rechtman 1992), where cannibalism was clearly a multigenerational and institutionalized practice (Allen 1994; Bowden 1984; Carneiro 1990; Sahlins 1983; Vayda 1960).

As the name suggests, sites with *in situ* floor deposits have scatters of human remains on the floors of structures. Human remains were deposited at the

time of abandonment and apparently resulted from the *in situ* processing of human beings. Numerous artifacts were left behind in association with the human remains, including butchering tools, personal ornaments, and typical domestic artifacts such as metates, manos, and whole ceramic vessels. Eight of the nine sites dating between A.D. 1125 and 1175 have these characteristics. In contrast to the secondary deposit sites, assemblages at these sites appear to have resulted from a single, intense episode of cannibalism, rather than several episodes spread over the duration of the occupation of the site

Explaining Cannibalism in the American Southwest

Many explanations have been offered for these assemblages of broken, battered, and sometimes partially burned human remains. Andrew Darling (1998) and others (Baker 1990; Nass and Bellatoni 1982) have proposed that disarticulated remains found at prehistoric Puebloan sites were the result of executions of individuals, families, or even villages suspected of practicing witchcraft and cannibalism. Based on a review of ethnographic literature on historic pueblos, Darling (1998) argues that witchcraft was so closely associated with acts of human sacrifice and cannibalism in Puebloan traditions that the concepts of witch and cannibal became virtually synonymous. Further, he notes that the physical destruction of witches played a large role in ridding the community of evil influences and preventing sick-

ness. His reconstructed model of witch execution involves a trial of the suspect followed by death, dismemberment, defleshing, and burning.

Darling's argument has several shortcomings, as do similar reconstructions (Baker 1990; Nass and Bellatoni 1982). First, Darling unintentionally provides evidence for the existence of cannibalism, albeit couched in terms of witchcraft. Many of his accounts specifically mention cannibalism or suspected cannibals, suggesting that the practice existed even if it was not socially sanctioned. Second, his argument is limited by a lack of historic or ethnographic evidence of dismemberment, defleshing, and burning of witches. His compiled research on 24 Zuni witch trials suggests that witch executions might have occurred in the historic period, but he does not present accounts of what happens to the bodies of witches after execution. Perhaps because of this lack of historical evidence, Darling is unable to propose a set of material correlates for distinguishing cannibalism from witch execution in the archaeological record. Instead he offers a hypothetical reconstruction of the disposal of bodies that follows exactly the same steps as cannibalism except for the final consumption of flesh.

One possible distinguishing trait between witch destruction and cannibalism is the degree of burning of the bodies of suspected witches. Darling emphasizes the importance of burning for purification. However, at 5MT10010 and similar sites, many bones show no signs of direct fire exposure and those that do generally exhibit a patchy distribution of browning and occasional blackening more consistent with cooking than with incineration.

In contrast, Turner and Turner (1995, 1999) have argued that these assemblages are clearly the remains of cannibalism, a finding that has been supported by our analysis and independent analyses such as White (1992), Dice (1993a, 1993b), and Minturn (1994). Turner and Turner (1995, 1999) propose a Mesoamerican origin for cannibalism in the Southwest, stating that "The Aztecs certainly used public displays of human sacrifice and cannibalism to intimidate neighboring tribes (Hassig 1988; Ortíz 1978; Weaver 1993), so what worked in the Valley of Mexico could just as well have enhanced the amount and regularity of tribute in the Chacoan sphere of influence." The evidence for this inference is "the concentration of these assemblages in and near Chaco Great Houses and outliers" (Turner and Turner 1995:15).

In the case of Cowboy Wash, no well-documented Chacoan outliers are known on or adjacent to the southern piedmont of Ute Mountain.⁴ There is no evidence that the Cowboy Wash community was under the direct or indirect control of Chacoan sites. In addition, chronological analysis suggests that the major outbreak of cannibalism documented at nine of the 18 sites in the Mesa Verde region actually occurred between A.D. 1150 and 1175, after the depopulation of Chaco Canyon in the A.D. 1140s (Judge 1991:26). This apparent outbreak of cannibalism in the Mesa Verde region dates to the period just after the collapse of the Chaco phenomenon, not to its zenith. Finally, no clear evidence exists that cannibalized remains in the Southwest were used in ritualized contexts or displays, such as the *tzompantli* ("skull racks") of central Mexico (Hassig 1992).

A third possible explanation for the occurrence of these disarticulated human remains in the region is hunger-induced cannibalism, as is documented in France and Germany during the Middle Ages (Villa 1992), during Euroamerican expeditions to the Canadian Arctic (Keenleyside et al. 1997), during the settlement of the western American frontier (Grayson 1990), and during World War II when Japanese troops on the Kokoda trail of New Guinea were isolated from supplies (Harries and Harries 1991:405). Indeed, the low incidence of cultigens at the Cowboy Wash sites and the date of their abandonment in a period of regional drought are consistent with simple food shortage as an explanation.

Several aspects of the evidence at sites like 5MT10010 do not resemble historic accounts of simple, hunger-induced cannibalism. First, such incidents typically occurred within groups that were trapped by severe winter conditions, held prisoner, or cut off during military campaigns. In those cases, escape was impossible, and all other food resources were depleted or unreachable. The Cowboy Wash area is low in elevation and lacks insurmountable barriers to movement even in winter. Thus, dispersal from the sites to other areas may have been possible. Numerous instances of population movement at both local and regional levels are known for prehistoric and historic Puebloan groups, and immigration clearly was an important strategy for coping with environmental and social stress.

Second, all of the people in these assemblages appear to have been processed, if not consumed, in one incident. There is no evidence that people were



Figure 10. Cranial injuries in two individuals from 5MT10010.

consumed slowly over a period of weeks or months as individuals gradually succumbed to hunger, disease, or ongoing military action.

Finally, as previously noted, the demographic profile of the Cowboy Wash assemblage differs in important respects from natural death profiles. Infants and young children—the age group most susceptible to malnutrition and disease—are present but are significantly underrepresented. Older children and adolescents, on the other hand, are more common than in natural death profiles from the region (Lambert 1999; Lambert et al. 1999).

Osteological data from the other Puebloan habitation sites excavated during the UMUILAP shed light on the social context of events at 5MT10010. Traumatic injuries likely to have resulted from interpersonal conflict were common in the individuals recovered during the course of the UMUILAP (Lambert 1999). Thirty-two percent of the crania from people in the UMUILAP sample dating to between A.D. 1075 and 1175 had healed depression fractures, including two individuals from 5MT10010 (Figure 10). Twenty-one percent of that population also had healed or healing rib fractures. Both cranial vault and

rib injuries were more common in males than in females. These findings demonstrate a pattern of sublethal interpersonal aggression involving some type of clubbing instrument in the years leading up to the events at 5MT10010.

These data are evidence that the cannibalistic events that culminated in the abandonment of the southern piedmont took place in a climate of violence. The death of many of the inhabitants of Cowboy Wash in a single incident and the apparent sudden and complete abandonment of the community following that incident is consistent with a successful attack by an outside group. Because the Cowboy Wash community was relatively small and isolated compared to other communities in the region, it was vulnerable to attack. Further, the presence of large quantities of Chuskan ceramics demonstrates that the community either consisted of Chuskan immigrants or had closer ties with groups outside the Mesa Verde region than with groups within the region.⁵ Such a situation would have made the community more susceptible to aggression by other local groups.

Whereas the present data strongly suggest that site inhabitants were the victims in Cowboy Wash, and

perhaps in the majority of cases in the Mesa Verde region, the identity of the perpetrators is less clear. Although it seems likely that another Anasazi group or groups were involved, the data are insufficient on this point. However, if these cannibalism sites dating to around A.D. 1150 were the result of raiding among communities, then we might expect to find both victim and perpetrator sites—although perpetrators could certainly have become victims in subsequent raids. Two types of cannibalism sites, *in situ* floor deposit sites and secondary deposit sites, might represent victim and perpetrator communities. At victim sites, villagers were killed, processed, and probably at least partially consumed. At perpetrator sites, captives and body parts would have been brought back, consumed, and then disposed of in a manner similar to routine food refuse. If *in situ* deposit sites and secondary deposit sites do represent victim and perpetrator sites, then high ratio of victim to perpetrator sites (8 to 1) in the Mesa Verde region suggests that cannibalism never became a multigenerational and institutionalized practice, such as in New Zealand (Allen 1994; Bowden 1984; Davidson 1984; Sutton 1990; Vayda 1960) and Fiji (Best 1984; Carneiro 1990; Gifford 1951; Rechtman 1992; Sahlins 1983). Instead, this ratio suggests that terroristic cannibalism may have been practiced infrequently by relatively few communities. The large number of possible victim sites in the Mesa Verde region in the mid A.D. 1100s, however, does suggest that, although rare, outbreaks of cannibalism could be quite intense.

The outbreak of violence around A.D. 1150 may have been caused by severe drought and possibly the social and ideological breakdown that followed the abandonment of Chaco Canyon and the collapse of the Chaco system. The reshuffling of the population in the San Juan basin and Mesa Verde region introduced outsiders into new areas, perhaps upsetting local intercommunity alliances that had maintained peace. The search for diminishing resources in the face of drought also would have heightened competition and increased psychological stress. Violence, raiding, and warfare have been documented as one response to environmental stress and resource scarcity in the American Southwest (Haas and Creamer 1993) and elsewhere in the world (Daly and Wilson 1988; Lambert 1994, 1997). Mutilation and consumption of individuals killed in conflict is a potential strategy for instilling fear in opposing

groups (White 1992:18–30). In the mid A.D. 1100s, certain groups in the Mesa Verde region may have used just such a practice to terrorize, intimidate, or even eliminate neighboring villages, especially those composed of recent immigrants to the region or whose primary alliances were with groups outside the region. In that time of severe drought, human flesh also could have constituted an important spoil of war.

Whatever the root cause, the outbreak of cannibalism apparently stopped as suddenly as it began. Tree-ring and regional settlement pattern data indicate that by the end of A.D. 1100s, much of the Mesa Verde region was abandoned (Varien 1997), possibly due to the worsening environmental and social conditions. When climatic conditions improved in the early A.D. 1200s, the area was reoccupied by Puebloan groups until the final abandonment of the region around A.D. 1280. Although osteological evidence from Cowboy Wash (Lambert 1999) and archaeological data from elsewhere in the northern southwest (Haas and Creamer 1993; Lightfoot and Kuckleman 1994, 1995) demonstrate that lethal violence continued in late Pueblo III times, no incidents of cannibalism have been reported in the Mesa Verde region after A.D. 1200. The occurrence of an even more severe drought in the Mesa Verde region in the late A.D. 1200s (Burns 1983) may not have resulted in any incidents of cannibalism. Beyond the Mesa Verde region, only two cases of disarticulated, modified human remains associated with Puebloan sites has been documented in the entire northern Southwest after A.D. 1200 (Turner and Morris 1970; Turner and Turner 1995, 1999). The reason for the sudden demise of this one- or two-generation outbreak of cannibalism and violence remains even more mysterious than its origins.

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Notes

1. Tchamahias are thin, highly ground and polished, oblong-shaped stone tools that are tapered at one end with a thin dull blade at the other end. They are unique to the Four Corners region, and 84 of these tools were recovered during the UMUILAP. For a detailed discussion of their morphology and function, see Ellis 1998.

2. Pukis are used to hold clay while the potter shapes it into a ceramic vessel. The three pukis in Feature 13 were jar bases that had been shaped into pukis by chipping and grinding. Because of their shape, these pukis from Feature 13 also could have been used as bowls.

3. Unfortunately, no excavation has been conducted in the two other possible early Pueblo III communities on the piedmont. The presence or absence of cannibalism in those communities is unknown.

4. No outliers have been identified on the piedmont despite extensive survey coverage. The nearest possible Chacoan outlier is Yucca House, which is located approximately 20 km northwest of Cowboy Wash. Although often cited as a Chacoan outlier, the occupational history of the site is obscured by a large late Pueblo III occupation. Powers et al. note in their outlier survey that “The occupational span of the proposed Chacoan structure is unknown (1983:177).” Even if Yucca House eventually proves to contain a Chacoan outlier, Cowboy Wash would still be about as far as one can get from a Chacoan outlier in the Mesa Verde region.

5. One of the most interesting and surprising aspects of the ceramic assemblages from the four excavated early Pueblo III sites in the Cowboy Wash community is the abundance of Chuskan pottery. At 5MT10206 just over 30 percent of the ceramics recovered from the site were manufactured in the Chuskan region (Errickson 1993:327); at the other three excavated sites approximately 10 percent of the ceramics are Chuskan types (Errickson 1993, 1998). Interestingly a full

range of functional vessel types is present in the assemblages. Although large quantities of Chuskan ceramics were being transported into Chaco Canyon and to other areas of the San Juan basin in the period from A.D. 1125 to 1175, the Cowboy Wash sites are the first documented case of the movement of Chuskan wares into the Mesa Verde region (Errickson 1993:493). The high incidence of Chuskan ceramics in the community may have resulted from immigration or exchange. Put another way, either the residents of the site

were recent immigrants from south or they participated in an alliance and exchange network distinctly different from other communities in the Mesa Verde region. Either scenario marked the community residents as different from their neighbors.

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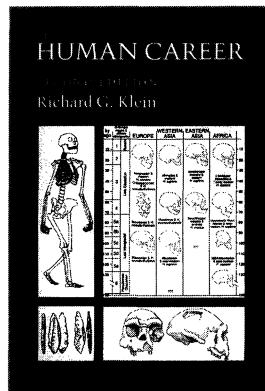
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