THE BIOARCHAEOLOGY AND TAPHONOMY OF VIOLENCE AT CASTLE ROCK AND SAND CANYON PUEBLOS, SOUTHWESTERN COLORADO

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Violence and the role of violence have emerged recently as topics important to understanding the prehistory of the northern Southwest. Recent excavations at Castle Rock and Sand Canyon pueblos, two thirteenth-century sites in the Mesa Verde region of southwestern Colorado, bring new data to bear on these subjects. Field contexts and the results of bone and myoglobin analyses indicate that nonlethal and lethal violence occurred in both of these villages and that additional modifications to bodies and bones occurred near the time of death. Around A.D. 1280, at least eight individuals at Sand Canyon Pueblo died violently, and at least 41 individuals died at Castle Rock. During or after the warfare event that ended the occupation of Castle Rock, some bodies were dismembered, bones were broken, crushed, and heat altered; a few bones were reamed, and the end of one bone was polished. Several incidents of violence and probable anthropophagy (the consumption of human flesh) have been documented in the Mesa Verde region for the mid–A.D. 1100s; however, this analysis of violent events in the late A.D. 1200s establishes a critical link between probable anthropophagy and warfare, and links both with the depopulation of the region.

La violencia y la función de la violencia han emergido recientemente como materia importante para lograr un mejor entendimiento de la prehistoria de la región sudoeste del norte. Excavaciones recientes efectuadas en los pueblos de Castle Rock y Sand Canyon (dos sitios datando del sigio XIII en la región de Mesa Verde ubicadas en el sudoeste de Colorado), han aportado nuevos datos que arrojan luz sobre estos temas. Los contextos de campo junto con los resultados de análisis de hueso y mioglobina han indicado que la violencia (la no mortífera tanto como la mortífera), existió en estos pueblos. Además, han indicado que modificaciones adicionales a los cadóveres y a los huesos sucedieron alrededor del momento en que ocurdó la muerte. Cerca del año 1280 d.de J.C., se murieron por lo menos ocho personas en el pueblo de Sand Canyon mediante métodos violentos, y por lo menos 41 personas se murieron de la misma manera en el pueblo de Castle Rock. Durante el evento de guerra que terminó la ocupación de Castle Rock o poco después, algunos de los cadáveres fueron desmembrados y los huesos fueron quebrados, triturados y sufrieron alteraciones térmicas. Algunos de los huesos fueron escariados y el extremo de uno de los huesos estaba pulido. Varios incidentes de violencia y posible antropofagia (o sea el consumo de la came humana) han sido documentados en la región de Mesa Verde a mediados del sigio Xi d.de J.C. Sin embargo, este análisis de los eventos violentos que sucedieron al fin del siglo XII d.de J.C. establece un vínculo importante entre la guerra y la posibilidad de antropofagia, además de vincular ambos con el despoblamiento de la región.

In recent decades, archaeologists, physical anthropologists, and historians have increasingly come to recognize that extreme violence, including anthropophagy in some cases, has occurred widely through time and cross-culturally, and is not confined to particular cultural traditions, stages of political complexity, or historical eras. Even though evidence of anthropophagy has been found in a large number of societies worldwide (Sanday 1986:4), these cases stand in marked contrast to the much greater prevalence of non-violent times. Good case studies of extreme violence and warfare in the past are necessary to reconstruct the history of violence so that ultimately we can begin to understand how and why such events occur. In this article, we use Ferguson's (1984:5) definition of warfare as "organized, purposeful group action, directed against another group that may or may not be organized for similar action, involving the actual or potential application of lethal force."

Indications that violence and warfare occurred in the ancient Southwest have been recognized by numerous explorers and researchers during the past century (e.g., Ellis 1951; Holmes 1878; Jett 1964; Kidder 1924; Linton 1944; Morris 1939:42; Nordenskiöld 1979:58 [1893]; also see discussion in

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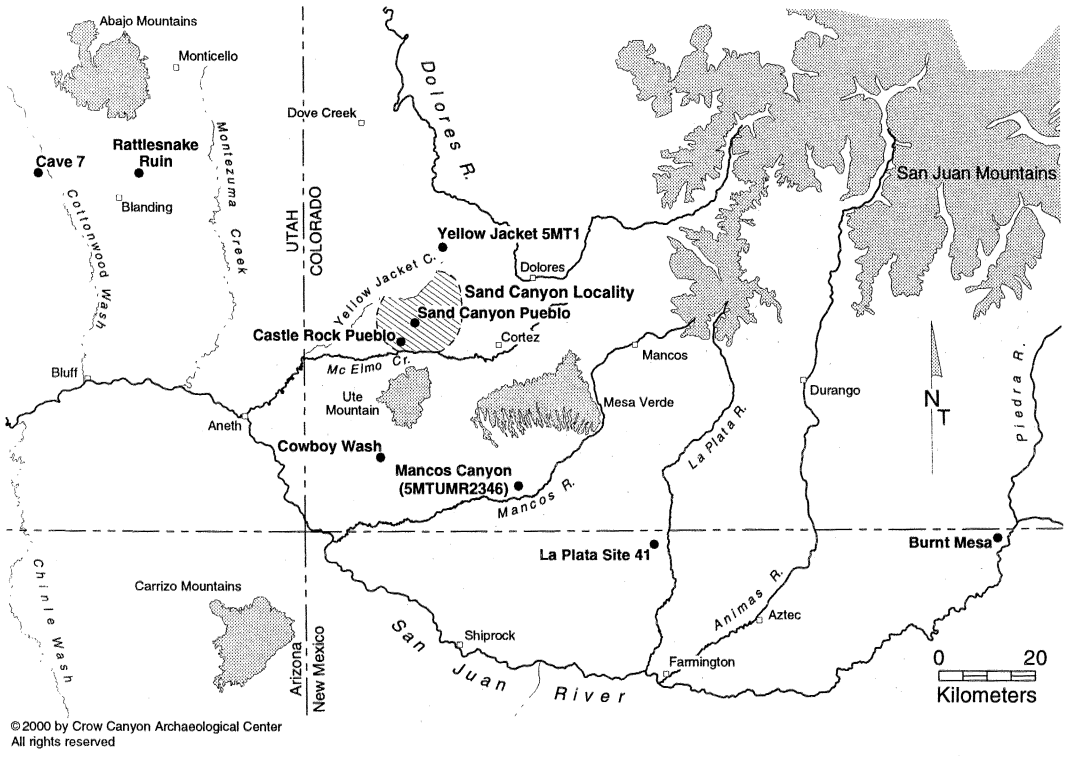

Figure 1. Selected sites with evidence of violence and/or anthropophagy in the Mesa Verde Region.

Wilcox and Haas 1994). During the mid-to-late A.D. 1200s (late Pueblo III period) in the Mesa Verde region of southwestern Colorado, there was a dramatic increase in the selection of defensible locations for villages, aggregation of population at reliable water sources, and construction of defensive structures. By the end of that century, the region was completely depopulated. Defensive site locations, defensible architecture, and population aggregation during the late Pueblo III period in the Mesa Verde region has been recognized by some researchers (Haas and Creamer 1996; Kuckelman 2002; LeBlanc 1999; Lightfoot and Kuckelman 1994, 1995, 2001) as indirect evidence of warfare. Direct, skeletal evidence of violent deaths dating from this time period has been sparse or poorly documented (Billman et al. 2000:Table 8; Kuckelman et al. 2000:Table 1; Turner and Turner 1999), and the effects of warfare and violence (exertion of physical force so as to injure or abuse) on ancient Puebloan sociopolitical, subsistence, and settlement systems, and the role of warfare in the migration of Pueblo Indians from the Mesa Verde region, have generally been downplayed. The greater abundance of skeletal evidence of violence and of implied violence associated with anthropophagy that can be firmly dated to the end of the Pueblo II (A.D. 1100–1150) or the early Pueblo III (late 1100s) periods (Baker 1994; Billman et al. 2000; Kuckelman et al. 2000; Turner and Turner 1999; White 1992) may have created a perception that violence was less prevalent in this region in the late A.D. 1200s.

Excavations by Crow Canyon archaeologists at Castle Rock and Sand Canyon pueblos (Figure 1) have produced direct evidence of warfare and interpersonal violence during the late Pueblo III period in the Mesa Verde region (Kuckelman 2002; Lightfoot and Kuckelman 1994, 1995, 2001). Some individuals in these villages were victims of nonlethal violence one or more times before their deaths. At least some of the residents of Sand Canyon Pueblo died violently at or near the end of the occupation of the village, and some of these bodies were also subjected to additional perimortem (around the time of death) trauma. Many, perhaps all, of the residents of Castle Rock Pueblo were killed in a single event that

ended the occupation of the village; some of these bodies suffered perimortem reduction, heat alteration, and additional modifications. Researchers have hypothesized a variety of different causes to account for similar modifications to human remains from other sites.

This paper presents and compares the evidence of violence from Castle Rock and Sand Canyon pueblos, provides an important case study of thirteenth-century violence in the region, and establishes important links between violent death and probable anthropophagy and also between warfare and probable anthropophagy. This study broadens our understanding of violence and interpersonal conflict in tribal societies, the forms violence takes, and conditions under which it occurs. In order to obtain a fuller understanding of this violence, we use a multimethodological approach—we examine osteological data and archaeological context data in concert to unravel the complex taphonomic signatures of warfare, violent death, and additional perimortem trauma at both villages, and consider the results against an ethnohistoric backdrop. Our results are presented in detail in order to facilitate independent evaluation and interpretation by other researchers. The organization of this paper is as follows: brief descriptions of the two sites and their settings, field and laboratory analyses performed, the data set that resulted, and descriptions of the bone assemblages; descriptions of the evidence of violent death on generally complete skeletons at each site; types of perimortem damage in the assemblages from both sites; discussion of the violent events at both villages, based on all available data; evidence of weapons and tools used in the violent events; evidence of anthropophagy; witchcraft as a possible interpretation; identity of the attackers; and conclusions reached.

The Sites

Castle Rock Pueblo (site 5MT1825) and Sand Canyon Pueblo (site 5MT765) were Puebloan villages in the Mesa Verde region of southwestern Colorado. The sites are within the Sand Canyon locality (Lipe 1992:2–3; Varien and Kuckelman 1999:Figure 1.3), which is in the Montezuma-McElmo drainage unit (Lipe and Varien 1999b:306, 307) of the Northern San Juan, or Mesa Verde, branch of the Anasazi tradition (Eddy et al. 1984). The sites are on public lands in Montezuma County, in the Canyons of the Ancients National Monument, which is managed by the Bureau of Land Management. Research at Castle Rock and Sand Canyon pueblos was conducted under Cultural Resource Use Permits C-39466(g) and C-39466(a) issued by the BLM, Colorado State Office.[1]

Castle Rock Pueblo

Castle Rock Pueblo (site 5MT1825) was a village of approximately 15 households. We conducted test excavations at the site from 1990 through 1994.[2] At an elevation of 1682 m, the site is situated on and around the base of a prominent, 20-m-high butte; a large area of slickrock is exposed around most of the periphery of the site. Current vegetation on the site includes sagebrush, four-wing saltbush, winterfat, prickly pear cactus, pinyon, and juniper. The nearest reliable source of water is McElmo Creek, 600 m south of the site, and the McElmo floodplain has good agricultural potential (Force and Howell 1997). The site is bordered on the north by an unnamed, intermittent drainage that the Castle Rock villagers dammed to capture runoff.

During the first two years of our excavations, we dug both randomly and judgmentally selected test pits as part of systematic testing of 13 sites for the Sand Canyon Archaeological Project Site Testing program (Varien 1999). Our objectives were to refine Pueblo III chronology by dating smaller sites around well-dated Sand Canyon Pueblo (Varien and Kuckelman 1999), and to improve understanding of the continuity and length of site occupation, community organization and change, site abandonment, and site-formation processes at selected Pueblo III sites within the Sand Canyon locality (Lightfoot et al.1992:12).

During the final three seasons at the site (1992–1994), we excavated specific structures more intensively and dug additional judgmental test pits (Lightfoot et al.1992). Results of all five years of excavation are reported in detail elsewhere (Crow Canyon Archaeological Center 2000a; Kuckelman, ed., 2000). During the course of our research, 201 test pits—approximately 5 percent of the 1.88-acre (.76-ha) site—were excavated.

We documented 15 ordinary-sized kivas, one oversized kiva, a minimum of 37 masonry rooms, nine possible towers, two plazas, one D-shaped structure, and several sections of retaining and village-enclosing walls (Figure 2), all built and used during a single occupation. The term "kiva" is used through-

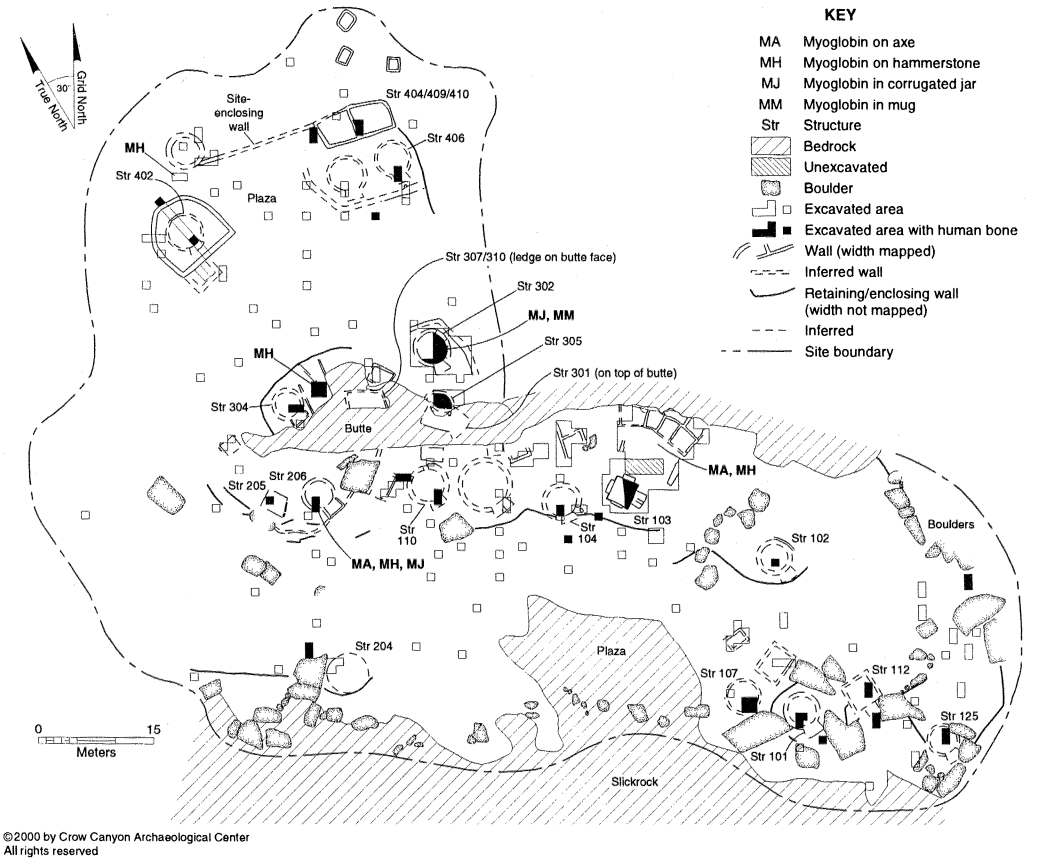

Figure 2. Locations of all human remains found and of artifacts that tested positive for human myoglobin, Castle Rock Pueblo.

out this paper as an architectural descriptor to denote a masonry-lined structure that contains pilasters resting on benches, a southern recess, hearth, deflector, and ventilation system. The 15 ordinary-sized kivas at Castle Rock are interpreted, on multiple lines of evidence, to have each been the primary habitation of a household. However, many also contain features such as niches and sipapus that indicate ritual use as well (Lekson 1988; Lipe 1989; Lipe and Varien 1999a:284). Tree-ring dates indicate that construction of the village began around A.D. 1256. The latest tree-ring date from the site is A.D. 1274 vv, and available data suggest that the demise of Castle Rock Pueblo occurred sometime between A.D. 1280 and 1285 (Kuckelman 2000a).

Sand Canyon Pueblo

Sand Canyon Pueblo (site 5MT765), located approximately 7.5 km northeast of Castle Rock, was a large village constructed and inhabited between approximately A.D. 1250 and 1285 (Bradley 1992:79). The village was situated at the head of a small tributary of Sand Canyon and encompassed a spring. Contained within the village's enclosing wall were an estimated 420 rooms, 90 kivas, 14 towers, a plaza, a D-shaped multi-walled structure, and a great kiva (Bradley 1992, 1993) (Figure 3). The site, at an elevation of 2072 m, is covered today by a pinyon-juniper forest.

The site was investigated between 1983 and 1993 as part of the Sand Canyon Archaeological Project. The research design for this project focused on community organization in the Sand Canyon locality (Lipe and Bradley 1986, 1988). More specifically, research was designed to test the hypothesis that Sand Canyon Pueblo was primarily nonresidential, and served as a ceremonial, religious, or economic center for the surrounding dispersed community (Adams 1984; Lipe 1992:3). The current understanding is that the site was a residential village,

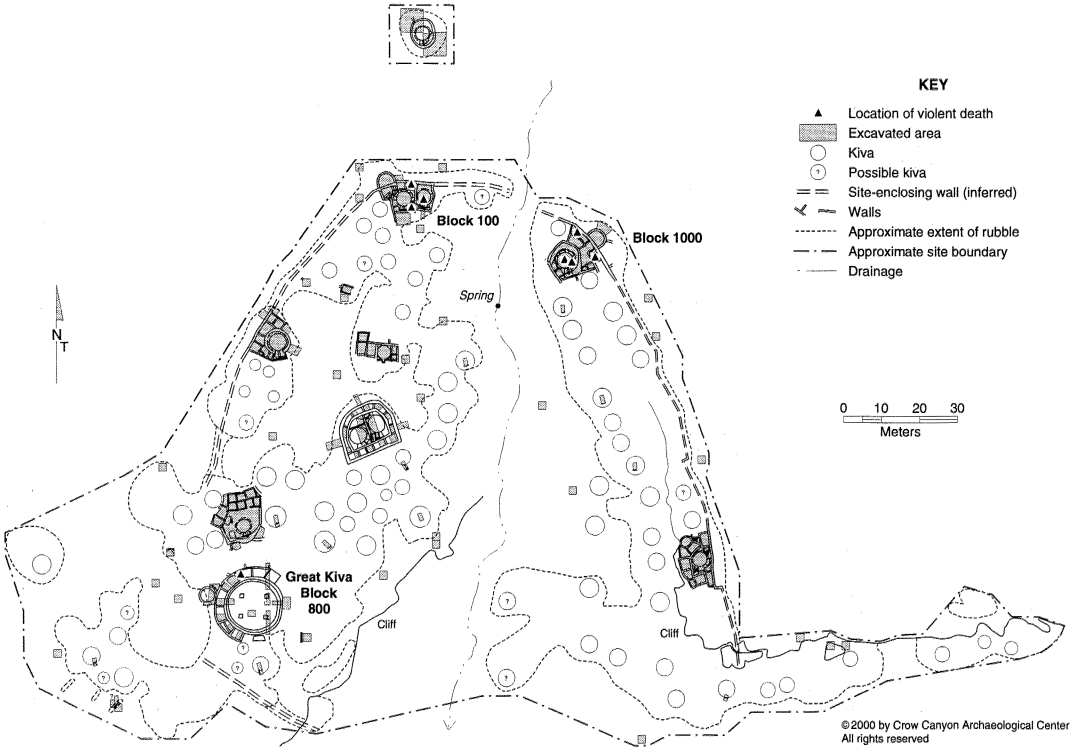

Figure 3. Locations of remains of individuals who died violently at Sand Canyon Pueblo.

although the presence of a plaza, a great kiva, a D-shaped multi-walled structure, and other public buildings indicates that it also served as a ritual and political center for the Sand Canyon community.

Most of these excavations were intensive, and major portions of six architectural units were completely excavated (Bradley 1993,1996) (Figure 3). Judgmental and random sampling were conducted as well. A total of 5 percent of the 5.4-acre (2.2-ha) site was excavated. A preliminary report on these excavations can be found in Bradley (1992). A final site report is in preparation.

Methods

A description of the field methods used in these excavations can be found in Crow Canyon's field manual (Bradley and Lightfoot 1986; Crow Canyon Archaeological Center 2000b), and specific methods used in the random testing portion of the excavations is also available (Crow Canyon Archaeological Center 2000a; Varien and Kuckelman 1999). In the field, complete or nearly complete human skeletons, as well as discrete concentrations of articulated or disarticulated human bones, were designated "Human Remains Occurrences" (HROs) and were assigned unique sequential numbers by site.

The contexts in which human bones were found at Sand Canyon Pueblo were described in a series of annual site reports (Bradley 1986:75, 1988:18; Bradley and Churchill 1995; Kleidon and Bradley 1989:46–47), and additional information has been reported in papers and other works (Bradley 1998, 1999; Katzenberg 1995a; Katzenberg and Walker 1992). The human remains from both Castle Rock and Sand Canyon pueblos are discussed in several publications (Katzenberg 1995b; Kuckelman 2002; Kuckelman et al. 2000; Lightfoot and Kuckelman 1994, 1995). Plan maps and descriptions of contexts of the Castle Rock remains are contained in the database portion of the Castle Rock Pueblo electronic site report (Crow Canyon Archaeological Center 2000a); similar information is being compiled for the Sand Canyon Pueblo assemblage. For both sites, photographs and detailed descriptions of the remains and the results of osteological analysis are archived at the Anasazi Heritage Center, Dolores, Colorado.

Portions of the Castle Rock and Sand Canyon human bone assemblages were examined by different analysts over a period of several years (Bradley and Churchill 1995:112; Bradley and Romasco 1994; Hoffman 1985, 1987, 1990; Katzenberg 1992, 1996, 1999; Kice 1990, 1991). At Castle Rock, in-field analysis was performed on one skeleton (HRO 12), the exposed portion of one skull (HRO 11), and 22 of 80 isolated bones. At Sand Canyon Pueblo, seven of 30 HROs (HROs 23, 24, 25, 26/27, 28, 29, 30) and four of 250 isolated bones were analyzed in the field. All other human bones from both sites were collected and analyzed in the lab. In order to minimize potential inconsistencies between analysts, all collected bone was reanalyzed in 1998 by Debra L. Martin, with assistance from Michael Margolis. The data reported here are based on Martin's reanalysis and also on data from the in-field analyses, some performed by C. Bradley and some by A. Katzenberg. Some preliminary interpretations (Lightfoot and Kuckelman 1994, 1995) that were based on the earlier bone analyses have been revised as a result of Martin's reanalysis.

Disarticulated bones collected from both sites were reanalyzed according to Martin (1998), which closely follows the excellent analysis methodology (standards, categories, criteria, and coding) established by White (1991, 1992) and contained in the *Standards for Data Collection from Human Skeletal Remains* (Buikstra and Ubelaker 1994), or SOD manual. Bones collected from articulated skeletons at both sites were reanalyzed following the methods outlined in the SOD manual, with additional notations of any trauma, modification, and perimortem damage specific to each bone. During analysis, a concerted effort was made to conjoin fragments both within and between bone deposits, and some fragments were successfully conjoined. High-resolution dental-casting material was used to make casts of all perimortem cutmarks; cross-sections of these casts are being examined microscopically in an effort to determine characteristics of the various types of tools that created the marks. The results of this study were not yet available at the time of this writing.

The contextual evidence indicates that all individuals represented in the Castle Rock assemblage were killed during one warfare event. In order to determine the fewest number of individuals represented in that assemblage, the number of mostly complete skeletons was added to the fewest number of individuals that could be represented within each concentration of disarticulated bones (Table 1). To avoid counting individuals more than once, extreme care was taken during reanalysis to find matches between bone concentrations based on size, sex, age, and distinguishing marks. Even given the movement of body parts across Castle Rock Pueblo as a result of intentional dismemberment and relocation of body parts by humans and also probably by carnivores (see Table 1), we believe the inferred number of individuals to be a conservative estimate of the number of individuals represented in the assemblage. Also, because only 5 percent of Castle Rock Pueblo was excavated, this estimate almost certainly represents many fewer people than were actually killed. We propose, on the basis of all available data, that fewer than 75 people would be represented if the entire site were excavated. The large size of Sand Canyon Pueblo and the characteristics of the sampling method used there make such an estimate impossible for that site.

Data Set

The Castle Rock Pueblo human remains assemblage includes three mostly complete, mostly articulated skeletons composed of approximately 500 bones. An additional 800 disarticulated bones and identifiable bone fragments are thought to represent at least 38 additional individuals (Table 1), for a site total of 41 individuals and a total number of identifiable bones and bone fragments of approximately 1,300. None of the remains found was intentionally buried while the village was inhabited.

The Sand Canyon Pueblo human remains assemblage is composed of approximately 1,750 identifiable bones found in 31 concentrations and approximately 250 scattered, identifiable bones and bone fragments, for a total assemblage of about 2,000 bones. Nine of the concentrations consist of complete or mostly complete, mostly articulated skeletons; the other concentrations include remains of individuals that are were in widely varying states of completeness and articulation. The assemblage contains some individuals who were formally buried, some who were not formally buried, and some for whom the data are insufficient to make a determination of burial type (Table 2). However, no concentrations of clearly modified, commingled remains were found at Sand Canyon Pueblo. Osteological analysis indicates that at least eight individuals rep-

Table 1. Selected Data, by HRO, on the Disarticulated Human Bone Assemblage, Castle Rock Pueblo.

HRO	STR	NB	FI	FR	CR	CT	CH	IC	PS	PL	RE	BR	SW	CA
2	206	250	5	13	7	—	—	—	—	—	—	16	7	4
3	302	180	6	15	9	3	4	1	—	—	—	8	4	20
4	110	95	6	13	1	3	—	—	1	1	2	11	5	4
5	406	40	3	3	—	—	—	—	—	—	—	—	6	3
6	304	65	3	2	—	—	—	—	—	—	—	1	1	6
7	112	75	2	2	—	—	—	—	—	—	—	—	—	2
8	102	15	1	—	—	—	—	—	—	—	—	—	—	2
IB		80	12	5	1	—	—	—	—	—	—	3	7	2
Total		800	38	53	18	6	4	1	1	1	2	39	32	43
% T				6.6	2.3	.8	.5	.1	.1	.1	.3	4.9	4.0	5.4

Note: HRO = human remains occurrence, STR = structure; NB = number of bones; FI = fewest individuals; FR = bones with fractures; CR = bones with crushing; CT = bones with cutmarks; CH = bones with chopmarks; IC = bones with inner conchoidal fracture scars; PS = bones with percussion striae; PL = bones with end polish; RE = bones reamed; BR = heat-altered bones; SW = surface-weathered bones; CA = carnivore-damaged bones; IB = isolated bones; %T = percent of total disarticulated bones

resented in this assemblage died violently; only those eight are included in this study.

Analysis Results

Sand Canyon Pueblo

The remains of the eight individuals in the Sand Canyon Pueblo assemblage who died violently were all in abandonment contexts; that is, they were in locations where none of the strata above the human remains was culturally deposited. This could indicate that these individuals all died in one violent event at the end of village occupation, but this could not be determined for certain. The remains of these eight individuals show evidence of fatal skull trauma, perimortem bone modification, or both, and were found in the excavated portions of architectural blocks 100, 800, and 1000 (Figure 3). The remains in Architectural Block 800 were located in a room associated with a great kiva. Blocks 100 and 1000 are located near a canyon-head spring, and the kiva suites containing remains are the only two suites at the site known to have associated towers abutted to the outside face of the site-enclosing wall. These could have been strategic hot spots during enemy attacks, or these suites near the spring could have been some of the last to be vacated.

One of the individuals who met a violent death (HRO 2) was a 40- to 45-year-old male who had six toes on his right foot, and whose skeleton was in a sprawled position on the floor of a room in Architectural Block 100 (Figure 3). He had a small, healed depression fracture on his left parietal (see Table 3 and *Antemortem Trauma* under "Discussion" below), and a large, lethal (capable of producing death) depression fracture on his left frontal bone that was caused by a blow to the head. Although approximately 90 percent of the bones of this individual were present, the skeleton was partly disarticulated by unknown agents.

Another victim of violence was a subadult of unknown sex who was approximately 15 years old (HRO 11). This person's mostly complete and articulated remains (the right arm and the mandible were

Table 2. Burial Type of Individuals Represented in the Human Remains Assemblage from Sand Canyon Pueblo.

Burial Status	Number of Individuals
Formally buried[a]	10
Not carefully placed, but no physical evidence of violent death	8
Not carefully placed, with physical evidence of violent death	**6**
Isolated bones with physical evidence of violent death	**2**
Insufficient data to determine burial type	7
Total fewest individuals represented	33

[a]Carefully placed and protected against disturbance by carnivores; some have grave goods also.
N = individuals included in this study

Table 3. Skull Trauma to Human Remains at Castle Rock and Sand Canyon Pueblos.

HRO	Element	Age	Sex	Perimortem	Antemortem	P or A	Total
CRP 2	skull fragment[a]	—	—	1 (ivr)	—	—	1
CRP 2	maxilla[a]	40–50	—	1 (sf)	—	—	1
CRP 2	skull fragment[a]	35–50	—	1 (ivr)	—	—	1
CRP 2	skull fragments[a]	adult	—	2 (ivr)	—	—	2
CRP 2	skull fragment[a]	adult	—	1 (sf, ivr)	—	—	1
CRP 3	skull fragment[b]	adult	—	1 (sf, ivr)	—	—	1
CRP 3	skull fragment[b]	adult	—	1 (sf, ivr)	—	—	1
CRP 3	complete skull	40	F	2 (df, ivr)	3 (df)	—	5
CRP 4	complete skull	40	F?	—	2 (df), 1 (bn)	—	3
CRP 9	complete cranium, no face[c]	35–50	M	1 (sf, ivr)	1 (df)	2 (df)	4
CRP 9	mandible[c]	35–50	—	1 (sf)	—	—	1
CRP 10	complete skull	8 ±	—	—	3 (df) 2 (rt)	—	5
CRP 12	complete skull	40–44	M	2 (df) +	—	—	2
SCP 2	complete skull	40–45	M	1 (df)	1 (df)	—	2
SCP 3	complete skull	18–20	F	—	3 (df)	—	3
SCP 11	complete skull	15 ±	—	1 (cr)	—	2 (df)	3
SCP 19	partial skull	12–15	—	1 (dp) 3 (ivr)	—	—	4
SCP 20	complete skull	20	M?	3 (df)	1 (df)	2 (df)	6
SCP 22	complete skull	8 ±	—	1 (df w/ivr)	—	—	1
Isolated	cranial fragment	15–20	—	2 (sf)	—	—	2
Total				26	17	6	49

Note: HRO = human remains occurrence; P or A = could be perimortem or antemortem; CRP = Castle Rock Pueblo
[a]could be from one person; ivr = internal vault release; sf = spiral fracture
[b]could be from one person; df = depression fracture; bn = broken nose
[c]could be from one person; rt = raised areas of trauma; + = additional trauma difficult to quantify; SCP = Sand Canyon Pueblo; cr = crushing; w/ = with

missing) were found in the collapsed wall debris of a room in Architectural Block 1000. The base of the skull exhibited perimortem crushing. The nose and several teeth in the maxilla were broken either perimortem or postmortem, and two small depression fractures on the left parietal indicate either perimortem or antemortem (preceding death) injuries.

The skeleton of a third person who met a violent death, a 12- to 15-year-old of unknown sex (HRO 19), was found face-down on the floor of a kiva in Architectural Block 1000. This skeleton was mostly complete and fairly well articulated. A large depression fracture is present on the occiput, and there are multiple additional perimortem skull fractures, all from blows to the head. There are numerous cutmarks near the distal end of the left humerus, anvil abrasions on the left clavicle, and spiral fractures of the right tibia shaft. The specific actions that caused these modifications are unknown, but were probably violence-related. There are also four sets of cutmarks or abrasions on the forehead, above the left eye orbit. Cutmarks of this type and in this location have been reported from numerous sites in the Southwest and have been interpreted as evidence of scalping (Allen et al.1985; France 1988; Turner and Turner 1999; White 1992:206) (also see *Scalping*, below).

The mostly disarticulated remains (only the lower arms and hands were articulated) of an 18- to 20-year-old who was probably male (HRO 20) were found in the collapsed wall and roofing material of a room in Architectural Block 1000. At least three perimortem depression fractures are present on the back of the skull. It was not possible to determine whether two additional depression fractures on the back of the skull were inflicted antemortem or perimortem. There are also perimortem anvil abrasions on the pelvis and one healed depression fracture on the frontal bone.

The remains of a child approximately 8 years old (HRO 22) were found in a kiva hearth in Architectural Block 1000. The left arm and left leg were in positions that would have traumatized the joints of a living person. A lethal fracture is located on the back of the skull. There are four clusters of cutmarks on the forehead above the right eye socket, and one series of cutmarks on the left parietal; these marks are probably the result of scalping (see *Scalping*, below).

The widely dispersed, partial remains of an adult

male who was 35 to 39 years old at the time of death (HRO 24) were found just above the floor of a room adjacent to the great kiva (Structure 800). The bones of his arms, hands, and feet were not present in the excavated portion of the room. No cutmarks or carnivore marks were noted during analysis. The skull exhibited no sign of trauma, but this man might have been decapitated (see *Decapitation* below). His pelvis and all of his leg bones had been fractured spirally near the time of death, as had several associated long bone splinters and fragments. In addition, the cancellous bone had been almost completely removed from one fragment of his femur shaft. There were no punctures or scratches on any of the bones that could be interpreted as evidence of canid activity. Therefore, we interpret the spiral fracturing of the long bones and the removal of the cancellous portion of the femur fragment as the result of human activity.

Evidence of the violent death of a seventh individual was documented on the bones of an isolated upper face found in the roof fall of a kiva in Architectural Block 100. This individual was aged 15 to 20 years at the time of death, and the frontal bones had been fractured perimortem. The eighth victim of violence was also represented by facial bones that exhibited perimortem striae indicative of facial processing; these were found in a corner room of a kiva in Architectural Block 100.

Castle Rock Pueblo

At least 41 individuals are represented in the human remains assemblage from Castle Rock Pueblo. All concentrations of human remains (HROs) found at the site were on kiva floors and in kiva-fill deposits (mostly in collapsed roofing material). Eighty additional identifiable bones and bone fragments were not assigned HRO numbers, either because they were in small concentrations or because they were isolated occurrences. These bones were found on kiva floors, in kiva-fill deposits, in the fills of towers, and in extramural areas (Figure 2). The location and weathered condition of a small concentration of bones just below modern ground surface at the base of the butte indicates that some remains were left on the butte, presumably in Structure 301 or within or on the roof of Structure 307/310. Table 4 shows the age and sex distribution of remains found at this site. Age and sex determinations were not possible for many of the individuals because of the disarticulated, fragmentary, and commingled condition of the remains.

One of the largely complete and generally articulated skeletons at Castle Rock Pueblo was that of an adult male, 35 to 50 years of age (HRO 9), found in a sprawled position on the floor of Structure 101. Calculations based on his femur length indicate he was between 163.5 and 170.4 cm tall (between 5'4" and 5'6") (Genovés 1967), only slightly taller than average for ancient Pueblo Indian males (Bennett 1975:Table 4; Karhu 2000:Table 3.24). However, Martin characterizes him as having been robust and strong, on the basis of unusually large muscle attachments and dense, heavy bones. There was one antemortem depression fracture on the back of his skull, and two small antemortem or perimortem depression fractures on his frontal bone. His face had been removed by means of a diagonal perimortem fracture across his forehead, and there were numerous percussion striae on his forehead. The portion removed was not found during our excavations. His teeth had been broken off by at least one blow to the mouth.

Most of the right leg was missing from the skeleton; however, the very robust bones of a lower right leg and foot were found in the southern recess of a different kiva (Structure 406), and appear to be the bones of the left leg and foot of HRO 9. Structure 406 is on the opposite side of the butte, more than 100 m northwest of the rest of this skeleton. Most of this man's right leg had thus been removed and apparently transported to a different structure. The femur head of this leg was still in the socket, which indicates that the transported part of the leg was not removed by canid activity (Katzenberg 1996:13); however, the bone was not well enough preserved to determine the specific means of removal.

Another mostly complete skeleton was that of a child approximately 8 years old at the time of death (HRO 10), found in a sprawled position on the floor of Structure 110. This child's left femur, left fibula, and both tibiae all suffered perimortem fractures. The fracture of the right tibia had apparently been caused by the forceful deposition of a large sandstone slab that was found resting on the splintered bone. Multiple healed depression fractures and two raised areas of trauma were observed on the skull (Table 3). The right arm was not articulated with the scapula, and the right hand was missing.

The third skeleton (HRO 12), that of an adult male 40 to 44 years old, was found in a sprawled

Table 4. Age and Sex Distribution of the Human Remains from Castle Rock Pueblo.

Age Category	Male	Female	Unknown Sex	Total
Fetus	—	—	—	—
Newborn to .9 year	—	—	1	1
1–4 years	—	—	4	4
5–9 years	—	—	7	7
10–14 years	—	—	1	1
15–19 years	—	—	2	2
20–34 years	1	—	3	4
35–50 years	3	2	2	7
50 + years	—	1	—	1
Subadult	—	—	2	2
Adult	1	—	10	11
Unknown age	—	—	1	1
Total	5	3	33	41

position on the floor of Structure 103 (a square kiva). This skeleton was complete and articulated, and was wedged between the deflector and the opening of the ventilator tunnel. His right tibia was already infected from an earlier slicing blow at the time his skull was shattered by multiple lethal fractures.

Under the following subheadings, we present data on antemortem trauma, perimortem trauma, and other perimortem modifications for the Castle Rock Pueblo assemblage as a whole (see also Tables 1, 3, 5, and 6).

Antemortem Trauma. In the Castle Rock assemblage of 1,300 bones, 13 antemortem trauma lesions were documented, and another two lesions could have been either antemortem or perimortem. The tibia mentioned above had suffered a slicing blow; the other 14 antemortem and possibly antemortem trauma lesions were concentrated on four skulls (Table 3).

Perimortem Fractures. In the entire assemblage of 1,300 identifiable bones and bone fragments, 74 perimortem fractures were documented (Table 5) on 61 bones (4.7 percent). In addition, multiple teeth in the maxilla of a 40- to 50-year-old individual in HRO 2 (in Structure 206) had been fractured in two separate arcs, with associated damage to the alveolar bone. These fractures appear to have resulted from two separate blows to the mouth. The following individuals also had teeth broken off in the sockets: a male 35 to 50 years old (HRO 9), an adult female (in HRO 5), and an adult who was probably female (in HRO 6). This tally includes all bone breakage that

Table 5. Elements and Their Perimortem Fracture Types in the Castle Rock Assemblage.

Element	Typical Spiral	Longitudinal	Sawtooth	V-shape	Irregular	Depression	Total
Femur	10	2	1	1	—	—	14
Rib	11	2	3	1	—	—	17
Tibia	7	1	—	—	—	1	9
Humerus	3	—	—	1	—	—	4
Radius	3	—	—	—	—	—	3
Cranium	5	—	—	—	—	4	9
Fibula	2	1	—	—	1	—	4
Ulna	2	—	—	—	—	—	2
Maxilla	2	—	—	1	—	1	4
Mandible	1	—	—	—	—	—	1
Pelvis	1	—	—	—	—	—	1
Phalanx	1	—	1	—	—	—	2
Clavicle	—	—	—	1	—	—	1
Metacarpal	—	—	1	—	—	—	1
Metatarsal	—	—	—	—	1	—	1
Indeter.	1	—	—	—	—	—	1
Total	49	6	6	5	2	6	74

Note: Indeter. = Indeterminate

Table 6. Number of Elements and Fragments with Specific Characteristics in the Castle Rock Disarticulated Bone Assemblage.

Element	CR	CT	CH	IC	PS	PL	RE	BR	SW	CA
Skull	—	—	—	—	—	—	—	9	10	—
Femur	7	3	2	—	—	—	1	7	6	6
Tibia	4	1	1	1	1	1	1	8	—	5
Humerus	2	1	—	—	—	—	—	3	3	3
Fibula	2	1	1	—	—	—	—	2	—	1
Radius	—	—	—	—	—	—	—	—	—	2
Ulna	—	—	—	—	—	—	—	2	2	1
Scapula	—	—	—	—	—	—	—	—	2	2
Rib	—	—	—	—	—	—	—	2	—	4
Pelvis	—	—	—	—	—	—	—	—	4	3
Vertebra	—	—	—	—	—	—	—	—	3	1
Clavicle	2	—	—	—	—	—	—	1	—	2
Patella	—	—	—	—	—	—	—	—	—	2
Talus	—	—	—	—	—	—	—	2	—	—
Calcaneus	—	—	—	—	—	—	—	—	—	4
Carpal	—	—	—	—	—	—	—	—	—	1
Metacarpal	—	—	—	—	—	—	—	1	1	1
Metatarsal	1	—	—	—	—	—	—	2	1	—
Phalanx	—	—	—	—	—	—	—	—	—	5
Total	18	6	4	1	1	1	2	39	32	43

Note: CR = crushing; CT = cutmarks; CH = chopmarks; IC = inner conchoidal fracture scars; PS = percussion striae; PL = end polish; RE = reamed; BR = heat-altered; SW = surface weathering; CA= carnivore damage

occurred as part of the final warfare event in the village. Among the 800 disarticulated bones, 53 bones (6.6 percent) were fractured (Table 1), and several of these bones had been fractured more than once. These fractures could have been associated with assault during the battle, with torture after the battle, or with other atrocities soon after death.

Spiral fractures are one type of perimortem breakage, and have been shown to result from both human and natural (weathering and carnivore) actions (White 1992:134). Weathering was noted on some bones in the Castle Rock assemblage of disarticulated remains, but only four of the 49 (8.2 percent) bones with spiral fracturing show other signs of weathering. It is therefore likely that most of the spiral fractures in the Castle Rock assemblage were caused by agents other than weathering.

Carnivore-induced scratches and punctures were documented on 43 bones in the Castle Rock Pueblo disarticulated bone assemblage (Tables 1 and 6). However, this damage co-occurs with spiral fractures on only nine of the 43 (20.9 percent) bones with spiral fractures, so it is unlikely that carnivores are responsible for all, or even most of the spiral fractures in the assemblage. Weathering and carnivore damage co-occur on seven bones.

Haglund et al. (1988:994) note that, in the carnivore-damaged Wupatki assemblage, spiral fractures were restricted to the smaller-diameter long bones such as the fibula, radius, and ulna; the reason postulated is the fairly weak jaw strength of coyotes. They maintain that reports of spiral fracturing of larger bones have been from studies of wolves and Eskimo dogs, which have much stronger jaws. Even though no bones collected at Castle Rock were identified specifically as *Canis familiaris*, it is not unlikely that domestic dogs were kept in this village. However, we know of no evidence that would indicate that ancient Puebloans kept dogs that were wolf-sized or larger (e.g., Allen 1981; Amsden 1976: 62–65; Haag 1966; Kuckelman 1986:283, 301). The 20 spiral fractures of the femurs, humeri, and tibiae from Castle Rock are thus more likely to have been caused by humans than by coyotes or the relatively small dogs of the ancient Pueblo Indians.

Crushing. Crushing damage was assessed for the Castle Rock assemblage using White's (1992:138) definition of crushing as the "displacement of bone cortex into the spongy bone space within." Crushing involves a larger area of bone than do carnivore-induced puncture marks. Seven of the 18 bones (38.9 percent) damaged by crushing also had carnivore scratches and punctures, which indicates that some of the crushing damage could have been inflicted by

carnivores. However, four of the bones with crushing damage were also heat-altered. Thus, the crushing damage on those bones is just as likely to have been caused by humans as by canids.

Cutmarks. Cutmarks were documented on the proximal end of one femur and one fibula (HRO 3) and on the distal end of a humerus (HRO 4). The head of an additional femur in HRO 3 had been sheared off completely. Cutmarks on the tibia and femur in HRO 4 were located midshaft. All three cutmarked bones in HRO 4 (a femur, a tibia, and a humerus) had also been altered by heat. No cutmarks were found on bones of articulated skeletons.

Cutmarks near the ends of long bones have been inferred to result from dismemberment of human limbs prior to cooking and consumption (Jamieson 1983:170). The locations of the cutmarks in the Castle Rock assemblage are indicative of the removal of legs from the torso at the hip, the dismemberment of a leg at the knee, and of a lower arm at the elbow. The midshaft cutmarks are indicative of flesh removal from the upper part of a leg and the lower part of a leg. These limbs were apparently not removed as trophies, because they were not taken when the attackers departed, and 50 percent of the cutmarked bones had been heat altered.

An important point should be made here regarding cutmarks. White (1992:277) observed that although hand and foot bones in the Mancos Canyon assemblage show no tool marks associated with processing, there is other firm evidence that disarticulation of these body parts did, in fact, occur. There is also compelling contextual evidence of a substantial amount of dismemberment at Castle Rock for which no cutmarks were detected. For example, a complete and articulated forearm and hand of a child approximately 8 years old was found on the floor of Structure 206 in the midst of the other, completely disarticulated, bones of HRO 2 (see plan map, Crow Canyon Archaeological Center 2000a). There are no carnivore marks on the bones of this hand or forearm and all phalanges were completely articulated, so it is unlikely that the dismemberment was canid induced. Thus, this forearm and hand was probably removed by human activity, even though there are no cutmarks on any of the bones. The number of cutmarks, therefore, should not be taken as an accurate indicator of the amount of intentional dismemberment that occurred to the bodies in an assemblage of disarticulated remains such as this.

Chopmarks. Chopmarks differ from cutmarks in that cutmarks were made by a sawing motion and chopmarks were made by striking a stone against bone (White 1992:146). All four chopmarks found were in HRO 3. The marks were located on the distal ends of one fibula and one femur and on the proximal ends of one tibia and a different femur. This type of mark is thought to result either from soft tissue manipulation or from a deliberate attempt to fragment a bone.

Inner Conchoidal Fracture Scars. These are notches or impact scars along the edges of long-bone fragments that result from percussion impact. This type of mark is hypothesized to predominate in an assemblage in which bone shafts were being fractured for marrow extraction (White 1992:136). One tibia exhibited this type of scar in this assemblage.

Percussion Striae. These striae are caused by the impact of a stone on bone (White 1992:150) and, in assemblages interpreted to have been subjected to anthropophagy, are most often documented on major long bones (White 1992:330). These striae were found on one bone in the disarticulated bone assemblage (Tables 1 and 6), and also on the frontal bone of an articulated skeleton (HRO 9) just above a large, diagonal fracture above the eye sockets. The percussion striae in this case might be associated with the removal of the face, or with scalping, or both. Turner and Turner (1999:51) report that percussion damage to crania is common in violence-related assemblages.

Polish. The spirally fractured end of an adult tibia had been polished. We infer that this was a human-induced modification, although we reserve judgment on White's (1992:122–124) suggestion that this type of modification was caused by abrasion of the fractured bone end during circulation in a pottery vessel.

Reaming. One reamed bone is an adult, longitudinally fractured tibia shaft from which both ends had been removed. Only a small portion of trabecular bone remains near the proximal end of this shaft. Also reamed is a femur of an individual 15 to 18 years old from which the distal end had been removed by spiral fracturing. This bone had cutmarks at midshaft and had been altered by heat. Although White (1992:344–345) points out that trabecular bone can be removed by nonhuman agents such as weathering and nonhuman carnivore chewing, we infer human agents here. This inference is based on the absence of carnivore scratches and punctures on the two bones, on the presence of heat alteration on one

of the bones, and the presence of heat alteration and cutmarks on the other. Thus we infer that humans intentionally removed the ends of these bones and scraped the marrow from the interior of the shaft, probably for consumption.

Heat Alteration. The intensity of the heat alteration in this assemblage resulted in bone color that ranged from tan to black; no bones had been burned white. During analysis, particular attention focused on distinguishing between alterations to bone caused by heat as opposed to weathering (White 1992:158–160). There was no evidence in any excavated areas of either site that the alteration was caused by an intentional cremation.

Sixteen of the 39 identifiable heat-altered bones (two humeri, two tibiae, two fibulae, two ulnae, five cranial fragments, one rib, one clavicle, and one metatarsal), representing a minimum of three people, were located in the partly burned, collapsed roofing deposits of Structure 206. Although only small-diameter burned fragments of wood were present (smaller than 10 cm diameter) in this roofing material, it is not impossible that these bones were altered by heat when the vegetal portion of the roofing material burned. Two of the bones, a fibula and a clavicle, were interpreted to have been exposed to high heat when the bones were dry. These are the only two bones in the Castle Rock assemblage that appear to have been exposed to high heat when dry. So they might not have been heat altered perimortem, but might have become altered somewhat later, possibly during intentional burning of the roof (Kuckelman 2002). However, these 16 bones show modifications similar to heat-altered bones in the remainder of the Castle Rock Pueblo assemblage; that is, localized heat alteration at midshaft, and bone ends missing, usually as a result of crushing or spiral fracturing. Thus, although it is possible that some or all of the 16 heat-altered bones in Structure 206 were altered as a result of the burning of the roof, the pattern of human modifications and the taphonomy suggest that the bones were intentionally heat altered and modified before the roof burned.

It is very unlikely that any of the other 23 heat-altered, identifiable bones in the Castle Rock assemblage of disarticulated bones were heat altered as the result of coming into contact with burning structural material. These heat-altered bones included seven femurs, six tibiae, four skull fragments, two tali, one humerus, one rib, one metacarpal, and one metatarsal. They represent at least eight individuals, and were mixed among unaltered bones in unburned contexts, which indicates intentional heat alteration of selected elements or body parts prior to the final deposition of the bones. In addition, element types are not randomly represented in this assemblage. For example, the heat-altered bones in HRO 3 consist of two femurs, three tibiae, and three cranial fragments. This indicates that specific body parts were deliberately selected for heat exposure. Two of the most numerous heat-altered elements in the assemblage are the two largest, most heavily fleshed bones in the human body (femur and tibia) (Table 6). According to Sanday (1986:165), thighs were considered to be among the most desirable portions of the body among the nineteenth-century anthropophagous Fijians.

In the Castle Rock assemblage, as in the Mancos Canyon assemblage (White 1992:257, 261–262), burning on femurs and tibiae most often occurs at midshaft. Patterned burning has been inferred to indicate that bones might have been partly covered with flesh when they were exposed to heat (Nickens 1975:289). At least three tibiae from Castle Rock are burned on the crests only—two of these are from the same person. White (1992:158, 262, 267) concludes that this pattern of heat alteration is suggestive of roasting of the lower legs for consumption, because, when fully fleshed, only the "shin" portion of the tibia would be subjected to enough heat to cause thermal alteration of the bone. If fully fleshed legs were roasted, this might explain why eight tibiae but only two of the (more protected) fibulae in the Castle Rock assemblage as a whole became heat altered.

Two heat-altered temporal fragments found in widely separated test units on the site are altered on the outside only, and one of these two fragments also exhibits internal vault release. Two other cranial fragments are heat altered on the interior only; these fragments also exhibit internal vault release. Vault release is indicative of cranial trauma (see *Perimortem Fractures* below), and the heat alteration of the outside of the cranium indicates that these elements were exposed to fire after the cranial trauma occurred.

Weathering. Weathering stages 1 through 4 of five weathering stages (Buikstra and Ubelaker 1994:Table 5) were documented in the Castle Rock assemblage. We interpret weathering of bones as evidence that some individuals or bones were not buried promptly after death, but were left exposed to the elements for an indeterminate length of time.

Carnivore Damage. The bones that were damaged by carnivores were not clustered in any particular provenience. The damage is inferred to have occurred soon after the attack on the village, but before the bones were covered, whether the covering occurred intentionally or naturally. Rodent damage was noted on only two bones in the Castle Rock assemblage; typically, most exposed bones are damaged by rodents within one year (Snow and Luke 1984:260). Katzenberg (1996:17) noted, with respect to the Castle Rock assemblage,

> Carnivore damage is not so extensive as is seen in modern forensic cases in which the individual is not subsequently buried. Specifically, the tooth marks and chewed areas have not destroyed as much bone. In modern forensic cases, bones are scattered, long bones are completely consumed, and smaller elements of the hands and feet are often not found at all. This suggests that the Castle Rock individuals were buried before extensive carnivore activity occurred.

This inference is further supported in work by Snow and Luke (1984:262), who state that carnivore activity tends to result in wide scattering or complete disappearance of pelvic elements and long bones. These bones, especially leg bones, are among the better-represented elements in the Castle Rock assemblage. Also, numerous leg bones are clustered in HRO 3 (Crow Canyon Archaeological Center 2000a:Structure 302, map 527), which is not a typical result of carnivore activity. In the Castle Rock assemblage, it was not possible to determine whether the damage to each bone occurred before or after any human modification to the same bone. In other words, human modification and carnivore chewing are not mutually exclusive activities, as carnivores could have damaged bones after the bones were discarded by humans (Lambert et al. 2000:59).

Turner and Turner (1990:201) state that carnivores would have been unable to get in and out of structures with 6-foot-high roofs and roof-only access. This is probably true of coyotes and most domestic dogs; however, Mindeleff (1989:159–160 [1891]) did observe a few dogs at Zuni that were able to "clumsily" make their way up and down ladders. So it is not impossible that some canid damage to bones at Castle Rock occurred to bodies on structure floors, but most such damage probably occurred to bodies that were left on the prehistoric ground surface for at least a few days.

It is worth mentioning here that, according to White (1992:155), there is no reliable method for determining the taxon responsible for any particular carnivore-induced mark. Humans are also carnivores. Human coprolites have been found to contain bones, and some bones might have been chewed by the ancient Puebloans (White 1992:345, 346). Even though we believe that much of the carnivore damage in this assemblage was probably canid-induced and resulted from a failure to promptly bury bodies or modified remains of the individuals killed during the attack, we caution against an a priori assumption that all carnivore damage was caused by nonhuman agents.

Discussion

In this section we present discussion, comparisons, and inferences about the violent events that occurred at both Castle Rock and Sand Canyon pueblos, based on all available data. Evidence of violence and violent death is present on the bones of many individuals from Castle Rock Pueblo and some of the individuals from Sand Canyon Pueblo. Evidence of violent death includes unhealed, depressed skull fractures, concentrations of disarticulated, commingled remains, and perimortem modifications such as fractures, cutmarks, thermal alteration, and absence of cancellous bone. Although we are aware that each of these perimortem (occurring around the time of death) modifications, considered in isolation, does not necessarily indicate violent death, we infer that these modifications in the Castle Rock and Sand Canyon assemblages resulted from violent actions for three reasons. First, there is no ethnographic or other evidence that scalping, dismembering, defleshing, heat altering, bone fracturing, or reaming are or ever were part of considerate treatment of the dead in Pueblo Indian culture. Second, the remains that had been subjected to these modifications had not been formally buried, but instead had been left exposed to scavengers and the elements, which argues that the modifications were not part of a considerate funerary ritual. And finally, at Castle Rock Pueblo, we not only see multiple examples of lethal skull trauma, but we also have good contextual evidence that all individuals represented at the site died during one event at the end of the occupation of the village, leading to the inference that this event was a violent one. Because it seems improbable that some villagers died in a violent event at the same time that

many others died of disease or starvation, it is reasonable to infer violent death for those individuals whose remains reveal no unequivocal signs of fatal trauma (violent death does not necessarily leave skeletal impress) but whose bones nevertheless display one or more of the aforementioned indirect indications of violent death. In addition, it is possible that modifications to bodies in some cases obliterated evidence of fatal trauma, such as embedded arrow points.

Antemortem Trauma

The antemortem trauma in these assemblages is indicative of violence at the villages before the final assault on Castle Rock, and before the abandonment of Sand Canyon Pueblo. In the Sand Canyon Pueblo assemblage, five antemortem trauma lesions were documented, and another four lesions could have been antemortem or perimortem (Table 3); all were located on skulls. The evidence of antemortem trauma in both the Sand Canyon and Castle Rock assemblages consist almost exclusively of cranial fractures. There are at least 17, and as many as 23, antemortem trauma lesions on skulls and one lesion (a slice) on a tibia. This seems unusual in that out of the approximately 3,200 identifiable bones and bone fragments from both sites combined, one might expect to find a few healed fractures to clavicles, ribs, or the bones of the arms or legs.

For example, the human remains from the Ute Mountain Ute Irrigated Lands Archaeological Project exhibited a very high incidence of antemortem cranial depression fractures as well as rib fractures, both of which were more common in males than in females (Lambert 1999:140, Table 6.12). The antemortem trauma in the La Plata River valley assemblage also included a substantial amount of postcranial as well as cranial trauma (Martin 1997). However, Karhu (2000:50, 60) reports that four of the five traumatic injuries on remains from primary interments at Yellow Jacket sites 5MT1 and 5MT3 were antemortem skull fractures resulting from blunt force trauma to the cranium, and among the types of trauma in the Pecos Pueblo assemblage, Hooton (1930:312–315) also found a predominance of cranial trauma, which he attributed to warfare.

What is also unexpected in our assemblages is that the antemortem lesions are not randomly distributed among the remains, especially in the Castle Rock assemblage. Rather, some individuals appear to have been the victims of repeated violence in the form of blows to the head. It is probable that the two 40-year-old females and the noncradleboarded 8-year-old child from Castle Rock with antemortem lesions (Table 3) were singled out as victims, either by one or more people in their own village or by an enemy group.

A reason for this possible singling-out is difficult to determine from the evidence at hand, although the targeting of adult women and a small child for head trauma might have been the result of intravillage rather than intervillage violence. Domestic violence is one possibility. Lambert (1997:89–90) suggests that, among the precontact peoples of coastal southern California, spousal abuse was responsible for the high incidence of female antemortem cranial trauma. Martin (1997) found evidence on human remains from the La Plata River valley of patterned violence against adult females. She infers an underclass composed of female emigrants or of women abducted during raiding. Wilkinson (1997) found a substantial amount of antemortem skull trauma on human remains from a Late Woodland site, and the fractures on women's skulls were more numerous and more severe than those on male skulls (Wilkinson 1997:28–31). Wilkinson infers that these females might have been captured during raiding and subsequently abused. This inference is based on recorded abuse of abductees among several Native American tribes (Wilkinson 1997:38).

There is some evidence indicative of a Puebloan practice of taking captives. Hurst and Turner (1993:171) and Turner et al. (1993) infer from the underrepresentation of women and children in the Cave 7 (Basketmaker II) and the Largo-Gallina (A.D. 1100–1300) assemblages, respectively, that women and children might have been taken captive during some attacks in which mostly adult males were killed. During the destruction of the Hopi village of Sikyátki, girls and younger women reportedly were taken captive and became wives of their attackers (Mindeleff 1989:25 [1891]), at least some captives reportedly survived the attack on Awatovi (Turner and Turner 1999:67–77), and Parsons (1969:XXVII) tells of a Paiute boy living at Tewa Village whom she believed had been captured in a raid.

Human remains from the ancient northern Southwest in general appear to contain relatively little antemortem trauma, but what little there is seems to be located primarily on skulls. We infer from the fore-

going evidence that ancient Pueblo people apparently seldom suffered falls or accidents that caused bone fractures, and that trauma to skulls was, for the most part, the result of violent interactions. The antemortem trauma on adult male skulls in our assemblages would not be uncharacteristic of wounds sustained in warfare events; however, the concentration of many of the healed skull trauma lesions on a few female skulls suggests a type of violence other than warfare (Kuckelman 2001).

Perimortem Trauma

Fatal skull fractures have been reported from numerous ancient human remains assemblages in the Southwest (Hurst and Turner 1993; Morris 1939:42–43; Turner and Turner 1999; White 1992). Many of the assemblages containing these skulls exhibit additional evidence of violence, and little antemortem trauma has been documented on postcranial bones, so most of these fractures are unlikely to have resulted from accidents.

Violence at Castle Rock and Sand Canyon pueblos undoubtedly took a variety of forms, and probably many victims were impaled with arrows. However, the high incidence of skull fractures from these sites suggests that hitting one's victim on the head with a weapon was a widely used form of violent assault (Table 3) (Kuckelman 2001, 2002). At least six individuals in these two villages apparently were killed by fatal blows to the head—four were killed by blows to the back of the skull, and two were killed by blows to the left frontal area of the skull. The latter two individuals were adult males aged 40 to 45 years. Skull fractures of the left frontal area have been interpreted to have been inflicted by a right-handed perpetrator in a face-to-face confrontation (Lambert 1997:89). In our assemblages, those killed by one or more blows to the back of the head are a 40-year-old female, a 20-year-old possible male, a 12-to-15-year-old adolescent, and an 8-year-old child. These people were killed from behind, probably either struck down while attempting to flee, or caught by surprise. Skulls from Wilkinson's (1997) Late Woodland site exhibited a similar pattern of trauma—a few frontal lesions on male skulls, and more scattered trauma lesions on female skulls.

Internal vault release was documented for eight different crania in the Castle Rock assemblage, and two crania in the Sand Canyon Pueblo assemblage (Table 3). According to White (1992:133–134), this type of trauma is a fracture of the cranium across a vault bone (as opposed to along a suture), resulting in the inner table of compact vault bone releasing from spongy bone superficial to it, and usually occurring from impact to the outside surface of the cranium. This type of damage is a fracture pattern commonly recorded in forensic cases of cranial trauma (Spitz 1973). In the Castle Rock assemblage, four of the crania or cranial fragments that exhibit internal vault release were also heat altered. We interpret internal vault release trauma and heat altering of crania as evidence of violent death. Thermal alteration of crania has been interpreted by researchers as evidence of intentional heating of the brain tissue (Billman et al. 2000; Flinn et al. 1976:315; Turner and Turner 1999:429; White 1992:207).

We infer that many of the perimortem fractures in this assemblage were violently inflicted by humans. However, it is not possible to differentiate between perimortem fractures that occurred just before death, at the time of death, or just after the death of the individual (White 1992:133). This includes the broken teeth from blows to the mouths of at least four individuals. Thus, any of these perimortem fractures could have occurred as wounds inflicted during the attack or as the result of trophy-taking, torture, preparation for consumption, or some other, unknown purpose.

Trophy-Taking

Evidence of trophy-taking at Castle Rock and Sand Canyon pueblos includes signs of scalping, decapitation, and face removal. Additional possible trophy-taking could have involved the removal of hands or feet, as the bones of these extremities are poorly represented among the Castle Rock disarticulated remains.

Scalping. Evidence of probable scalping was documented on the skulls of two individuals (HROs 19 and 22) in the Sand Canyon Pueblo assemblage. Scalping marks were also noted on children's skulls in the cannibalized Yellow Jacket (site 5MT1) remains (Malville 1989). The percussion striae on the frontal bone of a 35-to-50-year-old male (HRO 9) at Castle Rock Pueblo could also have been related to scalping.

Evidence of scalping in the New World has been found on human skulls in many areas of the United States from as early as the Archaic period (Smith 1997). Scalping was practiced in the northern South-

west at least as early as Basketmaker II times (Hurst and Turner 1993:169), continued through precontact times (Baker 1994:37; France 1988; Lambert 1999:141; Turner and Turner 1999; White 1992), and has been documented in historic times in many pueblos, including Hopi and Zuni (Ellis 1951; Parsons 1974:139, 1996; Titiev 1992:161). According to Stephen (1969:99–100), Hopi attackers scalped Apache enemies during the childhood of a man still living in 1893.

Decapitation. At least two individuals represented in the Castle Rock and Sand Canyon pueblo assemblages (in HRO 3 and HRO 24, respectively) might have suffered perimortem decapitation. The skull of a 40-year-old probable female in HRO 3 was articulated with three cervical vertebrae. There are no cutmarks on the cervical vertebrae in the associated bone concentrations of either skull. However, some cervical vertebrae are missing from HRO 3, and the presence of all cervical vertebrae from HRO 24 could not be confirmed due to incomplete exposure of elements during excavation. The association of cervical vertebrae with skulls that are disarticulated from the remainder of the bones of a skeleton has been interpreted as evidence of perimortem decapitation in prehistoric assemblages (Billman et al. 2000:159; Frayer 1997; O'Shea and Bridges 1989:11), in protohistoric assemblages (Owsley et al.1977), in modern forensic cases of decapitation (Buikstra and Gordon 1980:247), and in cases of proposed anthropophagy (Aguadé and Lory 1997:222; White 1992:206). Parsons (1996:424) states that heads were habitually taken as trophies by Pueblo people during warfare, and there are many instances of skulls without bodies and bodies without skulls in assemblages from the ancient Southwest (Turner and Turner 1999; Wilcox and Haas 1994:227–229).

Face Removal. The face of an adult male (HRO 9) at Castle Rock Pueblo had been removed. The portion removed would have looked very similar to that removed from skeleton number 322 from the Cave 7 massacre assemblage (Hurst and Turner 1993:Figure 8.31; Turner and Turner 1999:Figure 3.4). Face removal has been interpreted to have occurred to gain access to the brain for the purpose of consumption (Nass and Bellantoni 1982:268; White 1992:207). The removal of the face of HRO 9 is thus inferred to have been related to trophy-taking, or to gaining access to the brain for the purpose of consumption.

Weapons and Tools

Depressed skull fractures at Castle Rock and Sand Canyon pueblos are thought to have been caused by war clubs or hafted axes (Kuckelman 2002), both of which are known to have been used as weapons in Puebloan warfare (Lomatuway'ma et al. 1993:399; Stephen 1969:95; Titiev 1992:66; Woodbury 1954:42). Although no arrow points were found embedded in bones at either site, the bow and arrow was probably also used as a weapon in the violence at Castle Rock and Sand Canyon pueblos. Petroglyphs on the butte face at Castle Rock depict anthropomorphic figures holding drawn bows (Kuckelman 2000b:Figure 1; Lightfoot and Kuckelman 2001:Figure 3.5). The disarticulation of most remains at Castle Rock would have destroyed any original association between skeletons and arrow points that had been embedded in flesh or body cavities. It is possible that some of the projectile points found at these sites were associated with the fatal attack on the village; one point found at Castle Rock was a nonlocal type (Bull Creek) and material (see *Identity of the Attackers* below).

The following artifacts from Castle Rock were tested for the presence of human myoglobin (see more on myoglobin under "Anthropophagy" below): four hammerstones,10 projectile points, seven axes, eight bifaces, and a chipped stone tool. All four of the hammerstones and two of the axes tested positive for myoglobin, indicating that these objects came into direct contact with human muscle tissue (see R. Marlar et al. 2000 for a description of this type of analysis). We can only speculate about behaviors that would have resulted in the presence of this residue on these artifacts, although Lambert et al. (2000:54–55) refer to objects such as these as "tools suitable for heavy butchering and disarticulation." These tools could thus have been used for dismemberment, marrow extraction (Lambert et al. 2000:52) (see "Anthropophagy" below), or torture.

Anthropophagy

A substantial amount of research on cannibalism in the ancient Southwest has been carried out during the past 30 years (e.g., Baker 1994; Billman et al. 2000; Flinn et al. 1976; Lambert 1999; Lambert et al. 2000; Leonard et al. 2001; Malville 1989; J. Marlar et al. 2000; R. Marlar et al. 2000; Nass and Bellantoni 1982; Nickens 1975; Turner 1993; Turner and

Morris 1970; Turner and Turner 1999; White 1992). There are several characteristics that tend to co-occur in assemblages thought to have been subjected to anthropophagy: perimortem fracturing, burning, disarticulation, cutmarks, under-representation of vertebrae, and percussion pits and abrasions (Baker 1994; Lambert 1999; Lambert et al. 2000; Nass and Bellantoni 1982; Turner and Turner 1992,1999; White 1992). When compared to the bone conditions as used by White (1992) and suggested by Turner and Turner (1999:Table 2.11) as characteristic of either secondary burials, conflict, or anthropophagy, the characteristics of the Castle Rock Pueblo assemblage most closely match the characteristics of anthropophagy. We also compared the Castle Rock and Sand Canyon pueblo assemblages to those from non-cannibalized massacre sites such as Cave 7 (Basketmaker II) (Hurst and Turner 1993:170) and Crow Creek (A.D. 1300s) (Gregg et al. 1981:287). The perimortem damage to the skeletal material from the Cave 7 and the Crow Creek assemblages (White 1992:27) includes massive skull damage from conflict, mutilation, probable torture, and trophy-taking, but no heat alteration, reaming, or polishing. The modifications in the Sand Canyon Pueblo assemblage are not substantially different from those observed in the Cave 7 and Crow Creek assemblages, with the exception of the reamed femur from Sand Canyon. In the Castle Rock assemblage, the substantial breakage of postcranial elements, more numerous cutmarks on long bones, the reaming and polishing, as well as the burning of selected elements and the selective movement of body parts around the village, are suggestive of additional, different actions from those in evidence in the massacre-only assemblages.

The types of modifications in the Castle Rock assemblage closely resemble the modifications described for the Mancos Canyon (White 1992) and Cowboy Wash (site 5MT10010) (Billman et al. 2000) assemblages, two sites for which strong arguments of anthropophagy have been made. The relative quantity of modifications (especially breakage) is proportionately less in the Castle Rock assemblage. We infer that a minimum of 41 people were killed during one incident at Castle Rock. The three mostly articulated individuals were clearly not dismembered; however, the bones of the other 38 people represented are so mixed that it is not possible to determine with any degree of accuracy how many bodies were then subjected to dismemberment, thermal alteration, and additional breakage. We infer that the lower percentage of modifications at Castle Rock resulted from proportionally fewer bodies being modified at this site; that is, the difference in treatment was quantitative rather than qualitative.

Nevertheless, the overall similarity in the types of modifications between the Castle Rock and Cowboy Wash assemblages is important, because associated with the Cowboy Wash remains was a human coprolite (Billman et al. 2000; J. Marlar et al. 2000; R. Marlar et al. 2000). ELISA (enzyme immunosorbent assay) analysis of this coprolite revealed the presence of human myoglobin—found only in human muscle tissue (R. Marlar et al. 2000). The coprolite also tested positive for human brain tissue (Leonard et al. 2001; Marlar 2000). Brain consumption was also indicated by the presence of heat-altered crania at that site (Billman et al. 2000; Lambert 1999). These findings link modified bone assemblages such as that from Castle Rock Pueblo with direct evidence of anthropophagy.

ELISA was also performed on six vessels from two kiva floors at Castle Rock Pueblo; three of these vessels tested positive for human myoglobin. Two of the vessels that tested positive—a corrugated cooking pot and a mug—were found on the floor of Structure 302, the kiva in which bone concentration HRO 3 was found. The other vessel that tested positive was a corrugated cooking vessel from the floor of Structure 206, the kiva containing HRO 2. The presence of human myoglobin in these vessels indicates that human muscle tissue was contained within them, and suggests that this tissue was cooked in the jars, and might have been either ladeled or consumed in the mug. For the disarticulated portion of the human remains assemblage from Castle Rock, then, we feel that the most parsimonious explanation for the co-occurrence of evidence of dismemberment, spiral fracturing, patterned heat alteration of selected elements, movement of selected elements, and marrow removal, considered with the contextual field data and the presence of human myoglobin in cooking vessels, is that some of the bodies of individuals killed in the final attack on the village were subjected to anthropophagy.

Witchcraft

Some researchers have proposed witch execution as a possible explanation for the modified human

remains in the Southwest that others have interpreted as evidence of anthropophagy. In the most comprehensive presentation of this theory to date, Darling (1998:733) documents a strong association in the historic Pueblo belief system between witchcraft and anthropophagy; specifically, that witches are typically cannibalistic (Darling 1998:734). He outlines detailed procedures for induction into Pueblo witch societies (Darling 1998:735), and Hawley (1950:150–151) confirms that Pueblo Indian witches believe in their own power. Darling summarizes accounts of torture and execution of suspected witches, and argues that execution was likely to have included dismemberment and other means of reducing the remains of those who were executed. He argues that these processes could produce mass inhumations of fragmented bones that might be mistakenly interpreted as evidence of anthropophagy. However, because there are no accounts that detail the destruction of witches' bodies in historic times (Darling 1998:743), no similarity can be demonstrated between the remains of those individuals executed as witches in historic times and the ancient remains interpreted to have been cannibalized. Without such taphonomic data, it is difficult to ascribe witch execution to specific assemblages of ancient human remains.

Just as importantly, proponents of the witchcraft theory have failed to address a possibly critical aspect of the proposed relationship between witchcraft and anthropophagy; that is, what the victims of the presumed cannibalistic acts of the individuals in the witch societies would look like in the archaeological record. Thus, if members of witch societies did in fact engage in anthropophagy, then there should be archaeological evidence of that activity. This subject deserves further study.

However, it is still possible that the attack on Castle Rock Pueblo was designed to destroy witches. Most incidents involving witchcraft accusation or execution documented in Pueblos in historic times involved one, or at most a few, witches (Darling 1998; Simmons 1974), but in one incident in 1700 or 1701 most or all of the inhabitants of the village of Awatovi were massacred by warriors from other Hopi villages (Brew 1949:20–24; Lomatuway'ma et al.1993:401; Turner and Turner 1999:72–77; Waters 1977:259–265). This massacre was reportedly motivated by the Awatovi villagers' embrace of Christianity, which was considered to be sorcery or witchcraft (Fewkes 1898:603–605). It is not impossible that the attack on Castle Rock was motivated by a similar transgression.

But the problems with associating the modified human remains at Castle Rock in any way with either witch activities or witch executions run deeper. First, demonstrating human motivation from physical remains is difficult, and it is a task for which archaeology is ill-suited. In this paper, for example, we must first establish *what* happened at Castle Rock before venturing into the waters of *why* it happened. Second, determining the nature, role, and even the existence of pre-contact Pueblo Indian witchcraft beliefs is challenging at best. Spaniards coming to the American Southwest in the 1600s brought the mentality of a century of witch mania from Europe that included the brutal execution of many thousands of suspected witches (Simmons 1974) and the association of anthropophagy with witchcraft (Mair 1969:222), an association that did not necessarily exist before that time in Pueblo witchcraft beliefs. Simmons (1974:13) claims that American Indian witchcraft concepts were distinctively simple and innocuous before the Spanish concepts of witchcraft were introduced into the Southwest, and that the practice of witchcraft in the Southwest expanded prodigiously as a result of contact with the Spanish (Simmons 1974:14). Parsons (1996:1108–1112) discusses specific aspects of historic Pueblo Indian witchcraft that she believes were adopted from the Spanish in post-contact times, but admits the difficulty in separating the two belief systems. In addition, as Lekson (1990:76) points out, the massive immigration and displacement of Puebloans in the A.D. 1300s must have profoundly affected almost every aspect of Pueblo life, creating a very real "gap" at A.D. 1300, and across which it is very dangerous to project backwards. The difficulty of separating introduced concepts of witchcraft from indigenous Pueblo concepts makes it nearly impossible to argue convincingly—even using historic accounts of Pueblo witch persecution—that either witch activities or witchcraft retribution stimulated the thirteenth-century attack on Castle Rock Pueblo or was responsible for the many modifications to the human remains there. So although it is not impossible that witch activity or witchcraft retribution played a role in the decimation at Castle Rock, it would be very difficult to substantiate this hypothesis with empirical data.

Identity of the Attackers

The human remains found at Castle Rock Pueblo are believed to have been those of Puebloan village residents. Little evidence was found at the site to indicate the identity of the attackers. Possible clues to the attackers' identity include the types of projectile points found at the site, two noncradleboarded skulls, and evidence from other sites in the region that contained evidence of violent deaths. Also, an oral history recorded in 1874 of a relentless siege that purportedly destroyed Castle Rock Pueblo, quoted in its entirety elsewhere (Kuckelman 2000c; Lightfoot and Kuckelman 2001:54–56), identifies the attackers as ancestors of the Utes who came down from the north (Jackson 1981 [1878]; Lightfoot and Kuckelman 2001).

Most of the 48 projectile points found at Castle Rock Pueblo were of typical late Puebloan style for this region. Six points were found in the excavated portion of collapsed roofing material of Structure 302, the kiva that contained HRO 3. Any or all of these points could have been used in the attack. One Bull Creek point made of a nonlocal material was found in the fill of Structure 204 (a kiva). This style of point has been found only rarely in southwestern Colorado, but is most often found in the Colorado River area of southeastern Utah, in the transition zone between the Pueblo and Fremont cultures (Fetterman and Honeycutt 1990; Geib 1996; Holmer and Weder 1980; Kuckelman 2000d:par. 7; Matheny 1962; Ortman 2000:par. 99; Pierce et al. 1999). This point could have been used in the attack, or could have arrived at the site by any one of numerous other means.

Two victims at Castle Rock Pueblo might not have been Puebloan. Two crania appear not to have been cradleboarded—one was the disarticulated skull of an adult, probably female (in HRO 5), and the other was the skull of an articulated skeleton of a child about eight years old (HRO 10). The deformation of human skulls found throughout the Mesa Verde region indicates that cradleboarding was ubiquitous in the region by late Pueblo III times (Billman et al. 2000:164), and has been used to confirm the cultural relatedness of individuals in a burial population (Karhu 2000:50). Thus, the presence of noncradleboarded crania at Castle Rock might reflect the presence of members of a different cultural group. It is possible that these two individuals were immigrants from outside the region or were abductees taken captive during raids on non-Puebloan groups. Antemortem trauma lesions on the child's skull could be interpreted as substantiation of the abductee theory (see *Antemortem Trauma* above). Only a few other noncradleboarded skulls have been reported in late Puebloan assemblages in the northern Southwest (Hayes and Lancaster 1975:172; Martin 1997:65; Morris 1939:102; White 1992:94).

Morris (1939:42) states that the evidence of violent death at Snider's Well (late Pueblo II or Pueblo III), near Yucca House, is "more suggestive of strife among Pueblo peoples than of attack by nomads." Rattlesnake Ruin, a small Puebloan field house in southeastern Utah (A.D. 1050–1100), contained the possibly cannibalized remains of at least 20 people (Baker 1994). On the basis of the small size of the site and the large number of victims, Baker (1994:36) speculates that the victims were brought to the site from elsewhere. This description seems to fit the definition of a "perpetrator" site proposed by Billman et al. (2000:173) in which "captives and body parts would have been brought back, consumed, and then disposed of in a manner similar to routine refuse." Rattlesnake Ruin is clearly ancestral Puebloan in affiliation, as are the victims, indicating that both the attackers and victims were Puebloan. The same can be said of the circumstances at Mancos Canyon (site 5MTUMR 2346). The human remains there were identified by White (1992:99) as being of local Pueblo Indians, and the dead—probably victims of anthropophagy—are too numerous to have all been residents of the site. Thus, both the inhabitants and the nonresident victims were Puebloan.

Thus, although various researchers have postulated hostile interaction between Pueblo Indians and nomadic groups late in the Pueblo occupation of this region, there is little evidence to support this (Cordell 1984:305–306; Wilcox and Haas 1994:237). Lipe and Varien (1999b:341) maintain that there is no archaeological evidence of Numic or Athapaskan groups in the Four Corners area prior to A.D. 1300. Mindeleff (1989:25 [1891]) was informed by Hopi that the first "serious inroad" of a hostile tribe in the northern Southwest occurred after the destruction of Sikyátki, an event Fewkes (1898:591) dated to the fifteenth century. So although there is some evidence at Castle Rock to indicate that non-Puebloans could have been in the region and engaging in hostile actions, the bulk of the evidence supports an infer-

ence of inter-Puebloan violence.

Which Puebloan communities in the northern San Juan region were still populous enough late in the thirteenth century to have defeated Castle Rock Pueblo? If most of the Castle Rock adult males were within the village when the attack occurred, a force of between 42 and 126 warriors would have been required to defeat the village (Kuckelman 2002). Within the region, a sizable population apparently still inhabited the Yellow Jacket and the Sand Canyon communities, and adequate populations probably also remained on Mesa Verde and possibly in the Hovenweep area (Kuckelman 2002). Inter-regionally, the Kayenta region to the west and southwest and the Totah region to the south would also have contained enough warriors to have defeated this village. Or an alliance between any of these groups could have resulted in an attacking force of the requisite size.

Summary and Conclusions

The human remains assemblages and depositional contexts at Castle Rock and Sand Canyon pueblos reviewed in this paper clearly indicate that many people in these two thirteenth-century villages were victims of lethal as well as nonlethal violence. Much of the lethal violence appears to have occurred during the depopulation of the region late in the thirteenth century. The evidence from Castle Rock is abundant and indicates that many of the residents of this village were killed during a warfare event sometime after A.D. 1274.

It is difficult to ascertain whether the lethal violence at Sand Canyon Pueblo occurred during two or more events or primarily as a single event at the end of village occupation; however, the remains of the individuals that exhibit clear evidence of violent death were for the most part clustered on the site, which suggests that these people died in one warfare event. The contexts of the remains indicate that this event occurred at or near the time of village abandonment. Thus, many indicators of violence and warfare have been found at both of these sites (see also Kuckelman 2002).

That actions beyond those necessary to cause death occurred at both villages is also clear. At Sand Canyon Pueblo, those actions appear to have been restricted to trophy-taking and excessive bone breakage resulting from an unnecessary level of violence or from torture. At Castle Rock Pueblo, however, in addition to trophy-taking and excessive violence, bodies were dismembered and certain body parts such as legs were removed and placed in specific structures, selected body parts were subjected to heat, many bones were broken, at least a few bones were reamed, and the end of at least one fractured long bone was polished. Muscle tissue was placed in at least two cooking vessels and one mug, and was probably cooked. At this site, as at Cowboy Wash (site 5MT10010), there is evidence of roasting of major body parts as well as of cooking flesh in vessels (Lambert et al. 2000:61).

Castle Rock fits the profile of a "victim" site, where villagers were killed, processed, and at least partly consumed (Billman et al. 2000:173). Unlike, for example, the perimortem-damaged and extremely processed human remains that were found mixed with secondary refuse at Yellow Jacket sites 5MT1 and 5MT3 (Karhu 2000:65, 211–224)—possible "perpetrator"sites—no human remains were found in secondary refuse deposits at Castle Rock.

The co-occurrence of clear evidence of violent death, warfare, and associated evidence indicative of anthropophagy at Castle Rock is important in that in most assemblages of proposed anthropophagy (Billman et al. 2000; Malville 1989:20; White 1992), bones were reduced to such an extent that any direct evidence of violent death that might have originally existed was destroyed. No embedded weapon point has been found in any bone or bone fragment in a human bone assemblage suspected of being cannibalized (Turner and Turner 1999:221). Ferguson (1997:324) points out that anthropophagy does not necessarily involve killing; in some cases, only those who died of natural causes were consumed. White (1992:348) proposes that the people who were cannibalized at Mancos Canyon (site 5MTUMR2346) *could* have died of starvation, then been consumed by starving survivors; thus, it was not possible to determine the degree to which cannibalism and warfare were related (White 1992:361). The Castle Rock Pueblo assemblage may therefore be unique in the Southwest thus far in that it establishes a critical link between a warfare event in which many people were killed and probable associated anthropophagy (cf. Turner and Turner 1999:Table 3.80).

Establishing a link between warfare and anthropophagy is important for another reason as well. It allows us to eliminate some possible interpretations regarding the type of anthropophagy practiced at

Castle Rock Pueblo and potentially at other sites with similar evidence. Various researchers have defined and labeled numerous types of anthropophagy (White 1992:12–13). These types can be generally categorized as either endocannibalism (within one's group), which is usually respectful, and exocannibalism (outside one's group), which is usually associated with aggression. We believe that endocannibalism, which usually includes the consumption of friends or relatives as part of a funerary ritual, can be eliminated as a possibility for the Castle Rock assemblage because of the associated violence, and because it is clear that during and after human modification, the remains at Castle Rock Pueblo were not treated or disposed of in a considerate way.

What form of exocannibalism best fits our data, then? Types of exocannibalism include gustatory (culturally accepted), survival (starvation induced), and revenge and magico-religious (both are related to warfare). Gustatory cannibalism would seem to be unlikely for the Castle Rock assemblage and for ancestral Puebloans in general. If anthropophagy was a culturally-accepted dietary practice in ancient times, the archaeological evidence would be ubiquitous. Although there are many cases of possible anthropophagy in the ancient Southwest (Turner and Turner 1999), and Hopi oral traditions "contain vocabulary items that prove unequivocally that the topic of cannibalism was once fully part of Hopi linguistic and cultural reality" (Malotki and Gary 1999:12), evidence to indicate that there was regular consumption of human flesh among ancient Puebloans is lacking.

It is possible that starvation was the primary catalyst for the destruction of Castle Rock. However, survival cannibalism appears on the surface not to fit the Castle Rock data very well, because the evidence indicates that only some of the victims of the attack were cannibalized. If the attack had been motivated by starvation, one might expect more bones to show modifications, and greater reduction of bones, both of which should have resulted from attempts to derive the most nutrition possible from the remains. A scenario such as that might have resulted in assemblages such as those exhibiting "extreme processing" (Kuckelman et al. 2000:Table 1). However, a minimum of approximately 2,000 lbs of consumable material would have been available—calculated using Turner and Turner's estimates (1999:34) of the quantity of consumable material that would be derived from a human body—after the attack on Castle Rock. Perhaps there was more material than needed or more than could be consumed before the passage of time rendered the remains inedible. With starvation cannibalism, the degree to which a body is reduced might well be a function of how much meat is available (White 1992:359). Also, because such a small subset of total behaviors that occurred leave skeletal evidence, and because only 5 percent of Castle Rock Pueblo was excavated, these activities cannot be accurately quantified.

Numerous incidents of possible anthropophagy associated with "extreme processing" of human remains appear to date from the mid–A.D. 1100s (Billman et al. 2000:Table 8; Kuckelman et al. 2000:Table 1), near the time of the demise of the Chacoan system and the onset of a severe drought (Van West and Dean 2000). These incidents might have been starvation induced. For example, Nickens (1975:292) infers starvation cannibalism for the Mancos Canyon (site 5MTUMR 2346) assemblage; this was an incident of "extreme processing" of a large number (29 to 33) of people. Billman et al. (2000:173) suggest a variety of possible causes for the Cowboy Wash probable anthropophagy, including severe drought (starvation) and social upheaval associated with the demise of the Chaco system. Incidents of starvation cannibalism are alluded to in the Hopi ethnographic record (Malotki and Gary 1999:11).

Warfare-related, magico-religious cannibalism apparently has some pecedent in Puebloan culture. Among the Hopi, chewing on shreds of enemy scalps was thought to make children brave-hearted (Malotki and Gary 1999:11; Stephen 1969:99), and there are also accounts of communal consumption of the hearts of enemies (Malotki and Gary 1999:11). Although these actions are substantially different from dismembering, cooking, and consuming major portions of bodies, it is evidence that the concept of human flesh consumption was not unknown in Puebloan warfare. It is possible that the concept was expanded during times of famine to make the most of war spoils, and this scenario may be the best fit for the Castle Rock data. Revenge cannibalism also cannot be ruled out for Castle Rock, however; face removal, decapitation, scalping, and excessive skull fracturing would be considered evidence of vengeful aggression in many cultures.

Politically motivated display cannibalism has been recently explored by various researchers (LeBlanc 1999:176–186; Lekson 1999a,1999b; Turner and Turner 1999:413, 463). This theory postulates that many of the incidents of probable anthropophagy in the northern Southwest were the result of terrorist tactics used by Chaco elite to control and manipulate the masses. A weakness of this theory, pointed out by Lipe and Varien (1999a:284–287) and Kuckelman et al. (2000) is that, within the Mesa Verde region, some assemblages of proposed anthropophagy date much earlier than the Chacoan great houses, and some date later. Lipe and Varien (1999a:286) and Billman et al. (2000:169) note that many of the cases of proposed anthropophagy date from the mid–A.D. 1100s; this timing would indicate that the violence and probable anthropophagy were more likely to have been associated with the decline of the Chacoan system and with the onset of a severe drought in the mid–A.D. 1100s (Van West 1994:Figure 5.1; Van West and Dean 2000) than with the establishment or maintenance of the system. These two conditions could have given rise to anthropophagy stimulated by any or all of numerous motivators such as starvation, revenge, or social chaos resulting from the decline of the Chacoan system.

Castle Rock was destroyed in the late A.D. 1200s, however, which was long after the decline of the Chacoan system. But this violence also occurred during a time of environmental stress. The tree-ring record indicates that a major drought lasted from A.D. 1276 to 1299 (Douglass 1929), and that precipitation fell much more variably and unpredictably between A.D. 1250 and 1450 (Dean 1996). According to Petersen (1992:23), moisture problems combined with cooler temperatures, and shortened growing seasons caused by the onset of the first phase of the Little Ice Age could have virtually eliminated the dry-farming belt in the Mesa Verde region by the late A.D. 1200s.

Population pressure might well have been an additional factor. If climatic deterioration caused a resource shortage, the severity of the problem would have been a function of the size of the population dependent on dwindling resources. These conditions would have provided more than enough stress to adaptive systems to have resulted in an escalation of violence during the late A.D. 1200s and to have played a major role in the migration of the Pueblo Indians from the Mesa Verde region (Van West and Dean 2000). Many researchers have found a correlation between stressful environmental conditions and violent conflict (Ferguson 1997:340–341; Lambert 1997:78; Mackey and Green 1979:153; Milner et al.1991; O'Shea and Bridges 1989:17). Thus, it is probable that famine and competition for resources were at least some of the motivators for the late A.D. 1200s atrocities at Castle Rock.

The clear evidence of warfare at Sand Canyon Pueblo, and of warfare and probable warfare-associated anthropophagy at Castle Rock Pueblo contributes significantly to our understanding of violence in the Mesa Verde region during the thirteenth century. The association of violent death, institutionalized warfare practices, and probable anthropophagy serves to eliminate some possible motivations and interpretations for other modified mass burials and to inch forward our understanding of violence and its role in Puebloan prehistory.

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Notes

1. Crow Canyon's research at Castle Rock and Sand Canyon pueblos involving the study of human remains from federal lands was carried out under permit issued by the Bureau of Land Management (BLM), which mandates that the center engage in NAGPRA consultations and address issues about how research is conducted and reported. The BLM has conducted official consultations with affiliated Native American groups and interested parties regarding the nature and extent of Crow Canyon's research on public lands, including the study and treatment of human remains in archaeological contexts. Publication of these data in a scientific forum satisfies the specific conditions of Crow Canyon's permit to research archaeological sites on public lands.

2. As an integral part of its mission, the Crow Canyon Archaeological Center involves Native Americans in its research and public education programs. This includes the involvement of a ten-member Native American advisory group. One goal is to conduct archaeological research and public education in a manner that is respectful of Native American people and their perspectives. Through regular meetings, the center keeps the advisory group members informed and seeks their counsel. The fact that Crow Canyon's research at Castle Rock and Sand Canyon pueblos involves the study of human remains has mandated that the center not only engage in NAGPRA consultations, but also that it address the serious and emotionally charged issues about how the research is to be conducted and reported. Whenever possible to do so without compromising the integrity of our research, we revise our reports in response to comments from our advisory group. Our advisory group members act as consultants, and, as such, their participation in the review process does not mean that they support the conclusions or endorse the publication of this paper. We avoid publishing in ways that sensationalize human remains or interpretations based on their analysis. Many Native Americans, including some of the members of Crow Canyon's advisory group, may find some of the ideas discussed in this paper to be offensive and prefer that such ideas not be published. We appreciate the willingness of our advisory group members to work with us to the benefit of science and the discipline of archaeology.

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