A Tragic Day at Cross Mountain: Salvage Excavations at CA-KER-4619, Southern Sierra Nevada, California

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Abstract

In 1996 a crew from California State University, Bakersfield, conducted salvage excavations at a large habitation site (CA-KER-4619) in the southern Sierra Nevada. The site was mapped, and a number of burials eroding out of a stream bank were recovered or stabilized to avoid further damage. At least nine individuals were identified, including five adults, one juvenile, and three infants, the latter of which were buried in a common grave. The juvenile was adorned with numerous strands of beads (mostly of *Olivella* shell), and one of the adults had a "necklace" of *Haliotis* shell ornaments. DNA analysis of deciduous teeth from each of the three infants demonstrated that they had at least two different mothers. Projectile points suggested that the site dated sometime after 1,800 years ago, and two radiocarbon dates placed at least part of the occupation at about 400 B.P.. In the absence of any clear signs of trauma on any of the human remains, the radiocarbon dates suggest potential evidence of European disease transmission to native populations in post-Columbian, pre-mission times. The burial of three infants at the same time must have been a tragic day for the inhabitants of the Cross Mountain site.

Introduction

In the summer of 1996, a crew of archaeologists from California State University, Bakersfield (CSUB), conducted limited salvage excavations of human remains that were exposed in a stream bank at a location near Tehachapi in the foothills of the southern Sierra Nevada (Figure 1). The site, later named the Cross Mountain site (CA-KER-4619), is situated on private land that at that time was owned by Zond Systems, Inc. The exposed burials were discovered by a private citizen, who notified the Bureau of Land Management (BLM). The BLM then contacted Zond, at which time it was determined that some mitigation effort was necessary to avoid further destruction of the burials by erosional processes. CSUB was then contacted and requested to conduct salvage excavations in order to protect and preserve the human remains, and authorization to proceed was obtained from Mr. Ron Wermuth, the local Native American consultant. The BLM had estimated that there were two or three "isolated" burials that needed to be salvaged.

As soon as the crew from CSUB arrived at the site, it immediately became obvious that these were not just a few isolated burials. From the tremendous amount of cultural material visible on the surface, as well as extensive midden soil, it was quickly determined that this was a large habitation site containing a substantial cemetery. Given the little time CSUB was permitted, the primary goal of the project was to salvage the at-risk human remains, leaving an unknown portion of the cemetery intact. Due to these time constraints, only minimal mapping and documentation of the site beyond the burial features were feasible. The salvage excavations required two separate trips to the site in 1996, one in June and one in July. While numerous artifacts were observed across the surface of the site, the only surface collections performed

were in the areas around Hearth Feature 2 and Burial Feature 4.

This article provides details of the features (including the burials), artifacts, and ecofactual remains documented at the Cross Mountain site. It also includes discussions of the ethnographic context, prehistoric background, DNA analysis, and dating techniques used to assess the age of the site. While it was not a conventional excavation, the materials from the site permitted some intriguing interpretations.

Ethnographic Context

While there is some question as to the ethnicity of the occupants of the Cross Mountain site, it appears that the site was within ethnographic Kawaiisu territory (e.g., Zigmond 1986:398). As such, a brief discussion of Kawaiisu ethnography is provided below. Few

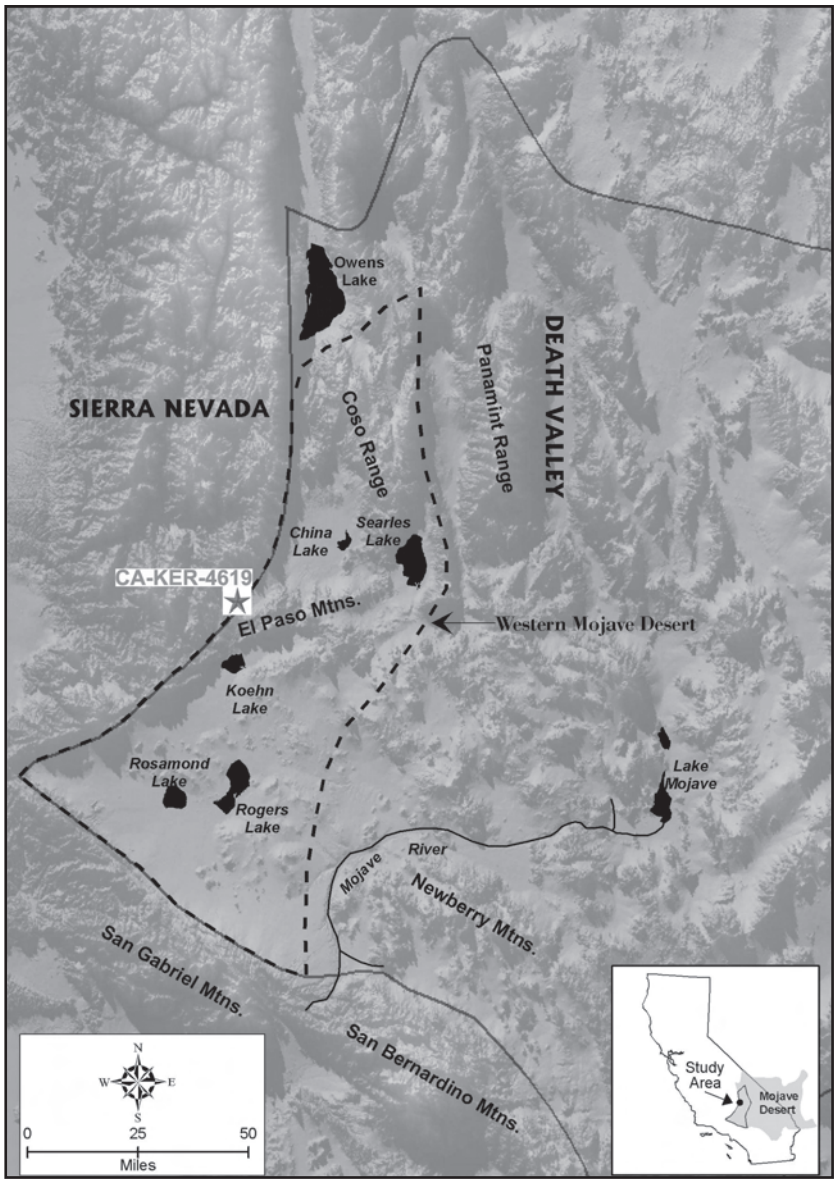

Figure 1. Location of the Cross Mountain site (CA-KER-4619). Map adapted from Gardner (2007:2).

detailed ethnographic data have been published on the Kawaiisu, although some contributions were made by Gifford (1917) on kinship, Kroeber (1925) on tribal aspects, Driver (1937) on culture traits, and Zigmond (1938, 1941, 1977, 1978, 1980, 1981) on various topics. The most cited data on the Kawaiisu, however, comes from Zigmond (1986), from which most of the following was synthesized.

Linguistically, the Kawaiisu belong to the western-most branch of the Southern Numic division of Northern Uto-Aztecan (Zigmond 1986:398). Although the origin, age, and diffusion of Southern Numic are unclear, at some point in time proto-Numic and Southern Numic appear to have dispersed near the southern Sierra Nevada in an area that was ethnographically documented as Kawaiisu territory (Fowler 1972:110). This dispersion is thought to have occurred roughly 2,000 years ago, which supports the idea that the Kawaiisu have occupied their present territory for at least that long (Zigmond 1986:399). It is also possible that the Kawaiisu moved into the southern Sierra Nevada only after about 1,000 B.P. (Kroeber 1925:601; also see Sutton 2010), suggesting that the Kawaiisu occupying the desert regions were a separate "Desert Kawaiisu" (Underwood 2006).

The Kawaiisu practiced a hunting and gathering economy, putting into service a diversified resource base consisting of a wide variety of botanical and faunal resources, including those used for food, medicine, and ritual purposes. Twined and coiled basketry played a significant role in the Kawaiisu subsistence system, and a variety of forms was utilized for gathering and preparation of food (Zigmond 1986:399). Bedrock mortars and pestles were also used for food preparation, as well as portable metates and manos. The fundamental sociopolitical organization of the Kawaiisu was the family group.

Of particular interest for this study is disposition of the dead. Zigmond (1986:404) reported that Kawaiisu deceased were typically "wrapped in a tule mat… placed in a rock cleft, covered with a split burden basket, and heaped over with rocks." Personal belongings were often buried with the deceased but could also be abandoned, burned, or retained by family or friends.

Prehistoric Background

The most recent prehistoric background for the Mojave Desert is that of Sutton et al. (2007), which incorporates much of the research of the last 25 years. Since the Cross Mountain site appears to date between the Rose Spring and Late Prehistoric complexes, a brief summary of that time span (ca. 1,800 B.P. to historic contact) is provided below.

The timing of the Rose Spring Complex (ca. 1,800 to 900 B.P.) has been established by numerous radiocarbon assays (e.g., McGuire et al. 1982; Sutton 1990, 1996; Yohe 1992; Gardner 2002, 2007; Williams 2009). Around the beginning of this time, or perhaps a little earlier, cultures appear to have changed dramatically across the western Mojave Desert. There is evidence of a shift in the environment after about 2,000 B.P. in the form of greater precipitation and elevated lake levels, which may have prompted a lacustrine emphasis (Sutton 1990; Gardner 2007). During this time, the bow and arrow diffused into the area, with the marker projectile points (Eastgate and Rose Spring series) presumably used as arrow points. Other evidence for this change includes a major population increase, dramatic changes in artifact assemblages, and well-developed middens (e.g., Sutton 1988, 1996; Gardner 2002, 2007).

After about 900 B.P., new technologies were introduced, and populations appear to have declined, signaling the inception of the Late Prehistoric Complex. This time is thought to reflect the late prehistory of ethnographic groups that resided in the desert. It was also a time of increasingly arid conditions that

probably began during the late Rose Spring Complex, with an apparent shift in subsistence and settlement focus to streams, springs, and wells. Late artifact assemblages contain Desert series projectile points (including Desert Side-notched and Cottonwood Triangular forms), buff and brown ware ceramics, shell and steatite beads, slate pendants, incised stones, and a variety of millingstones (see Gardner 2007).

Site Description

The Cross Mountain site is located in the southern Sierra Nevada just south of Jawbone Canyon and north of Tehachapi, at an elevation of 1,200 masl (Figures 2 and 3). The dimensions of the site are at least 120 by 80 m (~9,600 m^2). It is probably larger, but time did not allow a complete assessment of the site to determine more precise dimensions. It is a large habitation site or village (see Gardner 2007:178) containing a cemetery. The site is situated along an intermittent stream that was dry at the time of the excavations, and the cemetery was discovered because the stream bank had been cut back by erosion, thereby exposing some of the burials. The unstable slope above the stream bank consisted of a midden where human remains were also revealed. This midden contained a great variety of cultural constituents. A bedrock milling feature was also located within the site boundaries.

Field Methods

As the burials were located approximately a meter below the unstable slope surface, it was deemed impractical to excavate down to the burials in the traditional manner. Therefore, since the burials had been exposed in the stream bank, it was decided to excavate into the side of the bank. This made it impossible to establish a grid or to maintain levels. As the excavation slowly proceeded into the bank, the soil that was removed was screened primarily through 1/8-inch mesh, with 1/16-inch mesh used to spot check for very small artifacts such as beads. The human remains, artifacts, and other materials recovered from the burials and other features were placed in appropriately labeled paper or

Figure 2. General view of the Cross Mountain site (CA-KER-4619), looking east. Note the vertical stream cut where the burials were discovered, as well as a portion of the bedrock exposure.

plastic bags. All the excavated materials were transported to CSUB for laboratory analysis.

Laboratory Methods

In the laboratory, the limited amount of soil that was retained from the excavations was screened through 1/16-inch mesh, dried, and repackaged in plastic bags. The constituents from this soil were then sorted into specific categories, bagged, and labeled. Subsequently, the constituents were quantified metrically and catalogued. Some were catalogued as a group (e.g., nonhuman bone, seeds), while artifacts were individually recorded. All materials were catalogued according to whether they were removed in situ from the burials, whether they came out of the screens, or whether they were collected from the surface. Each burial was catalogued individually and by element, after which they were analyzed by the senior author with the assistance and expertise of two other osteologists, Richard Cerreto of Victor Valley College and Susan Kerr of Modesto Junior College.

Description of the Burial Features

Analysis of the burials at the Cross Mountain site resulted in the identification of at least five adults, one juvenile, and three infants. In the field, each burial

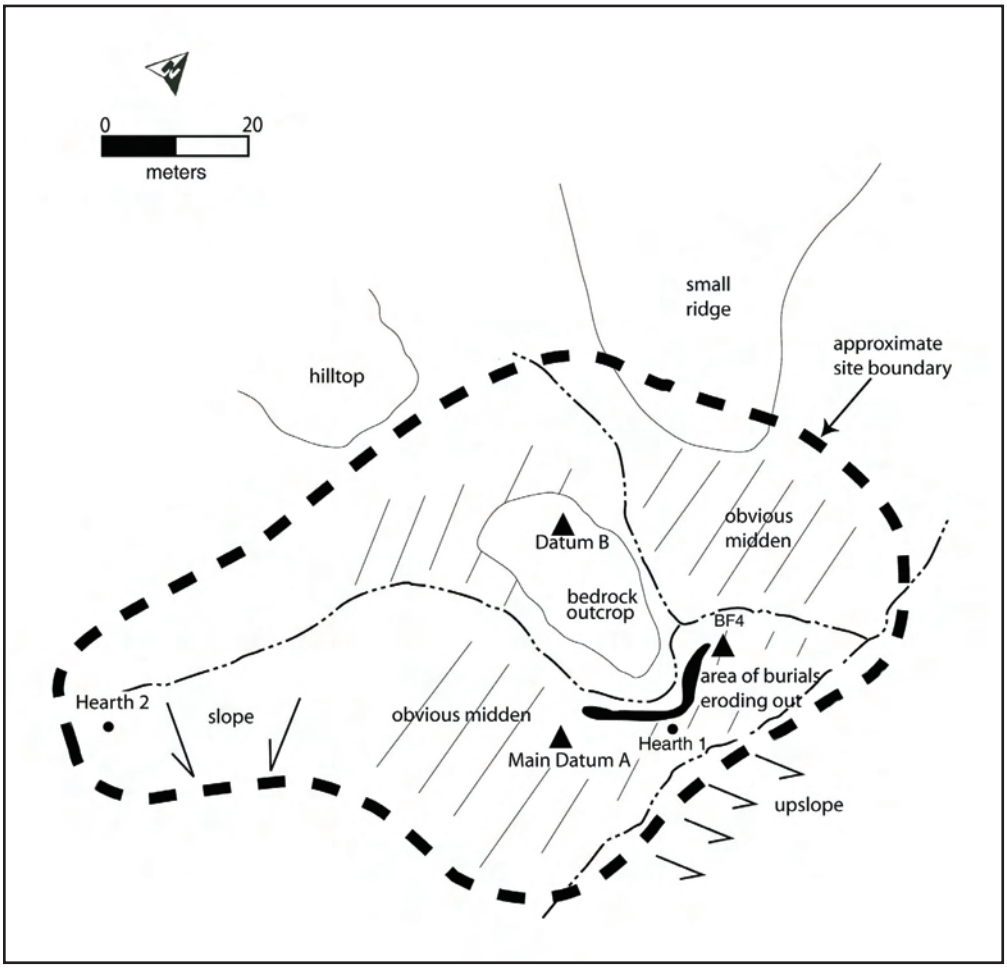

Figure 3. Basic map of the CA-KER-4619 site (BF4 refers to Burial Feature 4 datum).

feature was given a number, even if multiple individuals were discovered in a single feature; for example, Burial Feature 2 contained four individuals (2, 3, 4, and 5). Consequently, the burial numbers and individual numbers do not match; thus, for the sake of clarity, Table 1 provides a concordance of the burial numbers and individual numbers.

Table 1. Concordance of Burial Feature Numbers with Individual Numbers at CA-KER-4619.

Burial Feature No.	Individual No.
1	1
2	2, 3, 4, 5
3	6
4	7, 8
5	9

Burial Feature 1

Burial Feature 1 was located approximately 15 m northeast of Datum A. The feature contained a burial pit that was about 70 cm wide by 60 cm deep (Figure 4). The bottom of the pit was about 160 cm below the surface. A single individual was interred in this burial feature, designated Individual 1.

Burial Feature 2

Burial Feature 2 was positioned approximately 20 m northeast of Datum A (Figure 5). This feature contained a burial pit that was about 50 cm wide by 55 cm at its deepest. The bottom of this pit was at approximately the same depth as that for Burial Feature 1. Individual 2 was interred in the upper part of the pit.

In the course of excavating Individual 2, a separate burial pit containing three infants (Individuals 3, 4, and 5) (Figure 5) was discovered directly underneath. It is postulated that while digging the hole for Individual 2, the prehistoric excavators reached (or nearly reached) the grave of these three infants. Whether they saw the infants or stopped just short of them before placing Individual 2 into the pit is unknown. Based on the placement of the infants and the structure of the pit, the burial of these three individuals was determined to have been a single event.

Burial Feature 3

Burial Feature 3 was located about 21 m northeast of Datum A. Individual 6 was interred in this feature. The soil around the burial was very unstable; therefore, it was determined that only minimal recovery would be made of this individual, as it was felt that complete recovery would be too hazardous and destructive. As a result, only those elements that were exposed in the stream bank were removed, and no sketch was made of the feature.

Burial Feature 4

Most of Burial Feature 4 was situated within about 25 m north of Datum A (Figure 6). It had been heavily disturbed, as evidenced by the scattering and severe fragmentation of most of the bones. It is possible that the bones had been removed and scattered during the subsequent excavation of a new burial pit, conceivably that of Individual 6. Based on the surface collection of two mastoids of distinctly different size, the scattered remains of Burial Feature 4 contained at least two people, designated Individuals 7 and 8. The other surface-collected elements could not be assigned to either of the identified individuals and may have represented additional burials.

Burial Feature 5

Burial Feature 5 was not technically a burial or a feature, although it is referred to as such herein as it was likely part of an interment that became dispersed due to erosion and/or bioturbation, destroying its context. It consisted of a single element (a femoral midshaft)

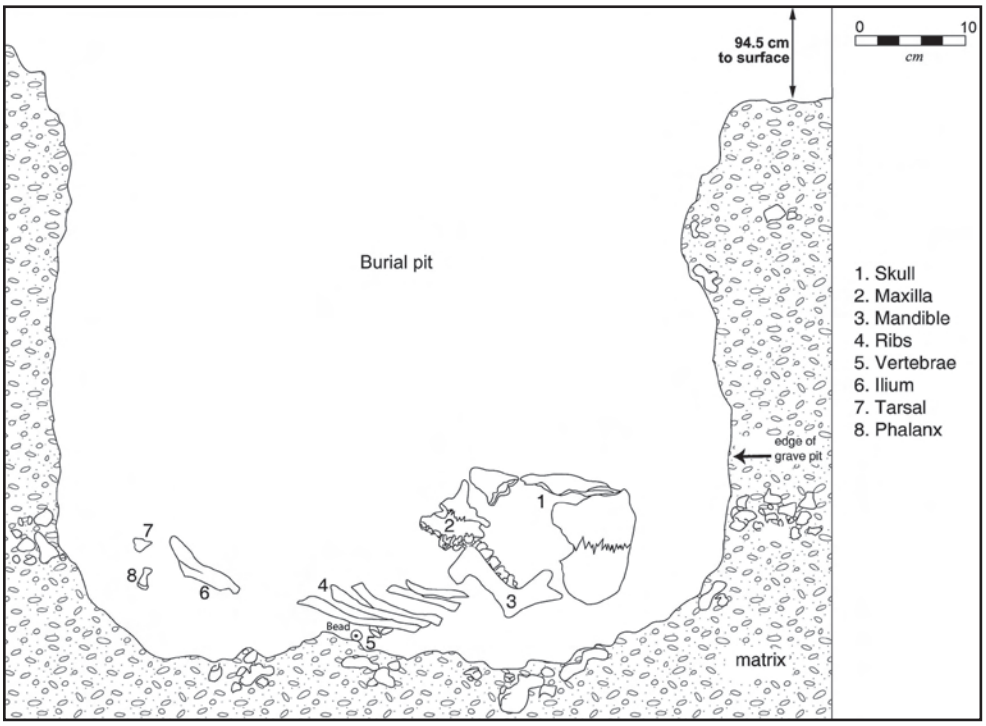

Figure 4. Profile map of Burial Feature 1 (view east) prior to excavation, showing the exposed elements of Individual 1.

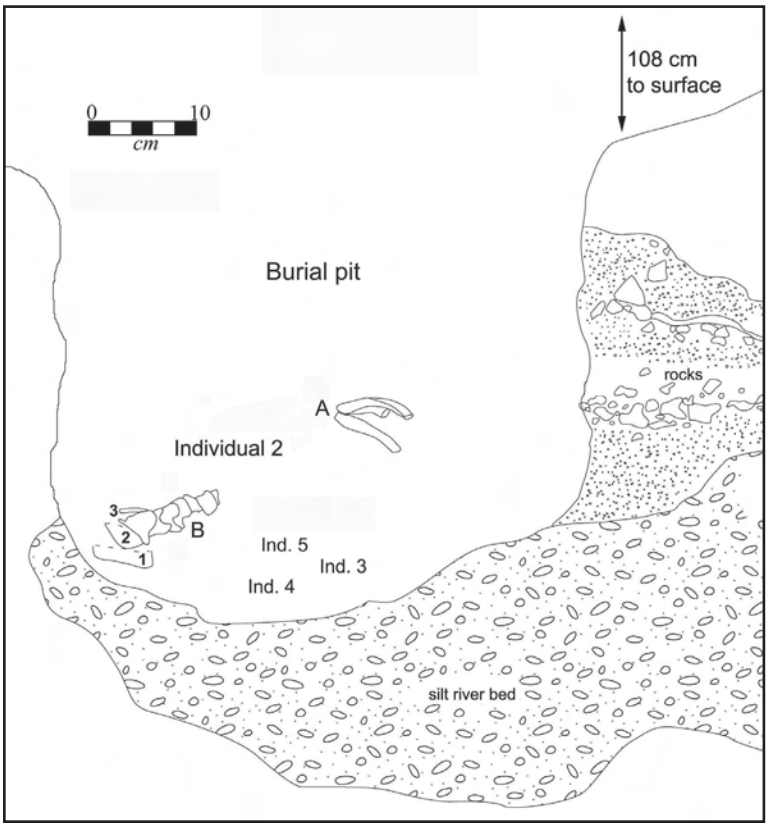

Figure 5. Profile map of Burial Feature 2 (view east) prior to excavation, showing the exposed elements of Individual 2: A = ribs, B = thoracic and cervical vertebrae. The *Haliotis* ornaments associated with Individual 2 are labeled 1, 2, and 3. Individuals 3, 4, and 5 were discovered directly below Individual 2.

that was recovered from the base of the stream bank, about 330 cm west of Individual 1. This femur represented Individual 9.

Description and Analysis of the Inhumations

The following are the descriptions and analyses of the identified individuals interred at Cross Mountain, including (when available) flexure, position, orientation, age, sex, pathological conditions, nonmetric traits, and associated artifacts (see Tables 2 and 3). If the artifacts could be directly associated with a specific individual, they are noted as such; if it could not be determined whether the materials were directly related to an individual (such as faunal remains or artifacts whose associations were uncertain), they are also so noted. A summary of the artifacts of uncertain association with the burial features (as well as the hearth features, discussed below) is presented in Table 4.

Individual 1 (Burial Feature 1)

Individual 1 was the nearly complete skeleton of a juvenile (Figure 7). Missing elements included the left humerus, left radius, left ulna, right fibula, most of the carpals and tarsals, two metacarpals, most of the phalanges, two left ribs, one right rib, one thoracic vertebra, the sacrum, the left temporal, and the patellae. Except for a minimal amount of postmortem breakage, the recovered bones were in remarkably good condition. No rodent gnawing or root damage was apparent on the bones. The inventory and description of the cranial and postcranial elements of Individual 1, as well as the metrics for

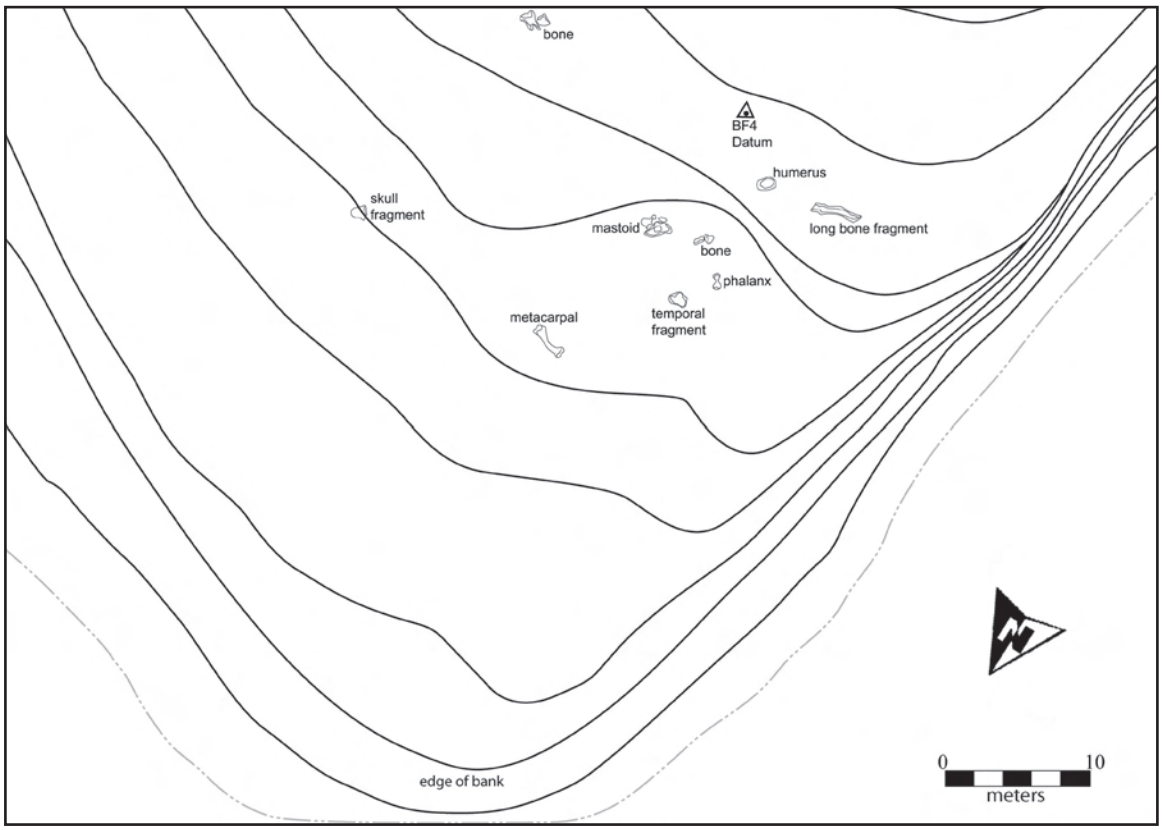

Figure 6. Map of Burial Feature 4 (plan view). The bones in this figure are surface fragments of intact burials that were left in situ. The solid lines in this figure are generalized contour lines.

Table 2. Summary of Burial Data for Individuals from CA-KER-4619.

Individual Number	Condition of Remains	Flexure, Position, and Orientation	Age and Sex	Pathologies/ Other	Associated Artifacts
1	nearly complete, minimal damage	semiflexed, lateral on right side, facing east, 263º from true north	juvenile, 7 ± 2 years old, indeterminate sex	possible pathology on left scapula (see text)	521 shell and stone beads
2	mostly missing, fragmentary	flexure and position indeterminate, facing east, 344º from true north	young adult, ~18-20 years old, probably male	slight lipping on the vertebrae	3 *Haliotis* ornaments, 2 *Olivella* beads
3	nearly complete, minimal damage	tightly flexed, supine, facing west, 105º from true north	infant, 1 year ± 4 months old, indeterminate sex	supernumerary deciduous canine	none
4	nearly complete, minimal damage	semiflexed, supine, facing east, 349º from true north	infant, 6 ± 3 months old, indeterminate sex	none obvious (but see text)	none
5	nearly complete, minimal damage	semiflexed, lateral on right side, facing north, 315º from true north	infant, 6 ± 3 months old, indeterminate sex	none obvious (but see text)	none directly associated, but 1 G1 *Olivella* bead near mid-thoracics
6	mostly missing, fragmentary	indeterminate	adult, > 21 years old (30s to 40s?), probably male	slight lipping on the vertebrae, dental anomalies (see text)	none
7	left mastoid only	indeterminate	adult, indeterminate sex	none observed	none
8	right mastoid only	indeterminate	adult, indeterminate sex	none observed	none
9	left femur midshaft only, heavily weathered	indeterminate	adult, indeterminate sex	none observed	none

Table 3. Nonmetric Traits for Six Individuals at CA-KER-4619.

Individual Number	SN	SF	IS	IF	ZF	AB	LO	PN	CC	FS	FO	MAF	MEF	SA
1	9 (L), 1 (R)	1 (L), 9 (R)	2 (B)	0 (B)	2 (L), 2 (R)	1	1 (L), 0 (R)	9 (L) 1 (R)	9 (B)	3	9 (B)	1/1 (R)	1 (L), 1 (R)	9 (L), 0 (R)
2	–	–	–	–	–	–	–	–	–	–	–	–	–	2 (L), 9 (R)
3	1 (L), 2 (R)	0 (B)	2 (B)	1 (L), 0 (R)	2 (L), 5 (R)	0	0 (B)	0 (L), 9 (R)	1 (B)	2	1 (B)	1/1 (B)	1 (B)	0 (B)
4	2 (L), 0 (R)	0 (B)	1 (L), 2 (R)	3 (L), 2 (R)	6 (L), 0 (R)	9	9 (B)	9 (B)	1 (B)	9	1 (B)	0/0 (B)	1 (L), 9 (R)	0 (B)
5	9 (L), 3 (R)	1 (B)	9 (L), 2 (R)	2 (L), 3 (R)	4 (B)	9	9 (B)	9 (B)	1 (B)	9	1 (B)	0/0 (L), 1/3 (R)	9	0 (B)
6	1 (B)	≥1 (L), 2 (R)	9 (L), 2 (R)	0 (B)	9 (L), 4 (R)	0	0 (B)	9 (B)	9 (B)	1	9 (B)	1/1 (B)	1 (B)	9 (B)

Key: SN = supraorbital notch; SF = supraorbital foramina; IS = infraorbital suture; IF = infraorbital foramina; ZF = zygomatico-facial foramina; AB = apical bone; LO = lambdoid ossicle; PN = parietal notch bone; CC = condylar canal; FS = flexure of superior sagittal sulcus; FO = foramen ovale; MAF = mastoid foramina; MEF = mental foramina; SA = septal aperture. R = right side, L = left side, B = both sides. Scoring system from Buikstra and Ubelaker (1994:Attachment 22). Refer to that attachment for explanations of the numbers, but in all cases 0 = absent and 9 = unobservable.

Notes: No cranial elements were recovered from Individual 2. This individual also had bifurcated spinous processes of C-5 and C-6. Individual 6 also had a parietal foramen on the left side.

Table 4. Artifacts of Uncertain Association with Burial and Hearth Features at CA-KER-4619.[a]

Cat. No. (CA-KER-4619-)	Feature	Provenience	Artifact	Material	Weight (in g)	Metrics and Comments
0112	Burial Feature 1	in situ	metate fragment	granite	145.2	97.0 x 66.0 x 24.8 mm
0113	Burial Feature 1	screen	debitage	obsidian	1.05	1 flake
0114	Burial Feature 1	screen	debitage	chert	2.04	5 flakes
0115	Burial Feature 1	screen	debitage	obsidian	0.50	7 flakes
0140	Burial Feature 1	screen	debitage	chert	0.04	5 flakes
0512	Burial Feature 1	screen	debitage	chalcedony	1.10	1 flake
0513	Burial Feature 1	screen	debitage	obsidian	< 0.1	1 flake
0494	Burial Feature 2	screen	debitage	rhyolite	< 0.1	pressure flake
0495	Burial Feature 2	screen	debitage	obsidian	2.0	1 flake found in slump ~0.75 m south of feature
0521	Burial Feature 2	screen	debitage	basalt	< 0.1	1 flake
0527	Burial Feature 2	screen	debitage	chert	0.40	2 flakes
0532	Burial Feature 2	screen	debitage	jasper	< 0.1	1 flake
0511	Burial Feature 2	screen	debitage	obsidian	< 0.1	1 flake
0501	Burial Feature 4	screen	debitage	obsidian	< 0.01	1 flake
0502	Burial Feature 4	screen	debitage	chert	0.06	1 flake
0503	Burial Feature 4	screen	biface base	chert	0.90	10.9 x 17.0 x 4.6 mm
0504	Burial Feature 4	in situ	biface base	chert	3.50	18.6 x 27.3 x 5.4 mm
0546	Hearth Feature 1	in situ	debitage	chert	1.71	1 flake
0547	Hearth Feature 1	in situ	debitage	chert	7.83	1 flake
0548	Hearth Feature 1	in situ	debitage	chert	0.04	2 flakes
0549	Hearth Feature 1	in situ	debitage	obsidian	0.02	2 flakes
0550	Hearth Feature 1	in situ	debitage	chalcedony	0.01	1 flake
0555	Hearth Feature 1	in situ	fire-affected rocks	granitic	60.53	N = 11
0545	Hearth Feature 2	in situ	pottery	clay	11.6	2 fragments (1 burned)

a. Excluding beads and bead strands (see Tables 31 through 39).

immature bones, per Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994), are provided in Tables 5 through 8.

Flexure, Position, and Orientation

The body of this individual was semiflexed; that is, the lower appendages were tightly folded against the body, but the upper appendages were extended (see Figure 7). It was positioned laterally on the right side, facing east. The orientation of Individual 1 was measured at 263 degrees from true north.[1]

Age, Sex, and Pathological Conditions

Based on the size of the bones and the nonfusion or partial fusion of the epiphyses, this individual was identified as a juvenile. The formation and eruption

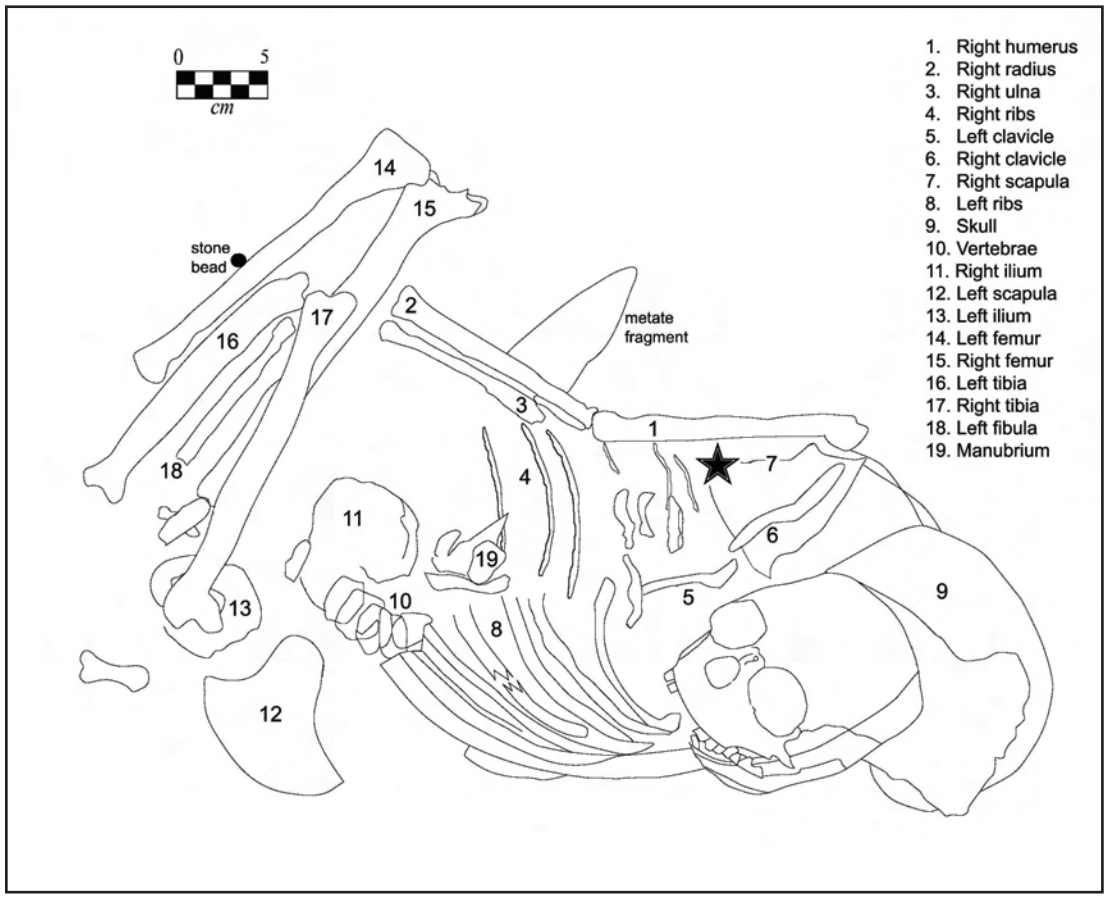

Figure 7. Profile map of Individual 1 in Burial Feature 1 (view east). The star indicates the approximate midpoint of Bead Strand D (see Figures 8 and 9).

of the teeth, per Ubelaker (1989), more specifically indicated that the age of this juvenile was 7 years ± 24 months. Due to the presence of deciduous maxillary central incisors and permanent mandibular central incisors, this child is believed to have been an older six-year-old or younger seven-year-old. Table 9 provides the inventory and description of the recovered dental elements. The sex of this individual was indeterminate, as subadults cannot be sexed employing conventional methods used for adults.

Faint Harris lines on one of the tibiae were visible on a radiograph provided by Kern Radiology in Bakersfield, as illustrated in Sutton and Yohe (2008:262). Harris lines are bands that are transverse to the length of long bones and are indicative of episodes of growth arrest due to nutritional stress. One other possible pathology was observed on the left scapula, where the medial end of the spine was curled under. The cause of this condition is unclear, but it may be related to some type of muscle problem. No other pathological conditions were noted.

Nonmetric Traits

As outlined by Buikstra and Ubelaker (1994), the primary nonmetric traits on the cranium of this individual included a supraorbital notch on the right side, a supraorbital foramen on the left side (< ½ occluded

Table 5. Inventory and Description of Cranial Elements from Individual 1 at CA-KER-4619.

Element	Number	Condition	Comments
frontal	1	complete	–
parietals	2	complete	part of left side broken off and recovered
occipital	1	complete	–
temporal	1	complete	right; auditory ossicle (incus) present
temporomandibular joint	1	complete	right
sphenoid	1	3 fragments	pterygoid processes of left side, two fragments of greater wing of left side
zygomatic	2	complete	–
maxilla	1	complete	(see Table 9 for dentition)
palatines	2	complete	palatine suture unfused
mandible	1	complete	fused (see Table 9 for dentition)
vomer	1	complete	–
ethmoid	1	2 fragments	–
nasal conchae	2	complete	–
lacrimals	2	complete	–
nasals	2	complete	attached to frontal
hyoid	1	fragment	greater horn

by spicules), complete infraorbital sutures on both sides, at least two zygomatico-facial foramina on both sides, and a mastoid foramen (temporal) on the right side. An apical bone, a lambdoid ossicle on the left side, and a parietal notch bone on the right side were also present. Flexure of the superior sagittal sulcus was bifurcate. No other nonmetric traits were observed.

Associated Artifacts

A total of 521 beads were recovered with Individual 1, many still in stringing position (Figures 8 and 9). The vast majority of these beads were classified as E1a (Bennyhoff and Hughes 1987:127). Other types included K1 cupped (Bennyhoff and Hughes 1987:137), *Haliotis* disks, clamshell tubes (*Tivela* sp.), and steatite disks (see below for analysis of shell beads and ornaments from the site). The *Olivella* E1a beads and K1 beads date to the Late Period.[2] Several additional artifacts were discovered in the vicinity of Individual 1, including a metate fragment and 20 pieces of debitage (see Table 4).

Individual 2 (Burial Feature 2)

Most of the skeletal elements of Individual 2, a young adult male, had already eroded out of the stream bank and were likely washed away (Figure 10). The few recovered elements included the left humerus, left clavicle, left scapula, 12 left ribs, three cervical vertebrae, and 10 thoracic vertebrae. No cranial elements were found. The bones were mostly fragmented due to postmortem breakage. The remains exhibited no obvious rodent gnawing or root damage. The inventory and description of the postcranial elements of Individual 2, as well as the metrics, are listed in Tables 10 and 11.

Flexure, Position, and Orientation

As so little of Individual 2 was recovered, the flexure and position could not be ascertained (see Figure 10). Although the skull was missing, it was determined that it was likely facing generally east based on the position of the other skeletal elements. The orientation of Individual 2 was measured at 344 degrees from true north.

Age, Sex, and Pathological Conditions

Per the method of Owings Webb and Suchey (1985) for epiphyseal union of the clavicle, this individual was identified as a young adult, probably about 18 to 20 years old. The maximum diameter of the humeral head was 47.2 mm, indicating that this individual was most likely male (Dittrick and Suchey 1986; but see Bass 1995:156). There was slight lipping evident on the vertebrae, but no other pathological conditions were noted.

Nonmetric Traits

The only nonmetric traits observed on this individual included a septal aperture (true perforation) and bifurcated spinous processes of C-5 and C-6 (see Buikstra and Ubelaker 1994).

Associated Artifacts

Three *Haliotis* ornaments (Figure 11) were found in situ in direct association with the cervical vertebrae of Individual 2. Two *Olivella* E1a beads (Bennyhoff and Hughes 1987) were also recovered from this burial, one in association with the three cervical vertebrae and the *Haliotis* ornaments. It was not clear whether the

Table 6. Metrics for Cranial Elements from Individual 1 at CA-KER-4619.

Cranial Element[a]	Measurements[b] (mm)
greater wing of the sphenoid	
length	50.1[c]
width	30.7[c]
petrous and mastoid portions of the temporal	
length	60.5 (R)
width	41.5 (R)
zygomatic	
length	66.3
width	44.6
maxilla	
length	35.5
height	51.5
width	55.5
mandible	
length of body	66.8
width of arc	31.1
full length of half mandible	92.2

a. Measurement of left bone except where indicated with (R).
b. Per Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994).
c. Estimated measurement.

Table 7. Inventory and Description of Postcranial Elements from Individual 1 at CA-KER-4619.

Element	Number	Condition	Comments
long bones			
right humerus	1	complete	unfused epiphysis present
right radius	1	complete	–
right ulna	1	complete	–
femora	2	complete	unfused epiphysis present for right femur
tibiae	2	complete	unfused epiphysis present for right tibia
left fibula	1	complete	–
clavicles	2	complete	–
short bones			
metacarpals	3	complete	unsided
manual phalanges	6	complete	unsided
metatarsals	5	complete	one left, one right, three unsided
pedal phalanges	10	complete	one left, one right, eight unsided
flat bones			
scapulae	2	complete	possible pathology on spine of left scapula
ilia	2	complete	–
ischia/pubes	2	complete	partial fusion, left broken in two pieces
sternum	1	complete	manubrium
left ribs	≥ 10	mostly complete	6 complete/unbroken (including 1st, 2nd, and 3rd), 2 complete/broken, 1 distal end, 1 proximal end, 3 midsections
right ribs	≥ 11	mostly fragmented	4 complete/unbroken (including 1st and 2nd), 1 complete/broken, 6 proximal ends, 2 distal ends
irregular bones			
carpal	1	complete	capitate, unsided
cervical vertebrae	7	mostly complete	atlas and axis about half broken, 3rd missing part of neural arch and centrum, 4th through 7th complete (all neural arches and centra present and fused)
thoracic vertebrae	11	complete	11 fused neural arches, 9 unfused centra
lumbar vertebrae	5	complete	partial fusion of centra to neural arches

second *Olivella* bead, which was recovered in the 1/8-inch mesh screen, was associated with this individual. The *Haliotis* ornaments were well-crafted and apparently made up at least part of a "necklace." There were two original perforations on each ornament through which a string of some kind had been threaded. One of the ornaments had a double perforation on one side, which may indicate that it broke and an attempt had been made to repair it.

Other artifacts of uncertain association with Individual 2 consisted of six pieces of debitage made of rhyolite, obsidian, basalt, chert, and jasper (see Table 4). As noted with Individual 1, the E1a beads date to the Late

Table 8. Metrics for Postcranial Elements from Individual 1 at CA-KER-4619.

Postcranial Element[a]	Measurements[b] (mm)
clavicle	
length	77.8
diameter	6.7
scapula	
length (height)	78.0 (R)
width	55.5 (R)
length of spine	58.8 (R)
ilium	
length	79.0
width	70.3
ischium	
length	47.5
width	29.1
pubis	
length	41.1
humerus	
length	152.5 (R)
width	31.6 (R)
diameter	12.0 (R)
ulna	
length	130.9 (R)
diameter	8.8 (R)
radius	
length	117.5 (R)
diameter	8.0 (R)
femur	
length	218.0
width	50.0
diameter	13.7
tibia	
length	178.0
diameter	14.6
fibula	
length	172.5
diameter	8.0

a. Measurement of left bone except where indicated with (R).
b. Based on Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994).

Table 9. Inventory and Description of Dental Elements from Individual 1 at CA-KER-4619.

Teeth	Comments
left maxilla	
deciduous central incisor	shoveled, fully erupted
deciduous canine	fully erupted
deciduous first molar	fully erupted
deciduous second molar	fully erupted
permanent first molar	fully erupted
permanent second molar	unerupted, crown, nearly complete
right maxilla	
deciduous central incisor	shoveled, fully erupted
deciduous lateral incisor	shoveled, fully erupted
deciduous first molar	fully erupted
deciduous second molar	fully erupted
permanent first molar	fully erupted
permanent second molar	unerupted, crown, nearly complete
left mandible	
permanent central incisor	shoveled, fully erupted
deciduous lateral incisor	shoveled, fully erupted
deciduous canine	fully erupted
deciduous first molar	fully erupted
deciduous second molar	fully erupted
permanent first molar	fully erupted
right mandible	
permanent central incisor	shoveled, fully erupted
deciduous lateral incisor	shoveled, fully erupted
deciduous canine	fully erupted
deciduous first molar	fully erupted
deciduous second molar	fully erupted
permanent first molar	fully erupted

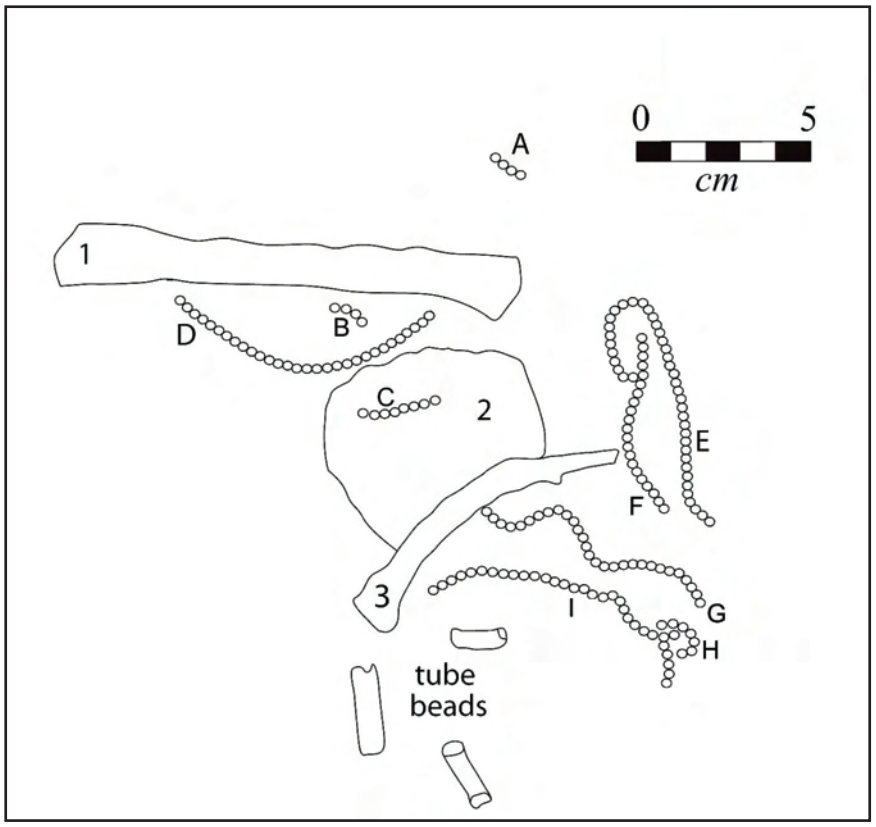

Figure 8. Generalized schematic of the bead strands associated with Individual 1. Bone 1 is the right humerus, Bone 2 is the right scapula, and Bone 3 is the right clavicle (refer to Figure 7). Strands J and K are not shown in this figure because they were directly beneath the scapula. Numerous loose shell and stone beads were scattered around the upper arm and chest that were most likely part of the strands at one time.

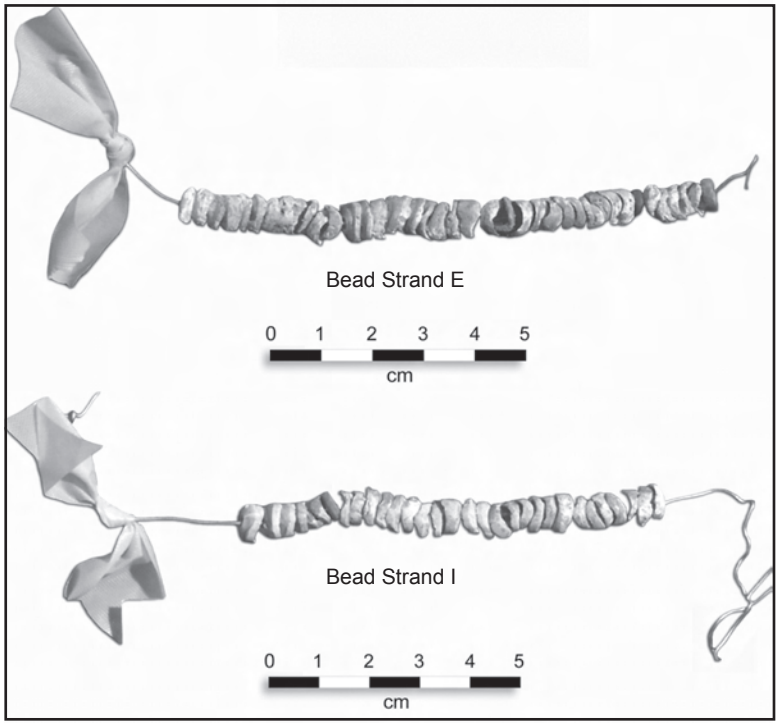

Figure 9. Two of the bead strands found with Individual 1 (Strands E and I). The steatite beads among the *Olivella* beads are visible in Strand E (seventh to last and last one on the right side of the strand) and Strand I (seventh from the left side of the strand).

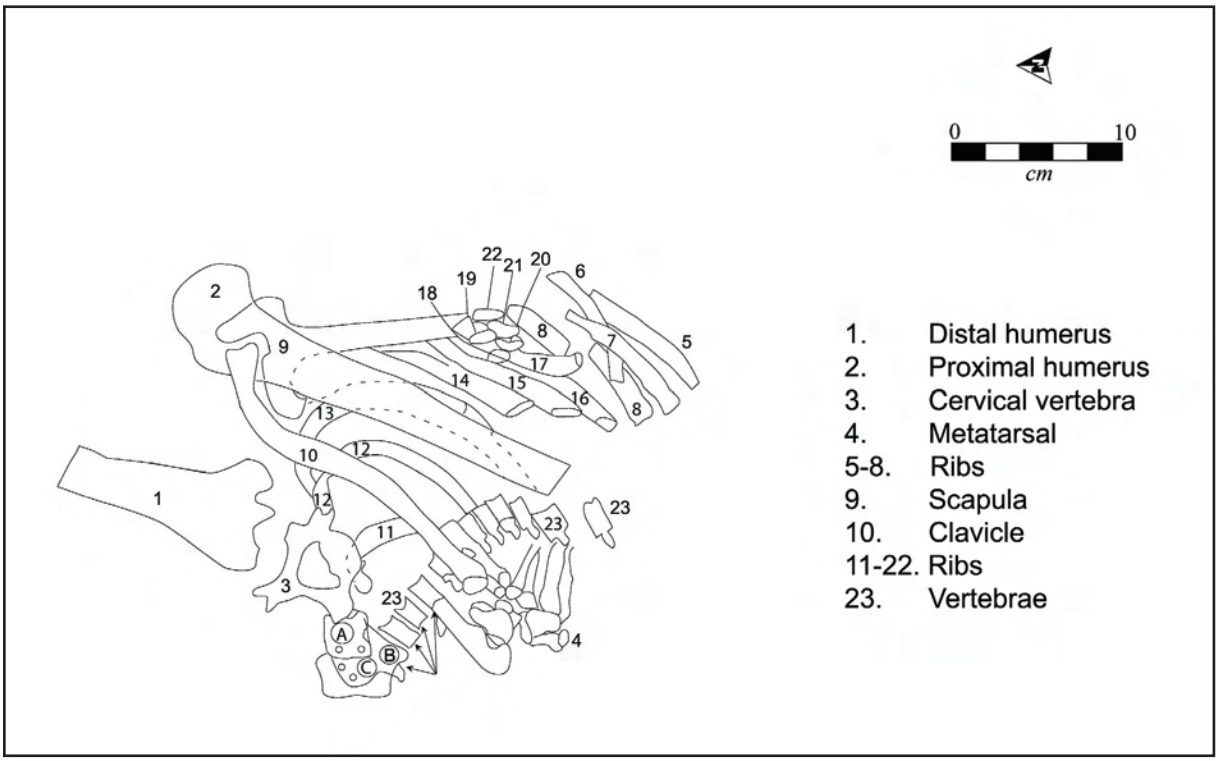

Figure 10. Plan view map of Individual 2 in Burial Feature 2. The *Haliotis* ornaments associated with this individual are labeled A, B, and C (see Figure 11).

Table 10. Inventory and Description of Postcranial Elements from Individual 2 at CA-KER-4619.

Element	Number	Condition	Comments
long bones			
left humerus	1	complete	broken in two pieces
left clavicle	1	complete	–
flat bones			
left scapula	1	fragments (8)	includes spine, acromion, axillary border, glenoid cavity, coracoid
left ribs	12	mostly fragmented	1 complete/unbroken rib (1st), 1 complete/ broken rib (2nd), and 10 proximal ends
irregular bones			
cervical vertebrae	3	mostly complete	C-5, C-6, C-7
thoracic vertebrae	10	mostly complete	T-1 through T-10

Table 11. Metrics for Postcranial Elements from Individual 2 at CA-KER-4619.

Postcranial Element[a]	Measurements[b] (mm)
clavicle	
maximum length	158.0
anterior diameter at midshaft	11.1
superior diameter at midshaft	8.5
humerus	
maximum length	325.0
maximum midshaft diameter	21.8
minimum midshaft diameter	15.5
maximum diameter of head	47.2

a. Measurement of left bone.
b. Based on Buikstra and Ubelaker (1994).

Period, and it is likely that the *Haliotis* ornaments also date to the Late Period.

Individual 3 (Burial Feature 2)

Individual 3 was the oldest of the three infants interred together in Burial Feature 2 (see Figures 5, 12, and 13). With Mr. Wermuth's approval, two ribs from this individual were submitted for radiocarbon analysis, and a deciduous molar was submitted for DNA analysis. The radiocarbon assay returned a date of 460 ± 60 RCYBP (see complete radiocarbon and DNA results below).

The skeleton of this infant was mostly complete (see Figure 13), missing only the right ischium, the carpals, four tarsals, five metatarsals, six manual phalanges, most of the pedal phalanges, and the patellae. Except for a moderate amount of postmortem breakage, the skeleton was in good condition. No rodent gnawing or root damage was visible on the remains. The inventory and description of the cranial and postcranial elements of Individual 3, as well as the metrics for immature bones, are provided in Tables 12 through 15. There were no artifacts found with this individual.

Flexure, Position, and Orientation

The body of this infant was tightly flexed; that is, all the appendages were tightly folded over the chest. It was placed in a supine position, and the head was facing west. The orientation of this individual was measured at 105 degrees from true north.

Age, Sex, and Pathological Conditions

Individual 3 was identified as an infant based on the size of the bones and nonfusion of the epiphyses. The formation and eruption of the teeth, per Ubelaker (1989), indicated that the age of this infant was 1 year ± 4 months. The sex was indeterminate, as subadults cannot be sexed with current techniques.

There was a supernumerary deciduous canine in the left maxilla that was unerupted. It had a nearly complete crown and was golden in color. A permanent canine would only have about a 5 percent complete crown and would probably be lighter in color. There also appeared to have been an additional partial crypt for the tooth. Supernumerary teeth are typically considered to be genetic markers (e.g., Scott and Turner 2000). No other pathological conditions were observed. Table 16 lists the inventory and description of the dental elements from this infant.

Nonmetric Traits

The cranium of Individual 3 had a supraorbital notch on the right side (> ½ occluded by spicules) and the left side (< ½ occluded by spicules), complete infraorbital sutures on both sides, infraorbital foramina (internal division only) on the left side, at least two zygomaticofacial foramina on the left side, one small foramen on the right side, and a mastoid foramen (temporal) on both sides. The condylar canal was patent on both sides, and there was partial formation of the foramen ovale on both sides. Flexure of the superior sagittal sulcus was to the left. No other nonmetric traits were observed.

Figure 11. *Haliotis* ornaments directly associated with the cervical vertebrae of Individual 2.

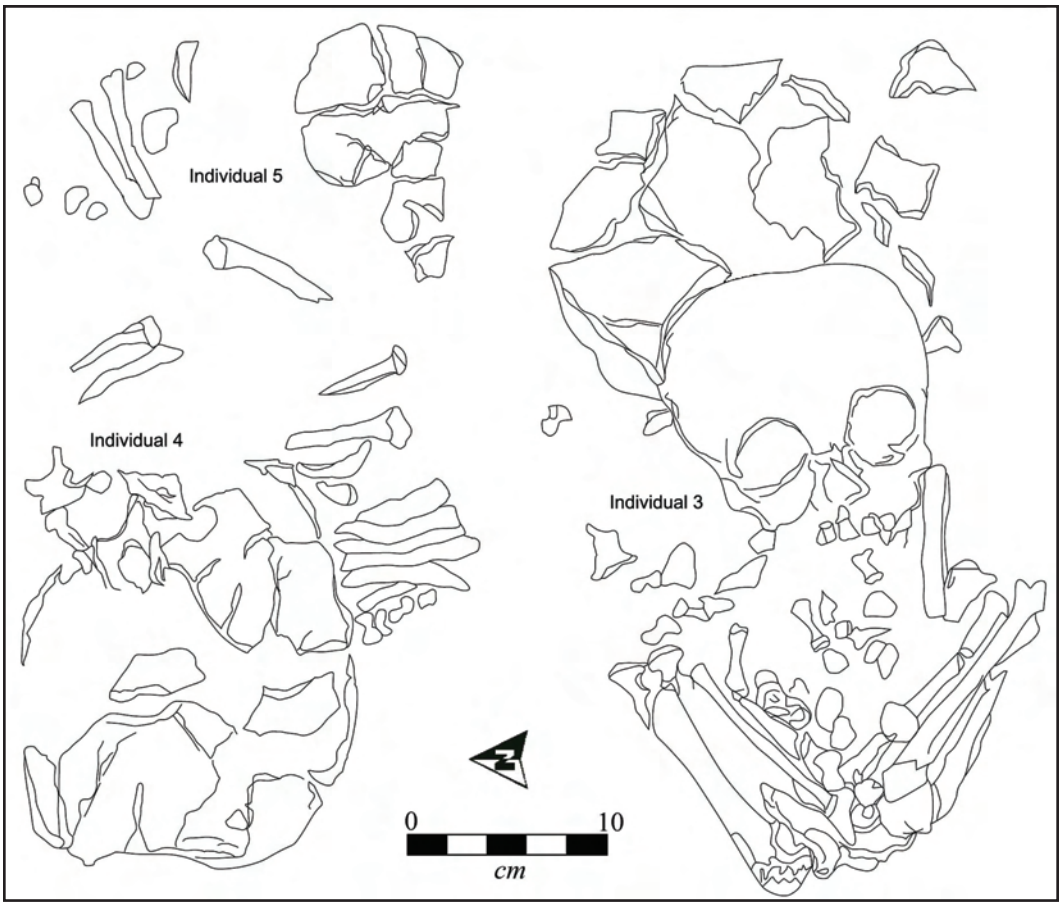

Figure 12. Plan view map showing the positions of Individuals 3, 4, and 5 in Burial Feature 2 (see Figures 13, 14, and 15 for details).

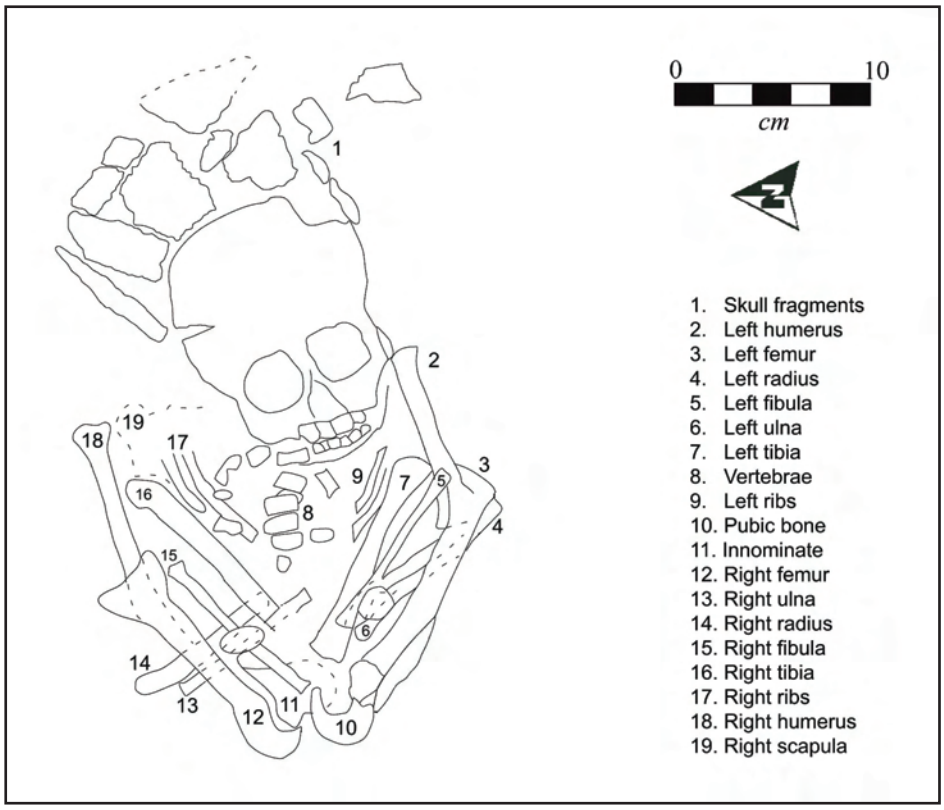

Figure 13. Plan view map of Individual 3 in Burial Feature 2.

Individual 4 (Burial Feature 2)

Individual 4 was the second of the three infants buried together in Burial Feature 2 (Figures 5, 12, and 14). The skeleton was nearly complete, missing only the right clavicle, right pubis, most of the carpals and tarsals, one metatarsal, most of the phalanges, one left rib, the sternum, and the patellae. With the exception of minor postmortem breakage, the skeleton was in very good condition, and no rodent gnawing or root damage was observed on the bones. The inventory and description of the cranial and postcranial elements of Individual 4, as well as the metrics for immature bones, are provided in Tables 17 through 20. No artifacts were discovered with this individual.

Flexure, Position, and Orientation

The body of this infant was loosely flexed and placed in a supine position. Perhaps due to the confines of the pit, the body was in a more or less sitting posture, with the head facing east. The orientation of Individual 4 was measured at 349 degrees from true north.

Age, Sex, and Pathological Conditions

Based on the size of the bones and the nonfusion of the epiphyses, this individual was identified as an infant. The formation and eruption of the teeth further indicated that the age of this infant was 6 months ± 3 months, per Ubelaker (1989). Because this individual was an infant, the sex could not be determined. Table 21 lists the inventory and description of the dental elements that were recovered. A deciduous molar was submitted for DNA analysis (see results below). There seemed to be excessive periosteal bony growth on the left radial tuberosity, especially posteriorly. Otherwise, no pathological conditions were observed on this individual.

Table 12. Inventory and Description of Cranial Elements from Individual 3 at CA-KER-4619.

Element	Number	Condition	Comments
frontal	1	nearly complete	2 large fragments (including eye orbits)
parietals	2	nearly complete	3 large fragments, many small fragments
occipital	1	nearly complete	–
temporals	2	complete	left squamous portion and auditory ossicle (malleus) present
temporomandibular joints	2	complete	–
sphenoid	1	complete	both greater wings (unfused), lesser wings
zygomatics	2	complete	right side attached to maxilla, left side broken
maxillae	2	complete	(see Table 16 for dentition)
palatines	2	complete	palatine suture unfused
mandible	1	complete	symphysis partially fused (see Table 16 for dentition)
vomer	1	complete	–
ethmoid	1	fragment	–
nasal conchae	2	complete	–
basilar part of occipital	1	complete	–
lateral part of occipital	2	complete	–

Nonmetric Traits

The cranium of Individual 4 had a supraorbital notch on the left side (> ½ occluded by spicules), a partial infraorbital suture on the left side, a complete infraorbital suture on the right side, multiple infraorbital foramina on both sides, and multiple small zygomatico-facial foramina on the left side. The condylar canal was patent on both sides, and there was partial formation of the foramen ovale on both sides. Flexure of the superior sagittal sulcus was unobservable. No other nonmetric traits were noted.

Individual 5 (Burial Feature 2)

Individual 5 was the third of the three infants interred in Burial Feature 2 (Figures 5, 12, and 15). The skeleton was essentially complete, missing only the carpals, seven tarsals, most of the phalanges, and the patellae. Other than minor postmortem breakage, the skeleton was in very good condition. There was no obvious rodent gnawing or root damage. The inventory and description of the cranial and postcranial elements of Individual 5, as well as the metrics for immature bones, are provided in Tables 22 through 25.

Flexure, Position, and Orientation

The body of this individual was semiflexed; that is, the upper appendages were tightly folded against the body, but the lower appendages were extended. It was positioned laterally on the right side in a sitting position, facing north. The orientation of Individual 5 was measured at 315 degrees from true north.

Age, Sex, and Pathological Conditions

This individual was identified as an infant due to the size of the bones and the nonfusion of the epiphyses. Based on the formation and eruption of the teeth (per Ubelaker 1989), the age of this infant was further determined to be 6 months ± 3 months. Table 26 lists

Table 13. Metrics for Cranial Elements from Individual 3 at CA-KER-4619.

Cranial Element[a]	Measurements[b] (mm)
lesser wing of the sphenoid	
length	19.5
width	15.8
greater wing of the sphenoid	
length	41.8
width	27.5
body of the sphenoid	
length	17.1
width	16.1
petrous and mastoid portions of the temporal	
length	53.7
width	24.8
basilar part of the occipital	
length	15.9
width	21.8
zygomatic	
length	31.2 (R)
width	24.2 (R)
maxilla	
length	34.2
height	31.0
width	–[c]
mandible	
length of body	48.2 (R)
width of arc	25.2 (R)
full length of half mandible	70.1 (R)

a. Measurement of left bone except where indicated with (R).
b. Based on Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994).
c. Too fragmented for accurate measurement.

the inventory and description of the recovered dental elements. A deciduous molar was submitted for DNA analysis. Due to its age, the sex of this infant could not be ascertained. Other than what appeared to be excessive periosteal bony growth on the left radial tuberosity, no pathological conditions were evident.

Nonmetric Traits

The cranium of Individual 5 had a barely visible supraorbital notch on the right side, a supraorbital foramen on both sides, a complete infraorbital suture on the right side, multiple infraorbital foramina

Table 14. Inventory and Description of Postcranial Elements from Individual 3 at CA-KER-4619.

Element	Number	Condition	Comments
long bones			
humeri	2	complete	–
radii	2	complete	both left and right broken in two pieces
ulnae	2	complete	right broken in two pieces
femora	2	complete	left broken in 2 pieces, right broken in 5 pieces
tibiae	2	complete	right missing part of distal end
fibulae	2	complete	left broken in 4 pieces
clavicles	2	complete	right broken in 2 pieces
short bones			
metacarpals	10	complete	5 left, 5 right
manual phalanges	22	complete	8 left, 8 right, 6 unsided
metatarsals	5	complete	unsided
pedal phalanges	6	complete	unsided
flat bones			
scapulae	2	complete	left broken in 4 pieces, small fragment of right broken off
ilia	2	complete	part of left broken off
ischium	1	complete	left
pubes	2	nearly complete	–
sternum	1	complete	manubrium
left ribs	12	mostly complete	4 are broken, but are matched; two retained for radiocarbon dating
right ribs	12	mostly fragmented	5 complete (including 1st, 2nd, 11th, and 12th), 7 distal ends
irregular bones			
tarsals	10	complete	calcanei, tali, naviculars, cuneiforms
cervical vertebrae	7	mostly complete	neural arches unfused, 5 unfused centra
thoracic vertebrae	12	mostly complete	at least 9 neural arches (fused), 12 unfused centra
lumbar vertebrae	5	complete	neural arches fused, 5 unfused centra
sacrum	1	mostly complete	1 fused neural arch, 3 unfused neural arches, 4 unfused centra

on both sides, two large and several smaller zygomatico-facial foramina on both sides, and several mastoid foramina (temporal) on the right side. The condylar canal was patent on both sides, and there was partial formation of the foramen ovale on both sides. Flexure of the superior sagittal sulcus was unobservable. No other nonmetric traits were observed.

Associated Artifacts

No artifacts that could be directly associated with Individual 5 were found, although a single *Olivella* bead was discovered in situ among the mid-thoracic vertebrae. It was a heavily weathered G1 tiny saucer (Bennyhoff and Hughes 1987:132), measuring 3.7 x 1.8 x 1.7 mm. It is likely that this bead was originally in the

Table 15. Metrics for Postcranial Elements from Individual 3 at CA-KER-4619.

Postcranial Element[a]	Measurements[b] (mm)
clavicle	
length	–[c]
diameter	5.8
scapula	
length (height)	41.8[d] (R)
width	–[c]
length of spine	43.0[d] (R)
ilium	
length	49.8 (R)
width	42.6 (R)
ischium	
length	31.8
width	19.5
pubis	
length	23.8 (R)
humerus	
length	88.5
width	26.3
diameter	9.3
ulna	
length	83.8
diameter	5.9
radius	
length	74.1
diameter	6.8
femur	
length	109.4
width	31.5
diameter	10.1
tibia	
length	93.4
diameter	10.1
fibula	
length	90.9 (R)
diameter	4.9 (R)

a. Measurement of left bone except where indicated with (R).
b. Based on Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994).
c. Too fragmented for accurate measurement.
d. Approximate measurement due to fragmentation of medial border.

Table 16. Inventory and Description of Dental Elements from Individual 3 at CA-KER-4619.

Teeth	Comments
left maxilla	
deciduous central incisor	shoveled, partially erupted
permanent central incisor	unerupted, crown 35% complete
deciduous lateral incisor	shoveled, partially erupted
deciduous canine	unerupted, crown complete
deciduous canine	unerupted, supernumerary canine below other canine, nearly complete crown, golden
deciduous first molar	unerupted, crown complete
deciduous second molar	unerupted, crown complete
permanent first molar	unerupted, crown 30% complete
right maxilla	
deciduous central incisor	shoveled, partially erupted
deciduous lateral incisor	shoveled, partially erupted
deciduous canine	unerupted, crown complete
deciduous first molar	unerupted, crown complete
deciduous second molar	unerupted, crown complete
permanent first molar	unerupted, crown 30% complete
left mandible	
deciduous central incisor	shoveled, fully erupted
deciduous lateral incisor	shoveled, partially erupted
deciduous canine	unerupted, crown at least 90% complete
deciduous first molar	unerupted, crown complete
deciduous second molar	unerupted, crown complete
permanent first molar	unerupted, crown 30% complete
right mandible	
deciduous central incisor	shoveled, fully erupted
deciduous lateral incisor	shoveled, partially erupted
deciduous canine	unerupted, crown at least 90% complete
deciduous first molar	unerupted, crown complete
deciduous second molar	unerupted, crown complete
permanent first molar	unerupted, crown 30% complete

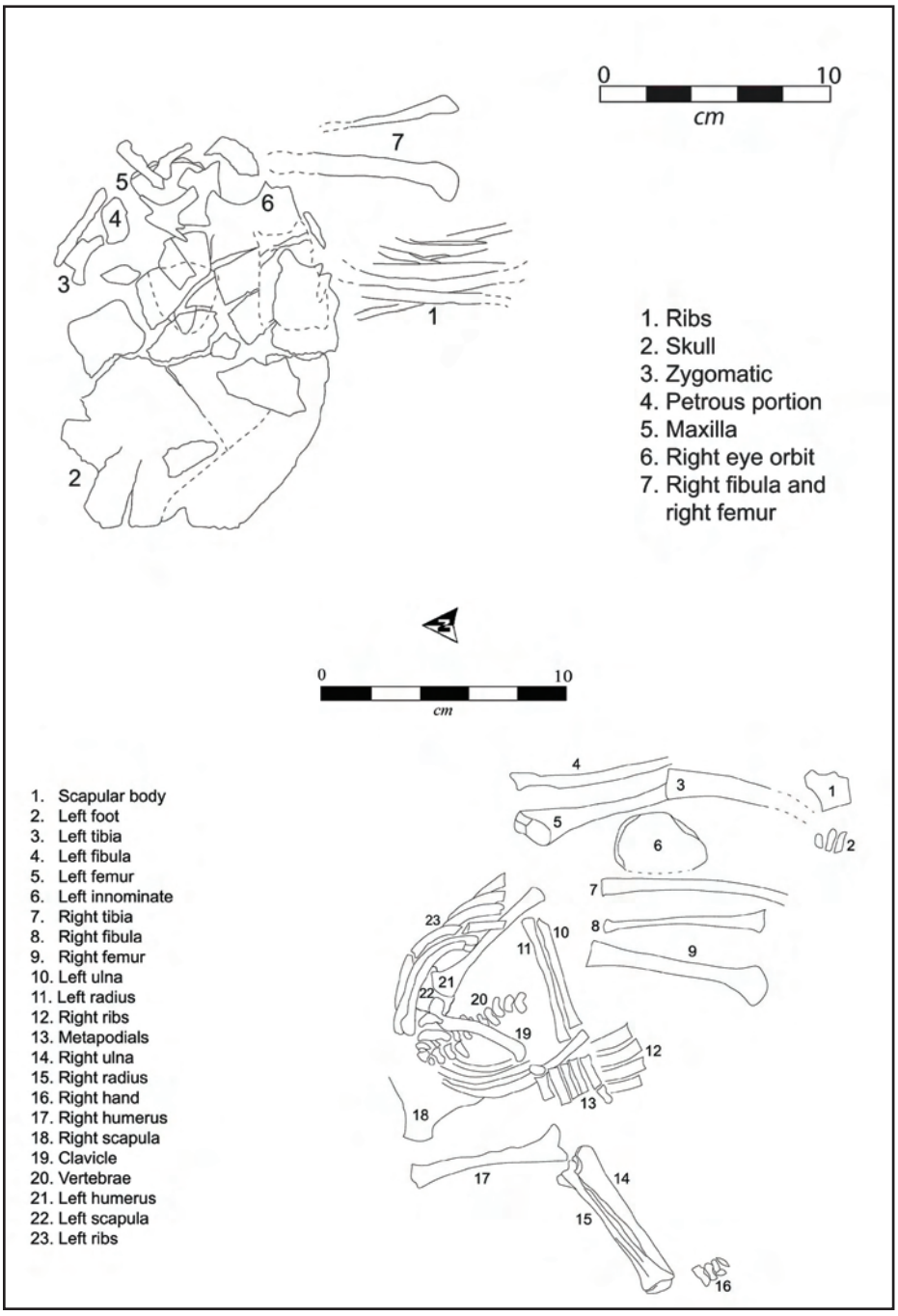

Figure 14. Plan view map of Individual 4 in Burial Feature 2. The top sketch shows the skull as it was revealed during excavation, and the bottom sketch shows the skeletal elements discovered beneath the skull. For reference purposes, Number 7 in the top sketch corresponds with Numbers 8 and 9 in the bottom sketch.

Table 17. Inventory and Description of Cranial Elements from Individual 4 at CA-KER-4619.

Element	Number	Condition	Comments
frontal	1	nearly complete	2 large fragments (broken at eye orbits)
parietals	2	nearly complete	3 large fragments, several small fragments
occipital	1	nearly complete	1 large fragment, several small fragments
temporals	2	complete	auditory ossicle (malleus) present
temporomandibular joints	2	complete	–
sphenoid	1	nearly complete	both greater wings (unfused), right lesser wing with body
zygomatics	2	complete	–
maxillae	2	nearly complete	unfused, part of right missing (see Table 21 for dentition)
palatines	2	nearly complete	palatine suture unfused, part of right missing
mandibles	2	nearly complete	symphysis unfused, right missing part of ascending ramus, left broken in 2 pieces and missing part of ascending ramus (see Table 21 for dentition)
vomer	1	nearly complete	–
ethmoid	1	fragments (2)	–
nasals	2	complete	–
nasal conchae	2	complete	–
basilar part of occipital	1	complete	–
lateral part of occipital	2	nearly complete	–

general midden but was deposited in the grave during backfilling of the pit in antiquity. This bead type has little temporal significance, but it has occurred in Late Period contexts.

Individual 6 (Burial Feature 3)

Individual 6 (probably a male) was exposed in the stream cut, and the soil above it was very unstable. Thus, only the exposed elements were removed, and the majority of the burial was left unexcavated. The few elements that were recovered from Individual 6 included the cranium, two vertebrae, and one humeral head fragment. The cranium was highly fragmented due to postmortem breakage, but there was no visible rodent gnawing or root damage. The inventory and description of the cranial elements of this individual are provided in Table 27. No artifacts associated with Individual 6 were recovered.

Flexure, Position, and Orientation

As so little of Individual 6 was recovered, the flexure, position, and degree of orientation could not be determined. Based on the skeletal elements that were observed, however, it was possible to ascertain that the cranium was facing east and the rest of the skeleton was most likely oriented to the east.

Age, Sex, and Pathological Conditions

The cranium of this individual was fragmented to such an extent that suture closure was difficult to determine, but most of the sutures appeared to have minimal to significant closure. There was complete closure of the basilar suture, however, indicating that the individual was over 21 years of age. Along with the degree of tooth wear (see below), the evidence suggests a somewhat older age, perhaps 30 to 40 years old. Using cranial traits for determining

Table 18. Metrics for Cranial Elements from Individual 4 at CA-KER-4619.

Cranial Element[a]	Measurements[b] (mm)
lesser wing of the sphenoid	
length	14.0[c] (R)
width	11.5 (R)
greater wing of the sphenoid	
length	29.7 (R)
width	22.4 (R)
petrous and mastoid portions of the temporal	
length	42.6
width	15.5
basilar part of the occipital	
length	12.1
width	15.9
zygomatic	
length	27.6
width	22.3
maxilla	
length	27.8
height	28.4
width	26.4

a. Measurement of left bone except where indicated with (R).
b. Based on Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994).
c. Estimated measurement.

sex (Buikstra and Ubelaker 1994), the cranium scored fours or fives for the nuchal crest, mastoid process, supraorbital margin, and glabella, indicating that this individual was probably male. The humeral head was too fragmented to corroborate the sex determination.

There was a possible carious lesion on the left first maxillary molar, an abscess on the right central maxillary incisor, and a small amount of calculus on several of the teeth. Additionally, there were chips on the right second maxillary molar and right third mandibular molar, possibly the result of using the teeth as a tool (e.g., as a cutting device). The incisors, canines, and premolars for both the maxilla and the mandible scored fives for surface wear, indicating a moderate level of tooth wear (Buikstra and Ubelaker 1994:52). The first, second, and third molars on the maxilla scored 31, 22, and 14, respectively, indicating maximum to minimal wear. On the mandible, the first, second, and third molars scored 33, 20, and 8, respectively (Buikstra and Ubelaker 1994:53). Table 28 lists the inventory and description of the dental elements recovered from this individual. There was also slight lipping on the vertebrae.

Nonmetric Traits

The cranium of Individual 6 had supraorbital notches on both sides (< ½ occluded by spicules), multiple supraorbital foramina on both sides, a complete

Table 19. Inventory and Description of Postcranial Elements from Individual 4 at CA-KER-4619.

Element	Number	Condition	Comments
long bones			
humeri	2	complete	–
radii	2	complete	–
ulnae	2	complete	–
femora	2	complete	–
tibiae	2	complete	broken in two pieces at distal end
fibulae	2	complete	–
clavicle	1	complete	left
short bones			
metacarpals	10	complete	5 left, 5 right
manual phalanges	11	complete	2 left, 4 right, 5 unsided
metatarsals	9	complete	5 left, 4 right
pedal phalanges	2	complete	left
flat bones			
scapulae	2	complete	–
ilia	2	complete	–
ischia	2	complete	–
pubis	1	complete	left
left ribs	11	mostly fragmented	2 complete/unbroken, 2 complete/broken, 7 distal ends
right ribs	12	mostly fragmented	3 complete/unbroken, 4 complete/broken, 5 distal ends
irregular bones			
carpal	1	complete	lunate
tarsals	2	complete	calcaneus, talus
cervical vertebrae	7	complete	neural arches unfused, 6 unfused centra
thoracic vertebrae	12	complete	1 with fused neural arches, 11 with unfused neural arches, 12 unfused centra
lumbar vertebrae	5	complete	unfused neural arches, 5 unfused centra
sacrum	1	mostly complete	4 unfused neural arches, 4 centra, 1 wing

infraorbital suture on the right side, two large and several smaller zygomatico-facial foramina on the right side, a parietal foramen on the left side, and mastoid foramina (temporal) on both sides. Flexure of the superior sagittal sulcus was to the right. No other nonmetric traits were observed.

Individual 7 (Burial Feature 4)

This individual was represented by a left mastoid process only. Measuring from the digastric groove to the tip of the mastoid process, it was 6.3 mm long. Individual 7 was an adult of unknown age or sex. No chronological data were recovered to determine the burial date.

Table 20. Metrics for Postcranial Elements from Individual 4 at CA-KER-4619.

Postcranial Element[a]	Measurements[b] (mm)
clavicle	
length	45.0
diameter	3.3
scapula	
length (height)	37.1
width	28.0
length of spine	32.0
ilium	
length	36.7
width	31.4
ischium	
length	20.1
width	12.9
pubis	
length	17.1
humerus	
length	65.6
width	17.2
diameter	5.6
ulna	
length	63.5
diameter	4.1
radius	
length	55.9
diameter	4.0
femur	
length	80.4
width	21.7
diameter	7.0
tibia	
length	69.2
diameter	6.6
fibula	
length	67.6
diameter	3.4

a. All measurements are of the left bone.
b. Based on Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994).

Individual 8 (Burial Feature 4)

Individual 8 was an adult of unknown age or sex, represented by a right mastoid process only. Measuring from the digastric groove to the tip of the mastoid process, it was 13.1 mm long. The distinct difference in size between the mastoids of Individuals 7 and 8 leaves no doubt that they represent two persons (possibly a female and a male, respectively). As with Individual 7, no chronological data were available to determine the date of the burial.

Unassigned Elements from Burial Feature 4

The unassigned elements from Burial Feature 4 included three complete elements, three nearly complete elements, and 133 fragments (see Tables 29 and 30). It was not possible to determine the flexure, position, or orientation of these remains, and they were too fragmentary to ascertain the presence of any nonmetric traits. An unassigned iliac crest was fused, which indicates that one individual was at least 17 years old (Owings Webb and Suchey 1985). It was not possible to determine whether this bone belonged to either Individual 7 or 8, or whether it belonged to a separate person.

Minimal lipping was evident on the unassigned lumbar vertebra and the right temporomandibular joint, and the thoracic vertebrae were too fragmentary to determine the extent of lipping. This suggests the presence of at least one younger adult. The femur was extremely weathered and fragmented, and the femoral head was too eroded for sex determination (Dittrick and Suchey 1986).

Of the unassigned teeth, the maxillary right second premolar had a small chip on the mesiolabial corner, and there was a small amount of calculus on most of the other teeth. The canines, incisors, and premolars on the maxilla and mandible scored fours or fives for surface wear, indicating slight to moderate tooth wear. The first and second molars on the maxilla scored 23 and 15, respectively, indicating minimal to moderate wear, the greatest amount

Table 21. Inventory and Description of Dental Elements from Individual 4 at CA-KER-4619.

Teeth	Comments
left maxilla	
deciduous central incisor	shoveled, unerupted, crown complete
deciduous lateral incisor	shoveled, unerupted, crown complete
deciduous canine	unerupted, crown 95% complete
deciduous first molar	unerupted, crown 75% complete
deciduous second molar	unerupted, crown 40% complete
right maxilla	
deciduous central incisor	shoveled, unerupted, crown complete
deciduous lateral incisor	shoveled, unerupted, crown complete
deciduous canine	unerupted, crown 95% complete
deciduous first molar	unerupted, crown 75% complete
deciduous second molar	unerupted, crown 40% complete
left mandible	
deciduous central incisor	shoveled, unerupted, crown complete
deciduous lateral incisor	shoveled, unerupted, crown complete
deciduous canine	unerupted, crown at least 95% complete
deciduous first molar	unerupted, crown 65% complete
deciduous second molar	unerupted, crown 35% complete
right mandible	
deciduous central incisor	shoveled, unerupted, crown complete
deciduous lateral incisor	shoveled, unerupted, crown complete
deciduous canine	unerupted, crown at least 95% complete
deciduous first molar	unerupted, crown 65% complete
deciduous second molar	unerupted, crown 35% complete

being on the first molar (Buikstra and Ubelaker 1994:53). Table 30 lists the inventory and description of the dental elements recovered from this burial complex.

Associated Artifacts

Five beads, two flakes, and two biface base fragments were surface collected in the vicinity of Burial Feature 4 (see Table 4), although it was not clear whether these artifacts were directly associated with the burials. The beads included three *Olivella* types (one each of E1a, G1, and K1) (per Bennyhoff and Hughes 1987) and two clamshell disk beads. The two flakes, one chert and one obsidian, had a combined weight of less than a gram. Both the biface bases were chert.

Individual 9 (Burial Feature 5)

Only one element was recovered from this individual, the heavily weathered midshaft of the left femur of an

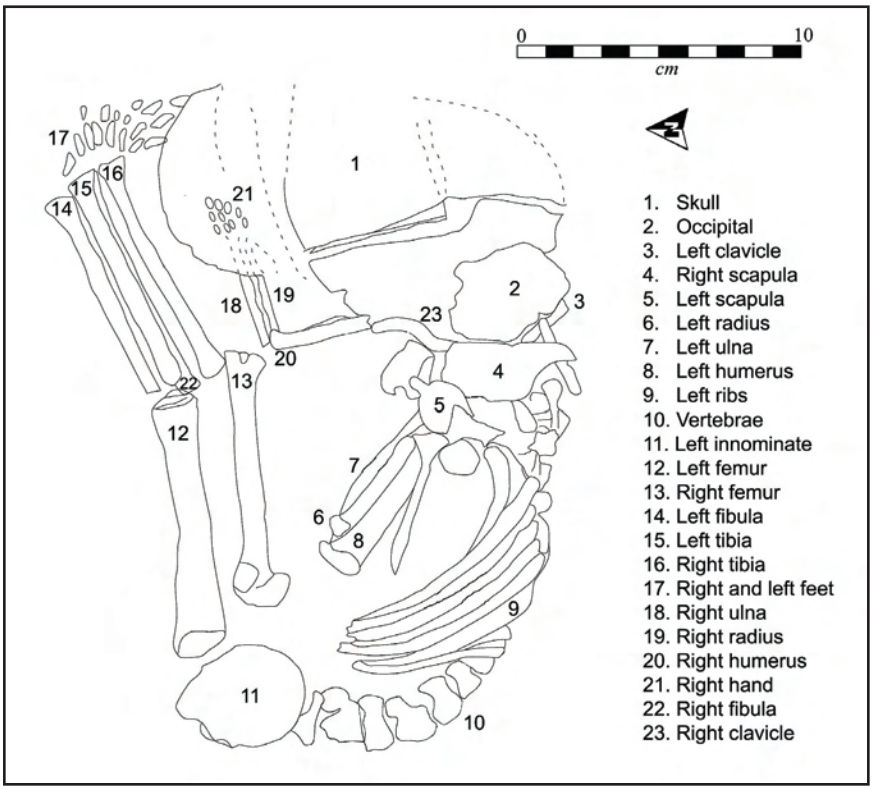

Figure 15. Plan view map of Individual 5 in Burial Feature 2.

Table 22. Inventory and Description of Cranial Elements from Individual 5 at CA-KER-4619.

Element	Number	Condition	Comments
frontal	1	nearly complete	fragmented
parietals	2	nearly complete	fragmented
occipital	1	nearly complete	fragmented
temporals	2	complete	–
temporomandibular joints	2	complete	–
sphenoid	1	nearly complete	both greater wings (unfused), lesser wings
zygomatics	2	complete	left somewhat fragmented
maxillae	2	nearly complete	unfused, part of left missing (see Table 26 for dentition)
palatines	2	fragmented	palatine suture unfused
mandibles	2	complete	symphysis unfused, part of gonial angle missingon left side (see Table 26 for dentition)
ethmoid	1	nearly complete	–
nasal concha	1	complete	–
basilar part of occipital	1	complete	–
lateral part of occipital	2	nearly complete	–

Table 23. Metrics for Cranial Elements from Individual 5 at CA-KER-4619.

Cranial Element[a]	Measurements[b] (mm)
lesser wing of the sphenoid	
length	15.0[c]
width	12.5
greater wing of the sphenoid	
length	35.3
width	24.1
body of the sphenoid	
length	13.4
width	18.0
petrous and mastoid portions of the temporal	
length	49.3
width	19.2
basilar part of the occipital	
length	13.1
width	16.1
zygomatic	
length	30.9 (R)
width	20.7 (R)
maxilla	
length	22.8 (R)
height	25.0 (R)
width	25.1 (R)
mandible	
length of body	40.1 (R)
width of arc	20.6 (R)
full length of half mandible	58.7 (R)

a. Measurement of left bone except where indicated with (R).
b. Based on Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994).
c. Estimated measurement.

adult. The anterior-posterior midshaft diameter at the nutrient foramen was 30.1 mm. With only one bone that was out of context (see above), it was not possible to determine the flexure, position, orientation, age (other than adult), sex, pathological conditions, or presence of nonmetric traits. There were no artifacts associated with Individual 9.

Other Features

Three other features were identified at the Cross Mountain site. Two were hearths, and one was a large bedrock outcropping that contained at least one mortar. Each is described below.

Hearth Feature 1

Hearth Feature 1 was initially exposed about 25 cm below the surface between Burial Features 1 and 2. The feature was somewhat dispersed (Figure 16), but it appeared to have measured about 150 cm in maximum width and 60 cm deep. As it was in danger of eroding out of the bank, a small soil sample and some charcoal for radiocarbon analysis were collected. The radiocarbon assay produced a date of 370 ± 60 RCYBP (see complete results below). The constituents from the soil sample included four chert flakes (9.6 g), a chalcedony flake (0.01 g), two obsidian flakes (0.02 g), 11 fire-affected rocks (total weight of 60.5 g), 27 unidentified burned seeds, and 13 faunal elements. There were also 15 faunal elements recovered from the hearth in situ (see discussion of faunal remains below).

Hearth Feature 2

Hearth Feature 2 was located on the slope above the burials, approximately 80 m west of Burial Feature 1 (Figure 3). It measured approximately 50 cm in diameter. Two burned carapace fragments identified as chelonian (turtles and tortoises), an unidentified rodent long bone fragment (unburned), and two undecorated pottery sherds (one burned) were collected from the

Table 24. Inventory and Description of Postcranial Elements from Individual 5 at CA-KER-4619.

Element	Number	Condition	Comments
long bones			
humeri	2	complete	left broken in 2 pieces at distal end
radii	2	complete	–
ulnae	2	complete	left broken in 2 pieces
femora	2	complete	–
tibiae	2	complete	distal epiphyses present
fibulae	2	complete	–
clavicles	2	complete	right broken in 2 pieces
short bones			
metacarpals	10	complete	5 left, 5 right
manual phalanges	17	complete	8 left, 8 right, 1 unsided
metatarsals	10	complete	5 left, 5 right
pedal phalanges	10	complete	4 left, 4 right, 2 unsided
flat bones			
scapulae	2	nearly complete	medial border of left missing
ilia	2	complete	–
ischia	2	complete	–
pubes	2	complete	–
left ribs	12	nearly complete	5 complete/unbroken, 7 complete/broken
right ribs	12	mostly fragmented	1 complete/unbroken (1st), 4 complete/broken, 7 distal ends
irregular bones			
tarsal	7	complete	calcaneus, talus, 5 unidentified
cervical vertebrae	7	complete	neural arches unfused, 6 unfused centra
thoracic vertebrae	12	complete	neural arches unfused, 12 unfused centra
lumbar vertebrae	5	complete	partial fusion of neural arches, 5 unfused centra
sacrum	1	mostly complete	5 unfused neural arches, 3 centra, 2 wings

surface of the hearth. As this feature was in no immediate danger of erosion or other damage, no soil sample was collected.

Bedrock Milling Feature

A large bedrock outcropping is situated near the northern end of the site (Figures 2 and 17). Much of the surface of this outcropping was obscured by soil, and no milling features were initially observed on the exposed portions of the bedrock. In the only place where the soil was brushed away in order to place the site datum, however, a single bedrock mortar was discovered. Given this "chance" encounter, it seems likely that other mortars exist under the soil on this outcropping, although time did not permit us to explore that possibility.

Table 25. Metrics for Postcranial Elements from Individual 5 at CA-KER-4619.

Postcranial Element[a]	Measurements[b] (mm)
clavicle	
length	48.6
diameter	4.1
scapula	
length (height)	32.0 (R)
width	30.7 (R)
length of spine	35.3 (R)
ilium	
length	40.9
width	34.5
ischium	
length	23.9
width	14.4
pubis	
length	18.2
humerus	
length	73.8 (R)
width	20.2 (R)
diameter	6.8 (R)
ulna	
length	68.2
diameter	5.4
radius	
length	60.5
diameter	5.0
femur	
length	87.1
width	22.9
diameter	7.9
tibia	
length	73.4
diameter	7.1
fibula	
length	70.4
diameter	3.8

a. Measurement of left bone except where indicated with (R).
b. Based on Fazekas and Kósa (1978) and Buikstra and Ubelaker (1994).

Material Culture

Numerous artifacts that were not associated with the burial or hearth features were identified across the surface of the Cross Mountain site but were not collected. Among these items were numerous projectile points, bifaces, manos, metates, pestles, cores, hammerstones, stone bowl fragments, and a multitude of flakes of various materials (e.g., chalcedony, chert, basalt, and obsidian). Most of the projectile points were Rose Spring and Desert series forms.

In addition, various artifacts were recovered from the burial and hearth features (Table 4) that could not be associated with specific individuals since they were not taken from stratigraphically controlled contexts. Most of these artifacts consisted of debitage of a variety of materials, including obsidian, chert, chalcedony, rhyolite, jasper, and basalt. Other items of uncertain association that were recovered included a granite metate fragment, two chert biface bases, two undecorated pottery sherds, and 11 fire-affected rocks.

As noted above, a variety of shell beads and ornaments were recovered in association with Individuals 1 and 2, along with a few from Burial Feature 4 (Tables 31 through 39). Even if they were not in stringing position, all the beads found in Burial Feature 1 were considered to be associated with Individual 1. The following provides a description and analysis of the beads and other ornaments found with Individuals 1 and 2.

Shell and Stone Beads Associated with Individual 1

Numerous beads (n = 521) were recovered with Individual 1, many still in stringing position (Tables 31 through 35). The majority of the loose beads (those not found in stringing position) were found during screening; only 20 were found in situ. Most of the beads (both loose and strung) were conically

Table 26. Inventory and Description of Dental Elements from Individual 5 at CA-KER-4619.

Teeth	Comments
left maxilla	
deciduous central incisor	shoveled, unerupted, crown complete
deciduous lateral incisor	shoveled, unerupted, crown complete
deciduous canine	unerupted, crown 95% complete
deciduous first molar	unerupted, crown complete
deciduous second molar	unerupted, crown 75% complete
right maxilla	
deciduous central incisor	shoveled, unerupted, crown complete
deciduous lateral incisor	shoveled, unerupted, crown complete
deciduous canine	unerupted, crown 95% complete
deciduous first molar	unerupted, crown complete
deciduous second molar	unerupted, crown 75% complete
left mandible	
deciduous central incisor	shoveled, unerupted, crown complete
deciduous canine	unerupted, crown 90% complete
deciduous first molar	unerupted, crown complete
deciduous second molar	unerupted, crown 75% complete
right mandible	
deciduous central incisor	shoveled, unerupted, crown complete
deciduous lateral incisor	shoveled, unerupted, crown complete
deciduous canine	unerupted, crown 90% complete
deciduous first molar	unerupted, crown complete
deciduous second molar	unerupted, crown 75% complete

Table 27. Inventory and Description of Cranial Elements from Individual 6 at CA-KER-4619.

Element	Number	Condition	Comments
frontal	1	nearly complete	several large fragments
parietal	1	fragmented	left somewhat fragmented, right almost completely missing
occipital	1	nearly complete	basilar part broken off but recovered
temporals	2	complete	–
temporomandibular joints	2	complete	–
zygomatic	1	complete	right
maxilla	1	nearly complete	several large fragments (see Table 28 for dentition)
palatines	2	complete	–
mandible	1	nearly complete	several large fragments (see Table 28 for dentition)

Note: In addition to the cranial elements, two vertebrae and one humeral head fragment were recovered from this individual.

Table 28. Inventory and Description of Dental Elements from Individual 6 at CA-KER-4619.

Teeth	Comments
left maxilla	
first molar	possible carious lesion, small amount of calculus on buccal surface
second molar	–
third molar	small amount of calculus on buccal surface
right maxilla	
central incisor	shoveled, abscess on buccal surface, small amount of calculus on labial surface
lateral incisor	shoveled, small amount of calculus on labial surface
canine	–
first premolar	–
second premolar	–
first molar	–
second molar	chip[a] on mesiobuccal corner
third molar	small amount of calculus on buccal surface
left mandible	
lateral incisor	shoveled, small amount of calculus on labial surface
first premolar	small amount of calculus on lingual and buccal surfaces
second premolar	small amount of calculus on lingual and buccal surfaces
first molar	–
second molar	–
third molar	–
right mandible	
lateral incisor	shoveled, small amount of calculus on labial surface
canine	small amount of calculus on labial surface
first premolar	small amount of calculus on buccal surface
second premolar	–
first molar	–
second molar	–
third molar	chip on distolingual corner

a. A chip involves damage to the enamel only that occurs on less than one-quarter of the circumference of the crown of the tooth (Siefkin 1993:5).

Table 29. Inventory and Description of Unassigned Elements from Burial Feature 4 at CA-KER-4619.

Element	Number	Condition	Comments
occipital	3	fragments	–
parietal	1	fragment	–
zygomatic	4	fragments	–
temporal	4	fragments	left
temporomandibular joint	1	fragment	right
occipital/temporal?	2	fragments	–
cranial (occipital?)	1	fragment	–
cranial (parietal?)	2	fragments	–
cranial (unidentified)	5	fragments	–
maxilla	3	fragments	1 fragment with both premolars and canine, 1 fragment with 1st and 2nd molars (all right side),
mandible	5	fragments	4 fragments of ascending ramus, 1 fragment including left central and lateral incisors, right lateral incisor and canine, mental eminence
clavicle	1	fragment	shaft fragment, left?
scapula	8	fragments	includes inferior angle (left?), infraspinous fossa (right), axillary border (left)
ilium	2	fragments	fragments fit together (left), iliac crest fused
acetabulum	1	complete	large, left
vertebra	6	fragments	1 lumbar, 2 thoracic, 3 probably thoracic
rib	4	fragments	includes 1 left proximal epiphysis
femur	7	fragments	left proximal epiphysis (fragmentary), proximal shaft
humerus	3	fragments	1 shaft fragment (left?), 2 proximal epiphyses
tibia	8	fragments	2 shaft fragments that fit together, 1 fragmentary proximal epiphysis
fibula	3	fragments	1 small shaft fragment and 1 proximal epiphysis that may fit together (right?)
long bone	2	fragments	2 small shaft fragments
long/short bone?	11	fragments	small fragments
metacarpal	1	complete	left second
metacarpal	1	nearly complete	right fourth, proximal end
metapodial	1	fragment	shaft, unsided
metatarsal	1	complete	right first
pedal phalanx	1	nearly complete	left fifth, proximal
phalanx	1	fragmented	proximal
talus	1	nearly complete	left
unidentified	45	fragments	–

Table 30. Inventory and Description of Unassigned Teeth from Burial Feature 4 at CA-KER-4619.

Teeth	Comments
right maxilla	
canine	small amount of calculus on mesiolabial surface
first premolar	–
second premolar	small amount of calculus on distolabial surface, small fracture on mesiolabial corner
first molar	small amount of calculus on buccal surface
second molar	small amount of calculus on buccal surface
left mandible	
central incisor	shoveled, small amount of calculus on mesial surface
lateral incisor	shoveled
right mandible	
lateral incisor	shoveled, small amount of calculus on mesial surface
canine	–

drilled and had ground edges. Many of them exhibited stringwear, retouch, and/or edgewear, suggesting that they were not manufactured at the time of interment but had been used for some period of time prior to this child's burial.

Of the loose beads, there were 254 *Olivella* beads, 62 steatite disk beads, four *Haliotis* disk beads, and nine clamshell (cf., *Tivela stultorum*) tube beads. The vast majority of the loose *Olivella* beads (n = 229) were Type E1a (per Bennyhoff and Hughes 1987). The remaining loose *Olivella* beads consisted of 11 K1 cupped beads and two whose type could not be determined.

Also recovered with Individual 1 were 11 bead strands consisting of 192 beads, all documented in situ (Figures 8 and 9, Table 35). Some of these were probably not individual strands but rather fragments of much longer strands whose articulation was lost over time. The strands were of various sizes; Strands A and B had four beads each, Strand C had nine beads, Strand D had 30 beads, Strand E had 40 beads, Strand F had 20 beads, Strand G had 29 beads, Strand H had eight beads, Strand I had 31 beads, Strand J had 10 beads, and Strand K had eight beads. As with the loose beads, the majority of strung beads were *Olivella* and most were Type E1a (n = 166). The remaining strung beads included eight that may have been Type E1b and 18 that were steatite disk beads.

The diameters of the loose *Olivella* beads ranged between 4.4 and 7.6 mm, with most falling between the range of 6.1 and 7.5 mm. The perforation diameters ranged between 1.8 and 3.1 mm, although the majority had diameters between 1.9 and 2.2 mm. The diameters of the strung *Olivella* beads ranged between 4.8 and 8.4 mm, and the perforation diameters ranged between 1.7 and 3.0 mm. As with the loose beads, most of the strung beads also fell within a narrower range, between 6.0 and 7.5 mm in diameter and 1.8 to 2.2 mm in perforation diameter. This narrow range is not surprising since many of the beads were found in stringing position and many of the others were probably once parts of strands, and they would likely have been produced during the same time and by the same tools and technology, possibly by the same artisan.

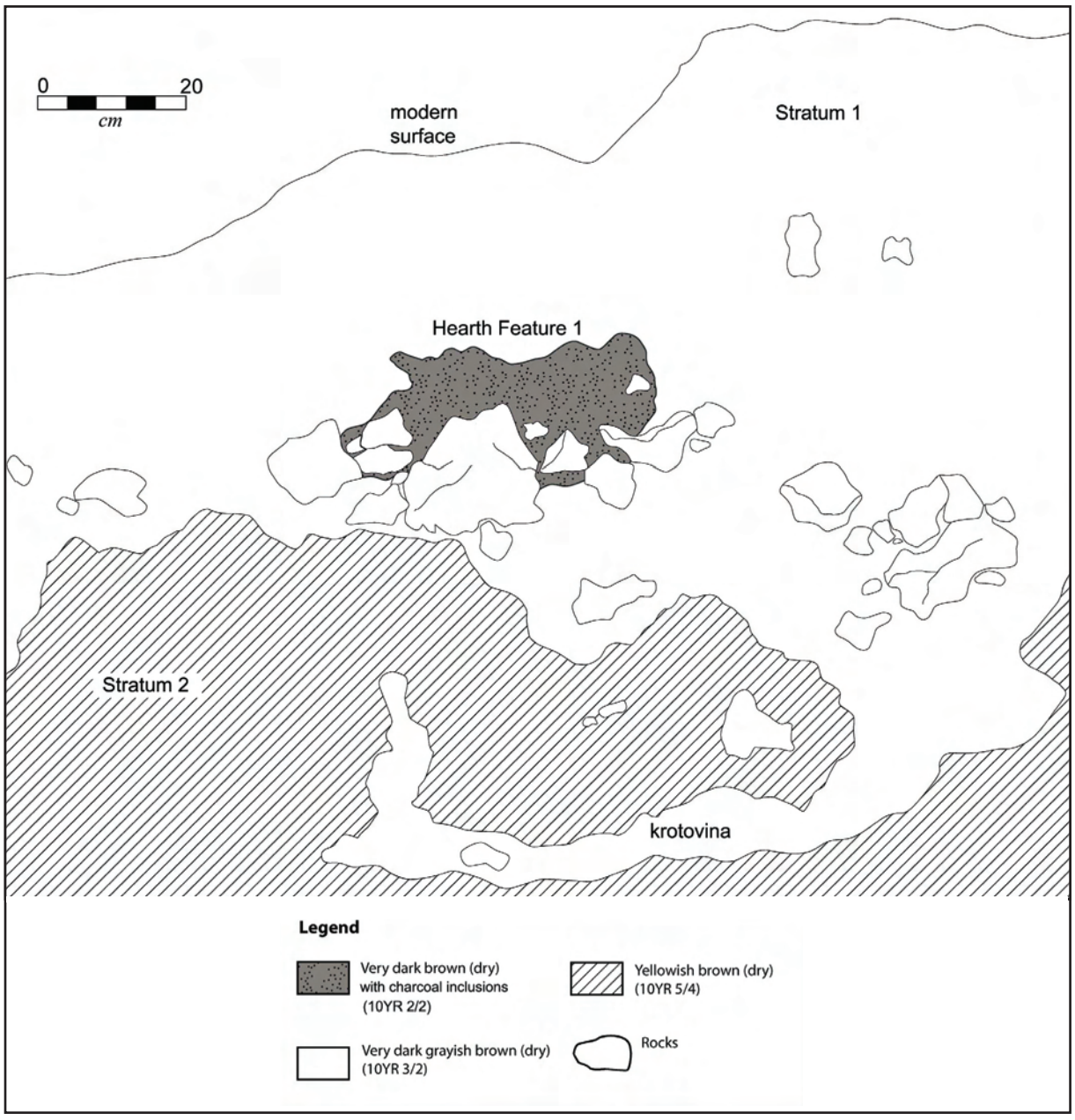

Figure 16. Profile map of Hearth Feature 1 (view generally south). Burial Feature 1 is to the right of the hearth, and Burial Feature 2 is to the left of the hearth.

Figure 17. The bedrock outcropping at the Cross Mountain site (CA-KER-4619), looking east.

All the beads from the strands were removed in the field one at a time and restrung in their original positions in order to determine patterns of bead distribution on each strand. Unfortunately, Strand F was dropped during its removal, and the positions of the beads were lost. Since this strand had more steatite beads than any of the others, it is even more regrettable in terms of determining possible patterning of *Olivella* to steatite beads.

While discerning a pattern of bead distribution is difficult under these circumstances, it was possible to ascertain that of those strands that had steatite beads (E, F, G, I, and J), all but Strand F had only one or two among numerous *Olivella* beads. This suggests a broad pattern of stringing one or two steatite beads, followed by long rows of *Olivella* beads; for example, Strand E had 33 *Olivella* beads in a row, then a single steatite bead, then five more *Olivella* beads, then another steatite bead (see Table 36). This broad pattern was supported by the number of loose *Olivella* and steatite beads, most of which were probably parts of the strands associated with Individual 1 that had subsequently become disarticulated; these loose beads demonstrated a roughly four to one ratio of *Olivella* to steatite. This does not explain the beads from Strand F, however, which had more steatite beads (n = 12) than *Olivella* (n = 8) beads, although their distribution on the strand is unknown (see above). Nevertheless, as they were all part of a single strand, they do not fit the putative pattern of the distribution of *Olivella* to steatite beads.

Using a modern analogue, the distribution of various ornaments on necklaces is often intended to highlight the part of the necklace that is the most visible when looking directly at the individual wearing it, that is, in the front where the necklace curves, such as a chain with a diamond attached in front, perhaps abutted on either side by one or two smaller gems. The point is that the gems, not the chain, are the focus of the necklace. Assuming that these bead strands were considered "necklaces," perhaps the distribution of steatite beads among the *Olivella* beads on Individual 1 was intended as additional ornamentation in the front, and the part of the strand that went around the neck had less detail; in effect, the long rows of *Olivella* beads by themselves may have constituted the "chain" and were not the focal point.

Moreover, if Strand F was intended as a "bracelet" rather than a "necklace," it may be that the *Olivella*

Table 31. Attributes of the Loose *Olivella* Beads Associated with Individual 1 at CA-KER-4619.[a]

Cat. No.	Prov	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0152	screen	K1	3.8	2.0	2.4	parallel-sided perforation, retouch
0153	screen	K1	4.4	2.1	2.4	parallel-sided perforation, edgewear
0154	screen	K1	4.8	2.1	2.4	conical perforation, edgewear, small pits on surface, retouch
0155	screen	K1	4.2	2.1	1.9	conical perforation, exterior retouch
0156	screen	K1	4.2	2.2	2.0	parallel-sided perforation
0157	screen	K1	4.1	2.3	1.7	parallel-sided perforation, perforation is slightly off center
0158	screen	K1	4.7	2.5	2.3	parallel-sided perforation, edgewear
0159	screen	K1	5.0	2.0	3.0	parallel-sided perforation, retouch
0160	screen	K1	4.7	2.15	1.9	parallel-sided perforation, small pits on surface, retouch
0469	in situ	K1	3.7	2.0	1.9	conical perforation, ground edges, found under right ilium of Individual 1
0473	in situ	K1	3.9	2.0	2.4	conical perforation, ground edges, from wrist of Individual 1
0161	screen	E1a	7.2	2.5	4.2	conical perforation, possible retouch on convex side
0162	screen	E1a	7.0	2.4	3.3	conical perforation, possible retouch on convex side
0163	screen	E1a	7.1	2.0	4.0	conical perforation, possible retouch on convex side
0164	screen	E1a	7.5	2.5	4.2	conical perforation, possible retouch on convex side
0165	screen	E1a	6.9	2.0	3.7	parallel-sided perforation, possible retouch on convex side
0166	screen	E1a	7.0	2.4	3.5	parallel-sided perforation, possible retouch
0167	screen	E1a	7.0	2.3	4.0	parallel-sided perforation, possible retouch
0168	screen	E1a	6.5	2.0	3.0	parallel-sided perforation, possible retouch and stringwear
0169	screen	E1a	7.5	2.0	3.7	conical perforation, grooves on convex side
0170	screen	E1a	6.1	2.0	3.1	parallel-sided perforation, possible retouch
0171	screen	E1a	7.1	2.0	3.5	parallel-sided perforation, ground edges, possible retouch
0172	screen	E1a	7.4	2.1	3.4	conical perforation, possible retouch
0173	screen	E1a	7.3	2.2	3.6	conical perforation, stringwear, edgewear, possible retouch
0174	screen	E1a	7.0	2.1	3.6	conical perforation, possible retouch, edgewear
0175	screen	E1a	7.1	2.0	3.6	conical perforation, retouch, stringwear, possible edgewear
0176	screen	E1a	6.4	2.1	3.2	conical perforation, stringwear, edgewear, possible retouch
0177	screen	E1a	7.4	2.0	2.3	parallel-sided perforation, heavily weathered surface
0178	screen	E1a	6.5	2.0	3.7	conical perforation, ground edges
0179	screen	E1a	7.4	2.3	3.4	conical perforation, stringwear, possible edgewear
0180	screen	E1a	6.6	2.2	3.1	conical perforation, retouch, possible edgewear
0181	screen	E1a	6.4	2.0	3.6	parallel-sided perforation, retouch, stringwear, edgewear
0182	screen	E1a	7.0	2.3	3.6	conical perforation, ground edges, edgewear, stringwear
0183	screen	E1a	6.8	2.2	3.4	conical perforation, retouch, possible edgewear, stringwear
0184	screen	E1a	6.4	2.8	2.8	conical perforation, heavily weathered, oblong perforation
0185	screen	E1a	7.3	2.0	4.0	conical perforation, ground edges, edgewear, possible retouch
0186	screen	E1a	6.6	2.0	3.4	conical perforation, ground edges, retouch
0187	screen	E1a	6.4	2.1	3.1	conical perforation, edgewear, possible retouch, stringwear

Table 31. *(continued)*

Cat. No.	Prov	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0188	screen	E1a	7.3	2.2	3.1	conical perforation, ground edges, possible retouch
0189	screen	E1a	7.4	2.0	3.5	conical perforation, ground edges, possible retouch
0190	screen	E1a	7.5	2.2	3.3	conical perforation (off center), edgewear and retouch
0191	screen	E1a	6.8	2.0	3.6	conical perforation, ground edges, edgewear, possible retouch
0192	screen	E1a	7.6	2.1	4.2	parallel-sided perforation, ground edges, edgewear, retouch
0193	screen	E1a	6.7	2.0	3.4	conical perforation, ground edges, slight edgewear and stringwear, possible retouch
0194	screen	E1a	6.7	2.0	3.3	conical perforation, stringwear, retouch, possible edgewear
0195	screen	E1a	7.0	2.1	3.5	conical perforation, ground edges, stringwear
0196	screen	E1a	7.6	2.0	3.5	conical perforation, ground edges, stringwear, retouch
0197	screen	E1a	7.0	1.9	3.4	conical perforation, ground edges, stringwear, retouch
0198	screen	E1a	6.7	2.0	2.8	conical perforation, ground edges, stringwear
0199	screen	E1a	7.0	2.2	3.0	conical perforation, ground edges, heavily weathered
0200	screen	E1a	7.1	2.0	3.4	conical perforation, ground edges, stringwear, retouch
0201	screen	E1a	7.1	1.9	3.3	conical perforation, ground edges, stringwear, retouch
0202	screen	E1a	6.4	2.0	3.4	conical perforation, heavily weathered surface, retouch
0203	screen	E1a	6.1	2.0	2.6	conical perforation, ground edges, stringwear, retouch
0204	screen	E1a	6.7	2.0	3.2	conical perforation, ground edges, stringwear
0205	screen	E1a	7.0	2.0	2.6	conical perforation, heavily weathered
0206	screen	E1a	6.3	2.4	2.5	conical perforation, heavily weathered, perforation off center
0207	screen	E1a	7.5	2.2	3.9	conical perforation, ground edges, possible retouch
0208	screen	E1a	6.4	2.0	3.4	conical perforation, heavily weathered surface, retouch
0209	screen	E1a	6.0	2.0	3.0	conical perforation, ground edges, retouch
0210	screen	E1a	6.6	2.2	3.6	conical perforation, ground edges, stringwear, retouch
0211	screen	E1a	6.1	2.0	3.4	conical perforation, ground edges, stringwear, retouch
0212	screen	E1a	6.3	2.2	4.2	conical perforation, ground edges, retouch
0213	screen	E1a	7.1	2.1	4.2	conical perforation, ground edges, stringwear, retouch
0214	screen	E1a	6.4	2.0	3.4	conical perforation, ground edges, retouch
0215	screen	E1a	7.0	2.2	3.4	conical perforation, ground edges, surface partially sheared off, edgewear
0216	screen	E1a	7.5	1.8	3.9	conical perforation, ground edges, slight edgewear, retouch
0217	screen	E1a	6.8	2.1	3.5	conical perforation, ground edges, retouch
0218	screen	E1a	6.7	1.9	3.6	conical perforation, heavily weathered, possible retouch
0219	screen	E1a	6.6	1.9	3.6	conical perforation, ground edges, retouch
0220	screen	E1a	6.7	2.0	3.7	conical perforation, ground edges, stringwear, retouch
0221	screen	E1a	7.0	1.9	3.7	conical perforation, ground edges, heavily weathered
0222	screen	E1a	6.5	2.0	3.0	conical perforation, ground edges, retouch
0223	screen	E1a	6.8	1.9	3.1	conical perforation, ground edges, stringwear, retouch, some edgewear

Table 31. *(continued)*

Cat. No.	Prov	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0224	screen	E1a	6.7	2.0	3.1	conical perforation, ground edges, stringwear, edgewear, retouch
0225	screen	E1a	6.6	2.2	3.4	conical perforation, ground edges, stringwear, retouch
0226	screen	E1a	6.7	1.9	3.2	conical perforation, ground edges, possible retouch
0227	screen	E1a	6.8	1.9	3.4	conical perforation, heavily weathered
0228	screen	E1a	7.1	1.8	3.3	conical perforation, ground edges, slight edgewear, retouch
0229	screen	E1a	6.5	1.9	3.4	conical perforation, ground edges, stringwear, retouch
0230	screen	E1a	6.9	2.0	3.5	conical perforation, ground edges, weathered, possible retouch
0231	screen	E1a	6.7	2.2	3.3	conical perforation, ground edges, stringwear, retouch
0232	screen	E1a	6.5	1.9	3.0	conical perforation, ground edges, heavily weathered
0233	screen	E1a	7.0	1.9	3.5	conical perforation, ground edges, slight edgewear, possible stringwear and retouch
0234	screen	E1a	7.5	1.9	4.0	conical perforation, ground edges, tiny hole on edge of perforation, stringwear, retouch
0235	screen	E1a	7.0	2.0	2.9	conical perforation, ground edges, retouch, slight edgewear
0236	screen	E1a	6.7	2.2	3.1	conical perforation, ground edges, slight edgewear, retouch
0237	screen	E1a	6.2	2.0	2.5	conical perforation, weathered, edgewear, retouch
0238	screen	E1a	6.1	2.2	3.5	conical perforation, ground edges, edgewear, retouch
0239	screen	E1a	6.2	2.1	3.0	conical perforation, ground edges, heavily weathered
0240	screen	E1a	7.4	2.0	3.5	conical perforation, ground edges, weathered, stringwear, edgewear
0241	screen	E1a	7.1	1.9	4.0	conical perforation, ground edges, possible edgewear, tiny hole on edge of perforation, possible stringwear and retouch
0242	screen	E1a	6.2	2.3	2.6	parallel sided perforation, heavily weathered
0243	screen	E1a	6.6	1.9	3.6	conical perforation, ground edges, weathered, retouch
0244	screen	E1a	7.4	2.0	4.0	conical perforation, ground edges, edgewear, possible retouch
0245	screen	E1a	7.4	2.1	4.0	conical perforation, ground edges, edgewear, retouch
0246	screen	E1a	6.3	1.8	3.5	conical perforation, ground edges, retouch
0247	screen	E1a	6.9	2.1	3.7	conical perforation, ground edges, retouch
0248	screen	E1a	7.1	2.0	3.0	parallel-sided perforation, ground edges, weathered, retouch
0249	screen	E1a	7.3	2.0	3.6	conical perforation, ground edges, edgewear, stringwear
0250	screen	E1a	6.4	2.0	3.7	conical perforation, ground edges, deep groove around edge of perforation, possible retouch and edgewear
0251	screen	E1a	7.1	2.0	3.7	parallel-sided perforation, ground edges, slight edgewear
0252	screen	E1a	6.6	1.9	3.3	conical perforation, ground edges, weathered, possible retouch
0253	screen	E1a	7.3	2.1	3.6	conical perforation, ground edges, slight edgewear, retouch
0254	screen	E1a	6.5	2.1	3.1	conical perforation, ground edges, possible retouch
0255	screen	E1a	6.4	1.9	3.5	parallel-sided perforation, slightly ground edges, weathered deep stringwear around edge of perforation

Table 31. *(continued)*

Cat. No.	Prov	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0256	screen	E1a	6.9	2.0	3.6	conical perforation, ground edges, heavily weathered, edgewear
0257	screen	E1a	6.2	1.9	3.0	conical perforation, ground edges, stringwear, retouch
0258	screen	E1a	7.1	2.0	3.5	conical perforation, possible ground edges, heavily weathered
0259	screen	E1a	6.8	2.0	3.6	conical perforation, ground edges, edgewear, stringwear, retouch
0260	screen	E1a	5.6	1.8	2.9	conical perforation, heavily weathered, edgewear
0261	screen	E1a	6.9	2.2	3.8	conical perforation, ground edges, retouch
0262	screen	E1a	5.8	2.1	3.3	conical perforation, heavily weathered, edgewear
0263	screen	E1a	6.4	2.0	3.3	conical perforation, heavily weathered, edgewear, retouch
0264	screen	E1a	6.4	1.9	3.0	conical perforation, heavily weathered, edgewear, retouch
0265	screen	E1a	6.8	1.9	3.5	conical perforation, ground edges, edgewear, retouch
0266	screen	E1a	6.3	2.2	3.3	conical perforation, heavily weathered, edgewear, retouch
0267	screen	E1a	6.6	2.3	3.3	conical perforation, heavily weathered, edgewear
0268	screen	E1a	6.4	2.2	3.7	conical perforation, ground edges, stringwear, edgewear, possible retouch
0269	screen	E1a	6.4	1.9	3.6	conical perforation, ground edges, stringwear, retouch
0270	screen	E1a	6.2	1.8	2.9	conical perforation, ground edges, heavily weathered, retouch
0271	screen	E1a	6.4	2.0	3.5	conical perforation, ground edges, slight edgewear, retouch
0272	screen	E1a	7.3	2.0	4.0	conical perforation, ground edges, edgwear, retouch
0273	screen	E1a	6.8	1.8	3.2	conical perforation, heavily weathered, possible edgewear
0274	screen	E1a	5.5	1.9	2.5	conical perforation, heavily weathered, pitted
0275	screen	E1a	7.2	2.0	2.2	conical perforation, heavily weathered
0276	screen	E1a	7.0	2.1	3.5	conical perforation, ground edges, retouch, stringwear
0277	screen	E1a	7.3	2.0	3.5	conical perforation, ground edges, edgewear, retouch
0278	screen	E1a	6.4	1.9	3.1	conical perforation, ground edges, retouch, stringwear
0279	screen	E1a	6.7	2.0	4.0	conical perforation, ground edges, weathered, stringwear
0280	screen	E1a	6.6	2.1	3.1	conical perforation, ground edges, retouch, stringwear
0281	screen	E1a	7.0	2.0	3.7	conical perforation, ground edges, stringwear, retouch
0282	screen	E1a	6.7	2.2	3.2	conical perforation, heavily weathered
0283	screen	E1a	7.2	2.0	3.2	conical perforation, ground and highly polished, retouch, stringwear
0284	screen	E1a	7.3	2.0	3.6	conical perforation, ground edges, possible edgewear, small pits, possible retouch
0285	screen	E1a	6.7	2.1	2.8	conical perforation, ground edges, heavily weathered, stringwear, edgewear
0286	screen	E1a	6.7	2.1	3.5	conical perforation, ground edges, large pits, edgewear, possible retouch
0287	screen	E1a	7.0	2.0	3.3	conical perforation (?), possible ground edges, possible edgewear and retouch

Table 31. *(continued)*

Cat. No.	Prov	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0288	screen	E1a	7.1	2.1	2.8	conical perforation, ground edges, heavily weathered, edgewear, retouch
0289	screen	E1a	6.6	1.9	3.4	conical perforation, ground edges, stringwear, retouch
0290	screen	E1a	7.5	2.2	3.6	conical perforation, ground edges, possible retouch
0291	screen	E1a	7.1	1.8	3.7	conical perforation, ground edges, stringwear, retouch
0292	screen	E1a	7.5	2.2	3.9	conical perforation, ground edges, slight edgewear, stringwear, retouch
0293	screen	E1a	6.7	1.9	3.0	conical perforation, ground edges, edgewear, stringwear, possible retouch
0294	screen	E1a	6.4	1.9	3.6	conical perforation, ground edges, edgewear, retouch
0295	screen	E1a	6.9	2.0	3.0	conical perforation, ground edges, heavily weathered
0296	screen	E1a	5.9	2.1	3.6	conical perforation, ground edges, retouch
0297	screen	E1a	6.7	2.0	3.9	conical perforation, ground edges, stringwear, retouch
0298	screen	E1a	6.6	1.9	3.0	conical perforation, ground edges, retouch
0299	screen	E1a	6.4	2.0	4.5	conical perforation, ground edges, slight edgewear, substantial stringwear, retouch
0300	screen	E1a	7.3	2.1	3.3	conical perforation, ground edges, small pits, retouch
0301	screen	E1a	6.6	2.0	3.3	conical perforation, ground edges, retouch
0302	screen	E1a	7.5	2.0	3.8	conical perforation, ground edges, stringwear, retouch
0303	screen	E1a	6.7	1.9	3.3	conical perforation, ground edges, slight edgewear, stringwear
0304	screen	E1a	6.5	2.1	2.6	parallel-sided perforation, ground edges, retouch
0305	screen	E1a	6.2	2.1	3.1	conical perforation, ground edges, stringwear, retouch
0306	screen	E1a	6.7	1.9	4.2	conical perforation (?), ground edges, stringwear, retouch
0307	screen	E1a	6.6	2.3	3.2	conical perforation, ground edges, stringwear, retouch
0308	screen	E1a	5.9	1.9	3.2	conical perforation, heavily weathered
0309	screen	E1a	6.1	2.3	3.2	parallel-sided perforation, ground edges, pitted, surface partially sheared
0310	screen	E1a	5.9	1.8	2.7	conical perforation, heavily weathered, pitted, edgewear
0311	screen	E1a	6.7	1.9	3.8	conical perforation, ground edges, stringwear, retouch
0312	screen	E1a	7.1	2.0	3.3	conical perforation, ground edges, slight edgewear, retouch
0313	screen	E1a	7.1	1.8	3.4	conical perforation, ground edges, edgewear, retouch
0314	screen	E1a	7.2	2.2	3.4	conical perforation, ground edges, substanial stringwear, slight edgewear
0315	screen	E1a	6.8	2.0	3.1	conical perforation, ground edges, heavily weathered
0316	screen	E1a	6.7	2.1	3.4	conical perforation, ground edges, slight edgewear, retouch
0317	screen	E1a	6.6	2.0	3.5	conical perforation, ground edges, slight edgewear, retouch, stringwear
0318	screen	E1a	6.1	2.0	3.3	conical perforation, ground edges, retouch, stringwear
0319	screen	E1a	7.0	2.2	3.4	conical perforation, ground edges, edgewear, retouch, stringwear
0320	screen	E1a	6.8	1.8	4.5	conical perforation, ground edges, slight edgewear, retouch

Table 31. *(continued)*

Cat. No.	Prov	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0321	screen	E1a	6.1	2.0	3.4	conical perforation, ground edges, retouch
0322	screen	E1a	6.4	2.0	2.8	conical perforation, ground edges, possible edgewear, retouch
0323	screen	E1a	6.5	1.9	3.0	conical perforation, ground edges, retouch, small pits
0324	screen	E1a	6.7	2.0	3.0	conical perforation, ground edges, heavily weathered
0325	screen	E1a	7.3	2.0	3.4	conical perforation, ground edges, edgewear, possible retouch
0326	screen	E1a	7.0	2.0	3.4	conical perforation, heavily weathered, deeply pitted
0327	screen	E1a	6.7	2.0	3.2	conical perforation, ground edges, edgewear, pitted, retouch
0328	screen	E1a	6.6	1.8	3.5	conical perforation, ground edges, retouch
0329	screen	E1a	6.5	2.1	3.9	conical perforation, ground edges, retouch, stringwear
0330	screen	E1a	5.6	1.9	3.1	conical perforation, one edge partially sheared off, retouch
0331	screen	E1a	6.2	2.2	3.3	conical perforation, ground edges, edgewear, retouch
0332	screen	E1a	6.3	2.0	3.8	conical perforation, heavily weathered
0333	screen	E1a	6.5	1.9	3.2	conical perforation, ground edges, pitted, possible retouch
0334	screen	E1a	5.9	2.1	3.4	conical perforation, heavily weathered, edgewear
0335	screen	E1a	6.6	2.1	3.6	conical perforation, ground edges, slightly pitted, edgewear, stringwear, retouch
0336	screen	E1a	6.7	2.1	3.5	conical perforation, ground edges, weathered, stringwear
0337	screen	E1a	6.2	1.9	3.6	conical perforation, ground edges, retouch, stringwear, slight edgewear
0338	screen	E1a	6.6	2.0	2.8	conical perforation, heavily weathered, edgewear
0339	screen	E1a	6.3	1.9	3.0	conical perforation, heavily weathered
0340	screen	E1a	7.0	2.0	3.2	conical perforation, weathered, ground edges, edgewear, stringwear
0341	screen	E1a	6.7	2.1	2.5	conical perforation, weathered, possible edgewear and retouch
0342	screen	E1a	6.3	1.9	2.9	conical perforation, weathered, ground edges, stringwear
0343	screen	E1a	6.7	2.9	3.3	parallel-sided perforation (off center), ground edges, “shelf-like” ridges in center of bead
0344	screen	E1a	6.1	2.0	2.7	conical perforation, ground edges, heavily weathered
0345	screen	E1a	6.4	1.9	3.1	conical perforation (?), ground edges, edgewear, retouch, stringwear
0346	screen	E1a	6.8	1.9	3.6	conical perforation, heavily weathered, edgewear, weathering has caused deformation of the perforation
0347	screen	E1a	6.4	2.0	2.5	conical perforation, heavily weathered
0348	screen	E1a	7.2	2.1	2.8	conical perforation, heavily weathered, stringwear
0349	screen	E1a	6.6	2.0	3.1	conical perforation, ground edges, heavily weathered, edgewear, possible retouch
0350	screen	E1a	6.4	1.8	2.5	conical perforation, heavily weathered
0351	screen	E1a	6.0	2.0	2.8	conical perforation, heavily weathered
0352	screen	E1a	7.4	2.0	2.4	conical perforation, heavily weathered, edgewear
0353	screen	E1a	5.8	2.3	3.0	conical perforation, ground edges, stringwear, retouch

Table 31. *(continued)*

Cat. No.	Prov	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0354	screen	E1a	6.7	1.9	2.6	conical perforation, heavily weathered
0355	screen	E1a	6.2	1.9	3.1	conical perforation, ground edges, edgewear, retouch
0356	screen	E1a	6.4	3.0	2.6	parallel-sided perforation (?), heavily weathered
0357	screen	E1a	5.8	2.0	3.4	conical perforation, possible ground edges, heavily weathered
0358	screen	E1a	5.6	1.8	2.5	conical perforation, possible ground edges, heavily weathered
0359	screen	E1a	6.3	2.2	2.7	conical perforation, possible ground edges, heavily weathered
0360	screen	E1a	5.8	2.4	1.7	conical perforation (?), heavily weathered
0361	screen	E1a	6.7	1.8	2.8	conical perforation, heavily weathered
0362	screen	E1a	6.5	2.8	2.8	conical perforation, one edge chipped off, heavily weathered
0363	screen	E1a	6.1	2.2	3.0	conical perforation, heavily weathered
0364	screen	E1a	6.8	1.9	3.2	conical perforation, ground edges, one edge chipped off and pitted, possible retouch
0365	screen	E1a	5.4	1.8	2.5	conical perforation, heavily weathered
0366	screen	E1a	4.9	2.1	1.5	conical perforation (?), heavily weathered
0367	screen	E1a	5.3	2.1	1.8	conical perforation, heavily weathered
0368	screen	E1a	6.0	3.0	2.2	conical perforation, heavy weathering has caused deformation of the perforation
0369	screen	E1a	5.2	3.0	1.5	parallel-sided perforation (?), heavily weathered
0370	screen	E1a	6.2	3.1	2.2	parallel-sided perforation (?), heavily weathered
0371	screen	E1a	4.4	2.0	1.6	conical perforation, heavily weathered
0372	screen	E1a	5.8	2.3	2.7	conical perforation, heavily weathered, pitted
0373	screen	E1a	5.8	2.0	2.8	conical perforation, fragment, heavily weathered, pitted
0374	screen	E1a	~5.6	~3.0	3.2	conical perforation, fragment, heavily weathered, pitted
0375	screen	E1a	~6.4	~3.0	2.1	conical perforation (?), fragment, heavily weathered, pitted
0376	screen	E1a	~5.8	~2.2	1.8	conical perforation, fragment, heavily weathered
0377	screen	E1a?	~5.1	~2.3	1.5	conical perforation, fragment, heavily weathered
0378	screen	E1a?	~6.0	~2.9	2.6	conical perforation, fragment, heavily weathered
0379	screen	E1a?	~6.1	~3.0	1.5	conical perforation (?), fragment, heavily weathered
0380	screen	E1a?	~6.0	~2.8	1.7	conical perforation, fragment, heavily weathered
0381	screen	E1a?	~5.5	~3.0	2.3	conical perforation (?), fragment, heavily weathered
0382	screen	E1a?	~5.0	indet.	1.7	conical perforation (?), fragment, heavily weathered
0383	screen	E1a?	~4.6	indet.	1.1	conical perforation (?), fragment, heavily weathered
0384	screen	E1a?	~4.5	indet.	1.1	more than 1/2 of bead missing, heavily weathered
0385	screen	E1a?	~5.5	indet.	2.1	more than 1/2 of bead missing, heavily weathered
0386	screen	E1a?	~4.7	indet.	2.6	more than 1/2 of bead missing, heavily weathered
0387	screen	E1a?	~5.5	indet.	2.2	more than 1/2 of bead missing, heavily weathered
0388	screen	E1a?	~5.1	indet.	2.7	more than 1/2 of bead missing, heavily weathered
0460	in situ	E1a	6.9	1.9	3.3	conical perforation, ground edges, edgewear, possible retouch, found inside mouth of Individual 1

Table 31. *(continued)*

Cat. No.	Prov	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0461	in situ	E1a	7.4	1.9	3.1	conical perforation, ground edges, ~3 mm. long edge portion broken off, retouch, from right knee of Individual 1
0462	in situ	E1a	6.4	2.0	3.5	conical perforation, ground edges, retouch, large pit on one edge, from ankle of Individual 1
0463	in situ	E1a	7.1	2.1	3.8	conical perforation, ground edges, stringwear, retouch, from ankle of Individual 1
0464	in situ	E1a	6.8	2.0	4.0	conical perforation, ground edges, retouch, from lower back of Individual 1
0465	in situ	E1a	6.5	1.9	3.2	conical perforation, ground edges, edgewear, retouch, from lower back of Individual 1
0466	in situ	E1a	7.1	2.0	3.8	conical perforation, ground edges, edgewear, stringwear, retouch, found between 5th and 6th left ribs of Individual 1
0467	in situ	E1a	6.7	2.0	3.7	conical perforation, ground edges, retouch, found under ribcage of Individual 1
0468	in situ	E1a	6.8	1.8	3.8	conical perforation, ground edges, weathered, edgewear, retouch, found under right ilium of Individual 1
0470	in situ	E1a	6.4	1.8	3.4	conical perforation, ground edges, possible edgewear and retouch, from wrist of Individual 1
0471	in situ	E1a	6.5	2.0	3.0	conical perforation, ground edges, heavily weathered, small portion of edge broken, from wrist of Individual 1
0472	in situ	E1a	6.1	2.4	3.1	conical perforation, ground edges, stringwear, retouch, from wrist of Individual 1
0460	in situ	E1a	6.9	1.9	3.3	conical perforation, ground edges, edgewear, possible retouch, from inside mouth of Individual 1
0389	screen	indet.	~5.5	indet.	1.2	fragment, indeterminate type, heavily weathered
0390	screen	indet.	~5.5	indet.	1.4	fragment, indeterminate type, heavily weathered

a. The catalog numbers begin with CA-KER-4619-; Prov = provenience; Diam = outside diameter; Perf Diam = perforation diameter; Thk/Crv = thickness/curvature; indet. = indeterminate.

Notes: The *Olivella* bead types are per Bennyhoff and Hughes (1987). The difference in diameters seems to stem more from what part of the shell the bead came from rather than the method of manufacture.

and steatite beads were strung in a different pattern (perhaps consecutively), which could account for the number of steatite beads associated with this strand. This assumes, of course, that the small number of beads from Strand F constituted the entire strand.

It is interesting to note the orientation of some of the *Olivella* beads on these bead strands. As the beads were being removed in the field, they were placed in precisely the same position and orientation as they were in situ. Thus, as shown in Figure 9, in relationship to how they are facing the flagging tape (which was placed on one end of each strand during removal in the field), some beads within the same strand had a concave orientation while others had a convex orientation in terms of how the curvature of the bead faced the tape (Table 37; also see Table 35). This is evident in Strands E and I in particular (see Figure 9). The purpose behind this pattern is unclear, although if the entire strands had been found in situ, it might be more

Table 32. Attributes of the Loose Steatite Disk Beads Associated with Individual 1 at CA-KER-4619.

Cat. No. (CA-KER-4619-)	Provenience	Diameter (mm)	Perforation Diam (mm)	Thickness (mm)	Description/Comments
0397	screen	4.4	2.3	2.1	ground edges
0398	screen	4.4	2.1	2.5	ground edges, edgewear
0399	screen	4.6	2.3	2.4	ground edges
0400	screen	4.5	2.1	2.3	ground edges, slight edgewear
0401	screen	4.5	2.2	1.9	ground edges
0402	screen	4.3	2.3	2.4	ground edges, pinkish tint on parts of bead
0403	screen	4.6	2.1	3.1	ground edges
0404	screen	4.4	2.1	2.3	ground edges
0405	screen	4.4	2.6	2.5	ground edges, caramel-colored natural striping
0406	screen	4.2	2.0	2.1	ground edges, possible edgewear, appears to have some type of residue adhering to one edge
0407	screen	6.3	2.0	2.2	ground edges
0408	screen	6.0	2.2	2.1	ground edges
0409	screen	6.5	2.0	3.1	ground edges
0410	screen	6.6	2.0	3.0	ground edges
0411	screen	6.3	2.0	2.3	ground edges
0412	screen	6.3	2.0	2.7	ground edges
0413	screen	6.4	2.2	2.2	ground edges
0414	screen	5.6	1.9	2.8	ground edges
0415	screen	5.5	2.2	2.8	ground edges, edgewear, groove across surface on both sides of perforation
0416	screen	6.4	2.0	1.6	ground edges
0417	screen	6.5	1.9	2.0	ground edges, edgewear
0418	screen	6.0	2.4	0.08	fragment of a bead that sloughed off in tabular fashion, retaining shape of bead
0419	screen	5.7	2.1	0.08	fragment of bead that sloughed off in tabular fashion, retaining shape of bead
0420	screen	6.0	2.3	2.9	ground edges, edgewear, groove across surface on both sides of perforation
0421	screen	5.6	2.0	2.5	ground edges, slight groove on surface
0422	screen	5.7	2.7	2.5	ground edges, slight edgewear, dark-colored steatite
0423	screen	6.0	2.2	2.6	ground edges, slight edgewear, groove across surface on both sides of perforation
0424	screen	6.0	2.4	3.3	ground edges, slight edgewear, pinkish tint
0425	screen	5.6	2.0	1.3	ground edges, slight edgewear, pinkish tint
0426	screen	5.7	2.2	2.0	ground edges, slight pinkish tint, groove across surface on both sides of perforation
0427	screen	5.4	2.0	3.7	ground edges, slight pinkish tint, groove across surface
0428	screen	5.9	2.1	2.3	ground edges, groove across surface on both sides of perforation
0429	screen	5.8	1.9	2.5	ground edges, very dark-colored steatite

Table 32. *(continued)*

Cat. No. (CA-KER-4619-)	Provenience	Diameter (mm)	Perforation Diam (mm)	Thickness (mm)	Description/Comments
0430	screen	4.8	2.1	2.3	ground edges, slight pinkish tint, asymmetrical thick-
0431	screen	5.2	2.1	2.3	ground edges, slight pinkish tint, groove across surface on both sides of perforation
0432	screen	5.7	2.3	2.8	ground edges, slight pinkish tint, appears to have layer of shell (*Haliotis*?) adhering to one surface
0433	screen	5.0	2.0	1.8	ground edges, slight groove across surface on both sides of perforation
0434	screen	5.6	2.0	2.8	ground edges, possible fragment of shell (*Haliotis*?) adhering to one surface
0435	screen	5.2	2.1	2.0	ground edges, slight pinkish tint, groove across surface on both sides of perforation
0436	screen	5.4	2.2	1.8	ground edges, asymmetrical thickness
0437	screen	5.4	2.3	2.4	ground edges, slight pinkish tint, possible slight groove across surface on both sides of perforation
0438	screen	6.1	2.2	2.2	ground edges, dark-colored steatite
0439	screen	5.6	2.0	2.3	ground edges, dark-colored steatite
0440	screen	4.9	2.4	2.1	ground edges, dark-colored steatite
0441	screen	4.8	2.0	1.7	ground edges
0442	screen	5.2	1.9	2.1	ground edges
0443	screen	4.8	2.2	1.7	ground edges, slight pinkish tint
0444	screen	5.4	2.5	2.0	ground edges, edgewear, pinkish tint
0445	screen	5.6	2.0	2.5	ground edges, edgewear, pinkish tint, possible groove across surface on both sides of perforation
0446	screen	5.1	2.1	2.6	ground edges, edgewear, pinkish tint
0447	screen	5.2	2.3	1.9	ground edges, pinkish tint, groove on surface of one edge
0448	screen	5.2	2.3	1.3	ground edges, slight edgewear, slight pinkish tint, slight groove across surface on both sides of perforation
0449	screen	5.2	2.0	2.0	ground edges, edgewear, groove across surface on both sides of perforation
0450	screen	5.8	2.3	1.9	ground edges, edgewear, slight pinkish tint, groove across surface on both sides of perforation
0451	screen	6.2	2.0	2.0	ground edges, somewhat decomposed, edgewear, layer of shell (*Haliotis*?) adhering to one surface
0452	screen	5.6	2.2	1.7	ground edges; one edge slightly flattened; slight pinkish tint; shell fragments (*Haliotis*?) adhering to one surface
0453	screen	6.2	2.1	2.3	ground edges, caramel-colored steatite
0454	screen	6.0	2.1	2.4	ground edges; one edge flattened; slight pinkish tint
0455	screen	5.9	2.1	1.5	ground edges; edgewear, pinkish tint, one edge flattened by edgewear, several grooves on surface of bead
0456	screen	6.8	2.0	1.3	ground edges, somewhat asymmetrical
0457	screen	5.4	2.1	1.2	ground edges, possible layer of shell (*Haliotis*?) adhering to one surface
0458	in situ	6.5	2.0	1.3	ground edges, slightly weathered, from upper chest of Individual 1

Table 33. Attributes of the Loose *Haliotis* Disk Beads Associated with Individual 1 at CA-KER-4619.

Cat. No. (CA-KER-4619-)	Provenience	Diameter (mm)	Perforation Diam (mm)	Thickness (mm)	Description/Comments
0149	screen	6.5	2.7	1.9	perforation off center, biconical, nacreous on ventral surface
0150	screen	5.5	2.0	1.9	parallel-sided perforation, slight deterioration
0151	screen	5.8	2.4	0.5	fragment
0459	in situ	5.1	2.0	1.7	ground edges, appears polished, groove across surface on both sides of perforation, edgewear, from under right tibia of Individual 1

Table 34. Attributes of the Loose Clamshell Tube Beads Associated with Individual 1 at CA-KER-4619.

Cat. No. (CA-KER-4619-)	Provenience	Length (mm)	Diameter (mm)	Perforation Diam (mm)	Description/Comments
0391	screen	17.8	4.0	2.0	cf., *Tivela stultorum*, ground ends
0392	screen	14.1	4.3	2.1	cf., *T. stultorum*, ground ends
0393	screen	13.0	4.4	2.0	cf., *T. stultorum*, ground ends, perforation off center
0394	screen	12.6	4.0	2.1	cf., *T. stultorum*, ground ends
0395	screen	8.7	4.8	2.2	cf., *T. stultorum*, ground ends
0396	screen	7.2	4.1	2.2	cf., *T. stultorum*, ground ends
0474	in situ	14.6	5.8	2.5	cf., *T. stultorum*, from neck of Individual 1, ground ends, slight chipping on ends
0475	in situ	18.8	4.0	2.0	cf., *T. stultorum*, from neck of Individual 1, ground ends
0476	in situ	6.1	4.1	2.3	cf., *T. stultorum*, from neck of Individual 1, ground ends, edgewear on one end, possible stringwear

obvious whether the switching of the orientation followed a prescribed pattern.

In the Mojave Desert just south of Cross Mountain, Robinson (1982:41) reported an isolated burial (recorded as CA-KER-515) a few miles north of the town of Mojave, in Kawaiisu territory. This site was dated by bead typology to the Late Period. The burial contained an adult male with 1,122 beads of shell and stone, many of which were still in stringing position. Robinson (1982:41) observed that one of the strands was made up entirely of *Olivella biplicata* E1a beads (almost 900) "displaying the same orientation so that the convex surface of one was always fitted into the concave surface of the next." The predominance of *Olivella* beads is similar to that found with Individual 1 at Cross Mountain, although some of the strands at Cross Mountain displayed mixed orientation of the beads.

A second strand at CA-KER-515 was made up of a variety of materials and bead types, including *Mytilus* disks, *Olivella* disks, *Tivela* tubes, *Haliotis* disks, and stone (presumably steatite) disks (Robinson 1982:42), the latter four of which were identified at Cross Mountain although not necessarily in stringing position. At Cross Mountain, in addition to the *Olivella* disks, nine loose *Tivela* tube beads, four loose *Haliotis* disk beads, and 62 loose steatite disk beads were found with Individual 1, which at one time were most likely

Table 35. Attributes of the Bead Strands Associated with Individual 1 at CA-KER-4619.[a]

Cat. No.	Material	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
Strand A						
0477-1	*Olivella*	E1a	7.1	2.0	3.6	conical perforation, heavily weathered
0477-2	*Olivella*	E1a	6.1	2.0	2.8	conical perforation, heavily weathered
0477-3	*Olivella*	E1a	~6.2	~3.0	~3.0	conical perforation, ~1/2 of bead missing, heavily weathered
0477-4	*Olivella*	E1a	~6.2	indet.	~2.2	conical perforation, ~1/2 of bead missing, heavily weathered
Strand B						
0478-1	*Olivella*	E1a	7.1	2.5	3.2	conical perforation, ground edges, heavily weathered, slightly pitted, concave orientation
0478-2	*Olivella*	E1a	7.0	2.0	3.2	conical perforation, ground edges, heavily weathered, stringwear, edgewear, concave orientation
0478-3	*Olivella*	E1a	6.4	2.0	4.0	conical perforation, ground edges, heavily weathered, stringwear, edgewear, concave orientation
0478-4	*Olivella*	E1a	4.8	2.0	3.2	conical perforation, heavily weathered, possible edgewear, pitted, concave orientation
Strand C						
0479-1	*Olivella*	E1a	7.3	2.1	4.0	conical perforation, ground edges, weathered, possible retouch, concave orientation
0479-2	*Olivella*	E1a	6.8	2.1	3.8	conical perforation, ground edges, weathered, possible retouch, concave orientation
0479-3	*Olivella*	E1a	7.0	2.0	3.3	conical perforation, ground edges, weathered, possible retouch, concave orientation
0479-4	*Olivella*	E1a	7.1	1.8	3.4	conical perforation, ground edges, edgewear, retouch, stringwear, concave orientation
0479-5	*Olivella*	E1a	6.8	2.3	3.5	conical perforation, ground edges, slight edgewear, possible retouch, concave orientation
0479-6	*Olivella*	E1a	7.1	2.1	3.6	conical perforation, ground edges, weathered, edgewear, retouch, stringwear, concave orientation
0479-7	*Olivella*	E1a	6.9	2.2	3.8	conical perforation, ground edges, weathered, retouch, concave orientation
0479-8	*Olivella*	E1a	7.1	2.1	3.9	conical perforation, ground edges, retouch, weathered, stringwear, concave orientation
Strand D						
0480-1	*Olivella*	E1a	6.7	1.8	3.2	conical perforation, ground edges, weathered, concave orientation
0480-2	*Olivella*	E1a	6.9	1.8	3.9	conical perforation, ground edges, weathered, edgewear, possible retouch, concave orientation
0480-3	*Olivella*	E1a	6.6	1.9	3.0	conical perforation, ground edges, weathered, edgewear, stringwear, concave orientation
0480-4	*Olivella*	E1a	6.6	2.1	3.0	conical perforation, ground edges, weathered, stringwear, retouch, concave orientation
0480-5	*Olivella*	E1a	6.6	2.0	1.6	conical perforation, slightly weathered, much flatter than other beads, possible retouch and stringwear, concave orientation
0480-6	*Olivella*	E1a	6.4	2.0	3.3	conical perforation, ground edges, weathered, slight edgewear, possible retouch, concave orientation
0480-7	*Olivella*	E1a	6.7	2.0	3.5	conical perforation, ground edges, edgewear, stringwear, possible retouch, concave orientation

Table 35. *(continued)*

Cat. No.	Material	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
Strand D						
0480-8	*Olivella*	E1a	6.8	1.9	3.2	conical perforation, ground edges, heavily weathered, edgewear, possible retouch, concave orientation
0480-9	*Olivella*	E1a	7.4	2.1	3.6	conical perforation, ground edges, heavily weathered, edgewear, stringwear, concave orientation
0480-10	*Olivella*	E1a	7.6	2.2	4.2	conical perforation, ground edges, heavily weathered, edgewear, stringwear, retouch, concave orientation
0480-11	*Olivella*	E1a	7.2	2.0	4.1	conical perforation, ground edges, heavily weathered, edgewear, stringwear, concave orientation
0480-12	*Olivella*	E1a	6.7	2.1	3.0	conical perforation, weathered, edgewear, possible retouch, concave orientation
0480-13	*Olivella*	E1a	6.2	1.9	3.2	conical perforation, ground edges, weathered, small pit on surface, retouch, stringwear, edgewear, concave orientation
0480-14	*Olivella*	E1a	6.2	1.9	3.0	conical perforation, ground edges, heavily weathered, stringwear, edgewear, concave orientation
0480-15	*Olivella*	E1a	6.3	1.8	3.0	conical perforation, ground edges, heavily weathered, stringwear, small pit on surface, edgewear, concave orientation
0480-16	*Olivella*	E1a	6.2	2.0	3.3	conical perforation, ground edges, heavily weathered, edgewear, stringwear, concave orientation
0480-17	*Olivella*	E1a	6.7	2.2	3.8	conical perforation, ground edges, heavily weathered, stringwear, possible retouch, concave orientation
0480-18	*Olivella*	E1a	6.5	2.1	3.5	conical perforation, ground edges, heavily weathered, stringwear inside and around perforation, possible retouch, concave orientation
0480-19	*Olivella*	E1a	6.7	2.1	3.9	conical perforation, heavily weathered, stringwear inside and around perforation, possible edgewear, concave orientation
0480-20	*Olivella*	E1a	6.7	2.0	3.4	conical perforation, ground edges, heavily weathered, stringwear inside and around perforation, edgewear, concave orientation
0480-21	*Olivella*	E1a	6.4	1.9	3.0	conical perforation, ground edges, weathered, possible retouch, stringwear inside and around perforation, concave orientation
0480-22	*Olivella*	E1a	6.6	1.9	3.4	conical perforation, ground edges, heavily weathered, stringwear around perforation, edgewear, concave orientation
0480-23	*Olivella*	E1a	6.6	2.0	3.1	conical perforation, ground edges, heavily weathered, small pit on surface, stringwear around perforation, retouch, concave orientation
0480-24	*Olivella*	E1a	7.0	2.0	3.9	conical perforation, ground edges, heavily weathered, stringwear inside perforation, concave orientation
0480-25	*Olivella*	E1a	7.0	2.1	3.4	conical perforation, ground edges, heavily weathered, stringwear around perforation, concave orientation
0480-26	*Olivella*	E1a	6.9	1.7	3.5	conical perforation, ground edges, heavily weathered, possible retouch and edgewear, concave orientation
0480-27	*Olivella*	E1a	6.9	2.0	3.4	conical perforation, ground edges, heavily weathered, stringwear around perforation, concave orientation
0480-28	*Olivella*	E1a	6.3	2.1	3.9	conical perforation, ground edges, heavily weathered, stringwear around perforation, concave orientation
0480-29	*Olivella*	E1a	6.3	2.0	4.0	conical perforation, ground edges, heavily weathered, edgewear, possible stringwear, concave orientation
0480-30	*Olivella*	E1a	6.1	1.9	3.2	conical perforation, ground edges, heavily weathered, stringwear on one edge, possible edgewear, concave orientation

Table 35. *(continued)*

Cat. No.	Material	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
Strand E						
0481-1	*Olivella*	E1a	6.9	1.9	2.8	conical perforation, ground edges, heavily weathered, possible stringwear on one edge, possible edgewear, convex orientation
0481-2	*Olivella*	E1a	7.1	2.1	3.3	conical perforation, weathered, convex orientation
0481-3	*Olivella*	E1a	6.9	1.9	4.1	conical perforation, high lip on one side, exterior retouch, convex orientation
0481-4	*Olivella*	E1a	7.2	2.2	4.1	conical perforation, thick shell, exterior retouch, convex orientation
0481-5	*Olivella*	E1a	7.4	2.1	3.6	conical perforation, convex orientation
0481-6	*Olivella*	E1a	7.1	1.9	3.9	conical perforation, exterior exfoliation, convex orientation
0481-7	*Olivella*	E1a	6.2	2.2	3.4	conical perforation, weathered, convex orientation
0481-8	*Olivella*	E1a	7.1	2.2	4.0	conical perforation, “sharper” than typical curvature, exterior retouch, convex orientation
0481-9	*Olivella*	E1a	7.2	2.1	4.3	conical perforation, significant weathering, convex orientation
0481-10	*Olivella*	E1a	7.2	2.8	3.1	conical perforation, significant weathering; perforation diameter and curvature imprecise due to deterioration, concave orientation
0481-11	*Olivella*	E1a	7.0	2.0	3.3	conical perforation, weathered, exterior retouch, convex orientation
0481-12	*Olivella*	E1a	6.2	1.8	3.6	conical perforation, exterior retouch, unusual pitting of shell surface, concave orientation
0481-13	*Olivella*	E1a	7.5	1.9	4.4	conical perforation, slight exterior retouch, high lip on one side, convex orientation
0481-14	*Olivella*	E1a/E1b	7.2	2.0	3.6	conical perforation, 90º curvature on one end and edge, exterior retouch, convex orientation
0481-15	*Olivella*	E1a/E1b	7.9	2.0	3.9	conical perforation, convex orientation
0481-16	*Olivella*	E1a	7.4	1.9	4.1	conical perforation (slightly off center), exterior retouch, convex orientation
0481-17	*Olivella*	E1a/E1b	7.3	1.9	3.2	conical perforation, exterior retouch, convex orientation
0481-18	*Olivella*	E1a	7.1	2.1	3.3	conical perforation, convex orientation
0481-19	*Olivella*	E1a	7.5	2.1	3.8	conical perforation, exterior retouch, convex orientation
0481-20	*Olivella*	E1a	7.5	1.7	4.3	biconical perforation, concave orientation
0481-21	*Olivella*	E1a	7.4	1.9	3.8	conical perforation, exterior retouch, concave orientation
0481-22	*Olivella*	E1a	7.4	2.0	4.5	conical perforation, extremely thick shell, concave orientation
0481-23	*Olivella*	E1a	7.5	2.3	4.1	conical perforation, made from high on the callus, convex orientation
0481-24	*Olivella*	E1a	7.1	2.0	3.8	parallel-sided perforation, some damage around perforation, concave orientation
0481-25	*Olivella*	E1a	7.6	2.0	4.4	conical perforation, slight exterior retouch, concave orientation
0481-26	*Olivella*	E1a	6.0	2.1	3.7	parallel-sided perforation, “stubby” looking, concave orientation
0481-27	*Olivella*	E1a/E1b	7.0	2.0	3.9	conical perforation, very thick shell, stringwear inside perforation, concave orientation
0481-28	*Olivella*	E1a	7.5	2.0	3.8	conical perforation, exterior retouch, concave orientation
0481-29	*Olivella*	E1a	6.5	1.9	3.9	conical perforation, stringwear inside perforation, concave orientation
0481-30	*Olivella*	E1a	7.1	1.9	4.1	conical perforation, exterior retouch, thick shell, concave orientation

Table 35. *(continued)*

Cat. No.	Material	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
0481-31	*Olivella*	E1a	7.2	2.1	3.6	conical perforation (slightly off center), exterior retouch, concave orientation
0481-32	*Olivella*	E1a	7.2	2.1	3.5	parallel-sided perforation, stringwear inside perforation, concave orientation
0481-33	*Olivella*	E1a	7.3	2.0	4.2	parallel-sided perforation (or slightly conical), concave orientation
0481-34	steatite	disk	5.1	2.0	2.1	parallel-sided perforation, dark gray in color with some tan speckles
0481-35	*Olivella*	E1a	7.3	––	3.3	parallel-sided perforation, stringwear, perforation more oval than round, convex orientation
0481-36	*Olivella*	E1a	7.4	2.2	3.3	conical perforation, convex orientation
0481-37	*Olivella*	E1a	7.1	2.2	3.7	parallel-sided perforation, convex orientation
0481-38	*Olivella*	E1a	6.8	1.8	3.7	conical perforation, small perforation, some polishing inside perforation, convex orientation
0481-39	*Olivella*	E1a	6.2	2.2	3.0	conical perforation, weathered, convex orientation
0481-40	steatite	disk	5.9	2.0	2.3	parallel-sided perforation, fine-grained, waxy olive green color, slightly translucent
Strand F						
0482-1	*Olivella*	E1a/E1b	8.4	2.1	3.4	conical perforation
0482-2	*Olivella*	E1a	6.4	2.2	2.5	conical perforation, heavily weathered, possible retouch
0482-3	*Olivella*	E1a	6.0	2.1	3.3	conical perforation, ground edges, heavily weathered, possible retouch and stringwear
0482-4	*Olivella*	E1a	6.1	1.9	2.2	conical perforation, heavily weathered
0482-5	*Olivella*	E1a	5.4	2.0	2.1	extremely weathered so difficult to tell whether it is a parallel-sided perforation or conical perforation, heavy edgewear
0482-6	*Olivella*	E1a	6.1	1.9	2.7	conical perforation, extremely weathered, heavy edgewear
0482-7	*Olivella*	E1a	5.7	2.2	2.3	appears to be conical perforation but badly weathered so difficult to determine with certainty
0482-8	*Olivella*	E1a/E1b	6.1	1.9	4.0	conical perforation, heavily weathered, stringwear, possible retouch
0482-9	steatite	disk	6.5	2.5	2.4	parallel-sided perforation, ground edges
0482-10	steatite	disk	6.0	2.1	2.6	parallel-sided perforation, ground edges, edge thicker on one side
0482-11	steatite	disk	6.4	2.1	2.9	parallel-sided perforation, ground edges, possible stringwear
0482-12	steatite	disk	6.7	2.0	2.6	parallel-sided perforation, ground edges
0482-13	steatite	disk	6.8	2.3	2.9	parallel-sided perforation, ground edges, slightly translucent, dark olive green color, retouch on perforation, possible residue on edges
0482-14	steatite	disk	6.6	2.0	2.5	parallel-sided perforation, ground edges
0482-15	steatite	disk	6.5	2.1	2.4	parallel-sided perforation, ground edges
0482-16	steatite	disk	6.4	2.0	2.7	parallel-sided perforation, ground edges, gold-colored flecks on one surface (possibly shell adhering to the stone)
0482-17	steatite	disk	6.4	2.3	1.9	appears to be conical perforation, ground edges, dark olive green color,slightly translucent, possible residue on edges, retouch
0482-18	steatite	disk	6.7	2.1	2.1	parallel-sided perforation, ground edges, slightly irregularly shaped
0482-19	steatite	disk	6.1	2.1	2.7	parallel-sided perforation, ground edges, partly dark olive green and partly cream-colored
0482-20	steatite	disk	5.9	2.1	2.5	ground edges, dark olive green color, slightly translucent, possible residue on edge and one surface

Table 35. *(continued)*

Cat. No.	Material	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
Strand G						
0483-1	*Olivella*	E1a	7.1	2.0	4.4	conical perforation, ground edges, retouch, concave orientation
0483-2	*Olivella*	E1a	7.3	2.2	4.0	conical perforation, ground edges, stringwear inside and around perforation, possible edgewear, concave orientation
0483-3	*Olivella*	E1a	6.2	1.9	3.6	conical perforation, ground edges, retouch, possible stringwear,concave orientation
0483-4	*Olivella*	E1a	7.0	2.0	3.3	difficult to tell whether conical perforation or parallel-sided, ground edges, retouch, stringwear, concave orientation
0483-5	*Olivella*	E1a	6.8	2.0	4.3	conical perforation, ground edges, retouch, stringwear, concave orientation
0483-6	*Olivella*	E1a	7.6	1.9	3.5	conical perforation, ground edges, retouch, stringwear, concave orientation
0483-7	*Olivella*	E1a/E1b	7.5	2.0	3.8	parallel-sided perforation, possible stringwear inside and around perforation, appears polished, concave orientation
0483-8	*Olivella*	E1a	7.1	1.9	4.0	conical perforation, heavily weathered, possible stringwear around perforation, convex orientation
0483-9	steatite	disk	5.9	2.0	2.1	parallel-sided perforation, ground edges, slight edgewear
0483-10	*Olivella*	E1a	7.1	2.4	3.5	conical perforation, ground edges, stringwear inside and around perforation, possible retouch, concave orientation
0483-11	*Olivella*	E1a	7.7	1.8	3.7	conical perforation, ground edges, stringwear inside and around perforation, concave orientation
0483-12	*Olivella*	E1a	7.4	1.8	3.8	conical perforation, ground edges, stringwear inside and around perforation, retouch, concave orientation
0483-13	*Olivella*	E1a	7.2	1.9	4.0	conical perforation, ground edges, retouch, stringwear inside perforation, concave orientation
0483-14	*Olivella*	E1a	6.3	2.0	3.3	conical perforation, ground edges, retouch, edgewear, concave orientation
0483-15	*Olivella*	E1a	6.5	2.0	4.5	conical perforation, ground edges, stringwear inside perforation, retouch, concave orientation
0483-16	*Olivella*	E1a	6.4	2.2	3.3	conical perforation, ground edges, retouch, stringwear inside and around perforation, concave orientation
0483-17	*Olivella*	E1a	7.4	2.0	4.1	conical perforation, ground edges, weathered, stringwear inside and around perforation, retouch, concave orientation
0483-18	*Olivella*	E1a	6.8	1.9	3.5	conical perforation, ground edges, stringwear inside and around perforation, slight edgewear, retouch, concave orientation
0483-19	*Olivella*	E1a	7.0	2.0	4.5	conical perforation, ground edges, possible stringwear inside perforation, possible retouch, concave orientation
0483-20	*Olivella*	E1a	7.2	1.9	4.5	conical perforation, ground edges, weathered, edgewear, retouch, possible stringwear inside perforation, concave orientation
0483-21	*Olivella*	E1a	5.5	2.1	2.7	parallel-sided perforation, weathered, edgewear, possible strin-gwear inside perforation, concave orientation
0483-22	*Olivella*	E1a	7.3	2.0	3.5	conical perforation, ground edges, stringwear, edgewear, possible retouch, concave orientation
0483-23	*Olivella*	E1a	7.4	2.1	3.8	conical perforation, edgewear, weathered, stringwear, possible retouch, possible stringwear inside perforation, concave orientation
0483-24	*Olivella*	E1a	7.6	2.2	3.4	conical perforation, ground edges, weathered, stringwear, retouch, concave orientation

Table 35. *(continued)*

Cat. No.	Material	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
Strand G						
0483-25	*Olivella*	E1a	7.3	2.0	3.1	conical perforation, ground edges, weathered, possible stringwear inside perforation, edgewear, concave orientation
0483-26	*Olivella*	E1a	7.0	2.2	4.3	conical perforation, ground edges, heavily weathered, stringwear inside perforation, concave orientation
0483-27	*Olivella*	E1a	6.9	1.8	3.1	conical perforation, ground edges, heavily weathered, stringwear inside perforation, edgewear, concave orientation
0483-28	*Olivella*	E1a	6.4	2.3	2.6	conical perforation, ground edges, heavily weathered, stringwear inside perforation, edgewear, concave orientation
0483-29	*Olivella*	E1a	7.3	2.2	3.9	conical perforation, ground edges, heavily weathered, stringwear inside perforation, concave orientation
Strand H						
0484-1	*Olivella*	E1a	6.6	2.2	2.8	conical perforation, ground edges, heavily weathered, stringwear inside perforation, concave orientation
0484-2	*Olivella*	E1a	7.7	2.1	3.7	conical perforation, ground edges, weathered, stringwear, possible stringwear inside perforation, possible retouch, concave orientation
0484-3	*Olivella*	E1a	6.8	2.0	3.4	biconical (?), heavily weathered, edgewear, concave orientation
0484-4	*Olivella*	E1a	7.0	1.9	3.0	conical perforation, ground edges, heavily weathered, edgewear, stringwear inside and around perforation, concave orientation
0484-5	*Olivella*	E1a	7.7	2.1	3.8	conical perforation, ground edges, heavily weathered, possible stringwear inside perforation, concave orientation
0484-6	*Olivella*	E1a	7.0	2.0	2.9	conical perforation, ground edges, heavily weathered, stringwear inside and around perforation, concave orientation
0484-7	*Olivella*	E1a	7.8	2.3	3.2	parallel-sided perforation, heavily weathered, edgewear, concave orientation
0484-8	*Olivella*	E1a	6.6	1.9	2.6	conical perforation, heavily weathered, edgewear, stringwear inside perforation, concave orientation
Strand I						
0485-1	*Olivella*	E1a	7.4	2.0	4.1	conical perforation, ground edges, appears polished, edgewear, stringwear inside and around perforation, convex orientation
0485-2	*Olivella*	E1a	7.4	2.0	4.3	conical perforation, ground edges, appears polished, edgewear, possible stringwear inside perforation, convex orientation
0485-3	*Olivella*	E1a	6.5	1.9	3.9	conical perforation, ground edges, appears polished, possible stringwear inside perforation, possible retouch, convex orientation
0485-4	*Olivella*	E1a	6.3	2.2	3.0	conical perforation, ground edges, possible stringwear inside perforation, possible retouch, convex orientation
0485-5	*Olivella*	E1a	6.4	2.0	3.4	conical perforation, ground edges, possible retouch, edgewear, irregularly shaped, convex orientation
0485-6	*Olivella*	E1a	6.8	2.1	3.0	conical perforation, ground edges, weathered, stringwear, retouch, convex orientation
0485-7	steatite	disk	6.4	2.3	1.7	parallel-sided perforation, ground edges, dark stone with chocolate and cream colored stripes
0485-8	*Olivella*	E1a	6.8	2.0	4.0	conical perforation, ground edges, possible edgewear, possible stringwearinside perforation, concave orientation
0485-9	*Olivella*	E1a	6.6	2.0	3.9	parallel-sided perforation, ground edges, edgewear, possible stringwear, concave orientation

Table 35. *(continued)*

Cat. No.	Material	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
Strand I						
0485-10	*Olivella*	E1a	7.4	2.4	4.3	conical perforation, ground edges, retouch, possible stringwear inside perforation, concave orientation
0485-11	*Olivella*	E1a	7.2	1.9	3.5	biconical (?), ground edges, possible retouch, possible slight stringwear, concave orientation
0485-12	*Olivella*	E1a	7.3	1.9	3.8	conical perforation, ground edges, slight edgewear, stringwear inside and around perforation, concave orientation
0485-13	*Olivella*	E1a	7.3	2.0	3.7	conical perforation, ground edges, slight edgewear, stringwear, retouch, concave orientation
0485-14	*Olivella*	E1a	7.2	1.9	4.0	biconical (?), ground edges, slight edgewear, stringwear inside and around perforation, concave orientation
0485-15	*Olivella*	E1a	6.7	2.1	4.0	parallel-sided perforation, ground edges, slight edgewear, possible stringwear inside perforation, possible retouch, concave orientation
0485-16	*Olivella*	E1a	7.2	2.3	4.4	conical perforation, ground edges, deep stringwear on one side of perforation, slight edgewear, concave orientation
0485-17	*Olivella*	E1a	7.4	2.0	4.1	biconical (?), ground edges, possible stringwear inside perforation, possible retouch, concave orientation
0485-18	*Olivella*	E1a/E1b	8.2	2.1	4.2	conical perforation, ground edges, stringwear inside perforation, retouch, concave orientation
0485-19	*Olivella*	E1a	7.0	2.1	3.8	conical perforation, ground edges, extreme wear around perforation, slight edgewear, concave orientation
0485-20	*Olivella*	E1a	7.1	1.9	3.2	biconical (?), ground edges, stringwear inside and around perforation, possible retouch, concave orientation
0485-21	*Olivella*	E1a	6.4	1.9	3.3	conical perforation, ground edges, possible stringwear inside perforation, slight chipping around perforation, concave orientation
0485-22	*Olivella*	E1a	7.4	2.2	4.3	conical perforation, ground edges, weathered, possible stringwear inside perforation, slight edgewear, concave orientation
0485-23	*Olivella*	E1a	7.4	1.9	4.1	conical perforation, ground edges, deep stringwear on one side of perforation, possible retouch, concave orientation
0485-24	*Olivella*	E1a	7.8	1.8	4.1	conical perforation, ground edges, weathered, slight edgewear, stringwear, concave orientation
0485-25	*Olivella*	E1a	6.4	1.9	4.1	conical perforation, ground edges, edgewear, stringwear inside perforation, retouch, concave orientation
0485-26	*Olivella*	E1a	6.7	1.8	3.8	conical perforation, ground edges, possible retouch, concave orientation
0485-27	*Olivella*	E1a	7.8	1.8	3.6	conical perforation, ground edges, slightly weathered, edgewear, stringwear inside and around perforation, concave orientation
0485-28	*Olivella*	E1a	7.1	1.7	3.9	conical perforation, ground edges, deep stringwear on one side of perforation, concave orientation
0485-29	*Olivella*	E1a	6.8	1.9	3.4	conical perforation, edgewear, possible stringwear inside perforation, concave orientation
0485-30	*Olivella*	E1a	7.6	2.2	3.8	biconical (?), ground edges, weathered, edgewear, stringwear inside perforation, chipping around perforation, concave orientation
0485-31	*Olivella*	E1a	7.1	2.1	3.4	conical perforation, ground edges, heavy edgewear, erosion around perforation, stringwear inside and around perforation, pitted surface, concave orientation

Table 35. *(continued)*

Cat. No.	Material	Type	Diam (mm)	Perf Diam (mm)	Thk/Crv (mm)	Description/Comments
Strand J						
0486-1	steatite	disk	5.9	2.0	2.3	parallel-sided perforation, ground edges
0486-2	*Olivella*	E1a	5.8	2.0	2.8	conical perforation, ground edges, edgewear, retouch, pitted on one side, stringwear inside and around perforation, concave orientation
0486-3	steatite	disk	6.2	2.0	2.4	parallel-sided perforation, ground edges, edgewear
0486-4	*Olivella*	E1a	5.9	2.1	2.6	conical perforation, ground edges, edgewear, retouch, deep stringwear on one side, concave orientation
0486-5	*Olivella*	E1a	7.6	2.1	3.5	conical perforation, ground edges, heavily weathered, edgewear, pitted, stringwear inside and around perforation, concave orientation
0486-6	*Olivella*	E1a	6.9	1.9	2.9	biconical?, heavily weathered, heavy edgewear, pitted, deep stringwear on one side of perforation, concave orientation
0486-7	*Olivella*	E1a	7.4	2.1	3.3	conical perforation, ground edges, heavily weathered, edgewear, pitted, deep stringwear on one side of perforation, concave orientation
0486-8	*Olivella*	E1a	7.1	2.1	3.5	conical perforation, ground edges, edgewear, stringwear, retouch, concave orientation
0486-9	*Olivella*	E1a	7.0	1.8	3.4	conical perforation, ground edges, pitted surface, edgewear, stringwear, retouch, concave orientation
0486-10	*Olivella*	E1a	6.9	1.9	3.1	conical perforation, ground edges, heavily weathered, edgewear, pitted, stringwear inside and around perforation, concave orientation
Strand K						
0487-1	*Olivella*	E1a	6.5	2.1	3.3	conical perforation, ground edges, slightly pitted, stringwear, convex orientation
0487-2	*Olivella*	E1a	7.0	2.4	5.3	conical perforation, ground edges, edgewear, slight pitting, stringwear, convex orientation
0487-3	*Olivella*	E1a	8.0	2.1	3.5	conical perforation, ground edges, slight chipping on the edge, slight pitting, stringwear, convex orientation
0487-4	*Olivella*	E1a	6.0	2.1	3.4	conical perforation, ground edges, slightly pitted, edgewear, stringwear, convex orientation
0487-5	*Olivella*	E1a	7.2	2.1	3.9	conical perforation, ground edges, slightly pitted, slight edgewear, stringwear inside and around perforation, convex orientation
0487-6	*Olivella*	E1a	7.0	1.9	3.5	conical perforation, ground edges, edgewear, slightly pitted, stringwear inside and around perforation, convex orientation
0487-7	*Olivella*	E1a	6.5	1.8	2.6	conical perforation, ground edges, heavily weathered, edgewear, pitting around perforation, stringwear inside and around perforation, convex orientation
0487-8	*Olivella*	E1a	6.6	2.0	3.8	conical perforation, ground edges, edgewear, pitting, possible stringwear inside perforation, convex orientation

a. The catalog numbers begin with CA-KER-4619-; Prov = provenience; Diam = outside diameter; Perf Diam = perforation diameter; Thk/Crv = thickness/curvature; indet. = indeterminate.

Notes: The *Olivella* bead types are per Bennyhoff and Hughes (1987). The orientation of the beads indicates whether they were concave or convex to the first bead on the string closest to the flagging tape when they were removed in the field. It is unfortunate that the orientation and position of the beads in String F were lost during removal of the strand in the field, so the order that appears in this table was not the original order of beads on the strand in situ.

Table 36. Sequence of Bead Types on Partial Bead Strands.

Key:	
1 = *Olivella* E1a (round thin lipped); Type E1b (oval thin lipped) is included in this category because there was ambiguity as to whether some beads were E1a or E1b, and the main difference between them is whether they are round or oval in shape	
2 = steatite disk	
Strand A	1111
Strand B	1111
Strand C	11111111
Strand D	11111111111111111111111111111
Strand E	1111111111111111111111111111111112111112
Strand G	11111111211111111111111111111
Strand H	11111111
Strand I	111111211111111111111111111111
Strand J	2121111111
Strand K	11111111

Note: The numbers for each strand correspond to the key. Strand F is not included here because it was dropped in the field and the bead positions were lost.

Table 37. Orientation of *Olivella* Beads on Partial Bead Strands.

Key for *Olivella* beads:	
1 = Concave	
2 = Convex	
Strand B	1111
Strand C	11111111
Strand D	11111111111111111111111111111
Strand E	11111111121211111112221222222222–11111–
Strand G	11111112–1111111111111111111
Strand H	11111111
Strand I	111111–222222222222222222222222
Strand J	–1–1111111
Strand K	11111111

Notes: The numbers for each strand correspond to the key. The key indicates whether the bead was concave or convex in relationship to which direction the curvature of the bead was facing the flagging tape. Strand A is not included here because two of the beads were broken in situ so it could not be restrung. The dash in four of the strands indicates where a steatite bead was strung. Strand F is not included here because the bead positions were lost in the field.

As each strand was being restrung during excavations, the orientation of the first bead in relationship to the flagging tape depended on which end of the strand was restrung first and was thus arbitrary. Because the orientation of the initial bead of each strand was arbitrary, the numbers for Strands E, I, and K were reversed in order to avoid confusion regarding the significance of the differences in orientation based on the first bead that was restrung. Nevertheless, each strand is internally consistent in terms of whether the orientation of each bead was concave or convex.

Table 38. Attributes of the Shell Ornaments and Beads Associated with Individual 2 at CA-KER-4619.

Cat. No. (CA-KER-4619-)	Type[a]	Length (in mm)	Maximum Width (in mm)	Thickness (in mm)	Comments
0488	*Haliotis* ornament	41.2	35.4	2.4	two drilled perforations at one end, some curvature of the shell, ground edges, see Figure 11
0489	*Haliotis* ornament	45.6	31.2	2.0	two drilled perforations at one end, some curvature of the shell, ground edges, see Figure 11
0490	*Haliotis* ornament	45.6	31.1	2.1	three drilled perforations at one end, some curvature of the shell, ground edges, see Figure 11
		Diameter (in mm)	**Perf Diam[b] (in mm)**	**Thk/Crv (in mm)**	
0491	*Olivella* E1a bead	4.8	1.3	~2.0	parallel-sided perforation, weathered, stringwear, ground edges, found in screen
0492	*Olivella* E1a bead	5.7	1.4	2.6	parallel-sided perforation, associated with cervical vertebrae, weathered, ground edges, stringwear, found in situ

a. The types for the *Olivella* beads are according to the typology of Bennyhoff and Hughes (1987). All three of the *Haliotis* pendant ornaments were found in situ and were directly associated with the cervical vertebrae, making up part of a "necklace."
b. Perf Diam = perforation diameter; Thk/Crv = thickness/curvature.

Table 39. Attributes of the Shell Beads from the Vicinity of Burial Feature 4 at CA-KER-4619.

Cat. No. (CA-KER-4619-)	Type[a]	Diameter (in mm)	Perf Diam[b] (in mm)	Thk/Crv (in mm)	Comments
0496	*Olivella* E1a	5.9	1.3	3.4	conical perforation, ground edges, weathered
0497	*Olivella* G1	4.1	1.4	1.1	parallel-sided perforation, ground edges
0498	*Olivella* K1	3.4	1.5	2.5	conical perforation, ground edges
0499	clam disk	6.3	1.9	2.7	conical perforation, ground edges, heavily weathered
0500	clam disk	7.3	1.9	2.6	parallel-sided perforation, ground edges, stringwear

a. The types for the *Olivella* beads are according to the typology of Bennyhoff and Hughes (1987).
b. Perf Diam = perforation diameter; Thk/Crv = thickness/curvature.

either strung or used as appliqué. Steatite disk beads were also found on four of the bead strands recovered with Individual 1.

Another interesting comparison with the bead strands reported by Robinson (1982) is the ratio of *Olivella* (n = 899) to other bead types (n = 233). While there is a minor mathematical or typographical error in these numbers (Robinson [1982:41] reported a total of 1,122 beads in the text, but the total in his Table 2 is 1,132), the ratio is still roughly four to one, which was also the case for the *Olivella* beads at Cross Mountain (see above). The difference is that while one of the strands reported by Robinson (1982) was made up entirely of *Olivella* beads, the other strand was made up primarily of *Mytilus* beads with very few *Olivella* beads, unlike the predominance of *Olivella* beads on all the strands from Cross Mountain.

The only other strung beads in the region of which the authors are aware are two glass bead strands that were given to a Kawaiisu woman by her Tubatulabal great-grandmother (Sutton 2000). While these were all glass beads, Sutton (2000:31) speculated that glass

bead types may have been "equivalent" replacements or substitutes for some shell bead types. This suggested to Sutton (2000:31) that some native groups in the southern Sierra Nevada may have substituted glass beads for shell beads as a potential response to Euroamerican contact, at which time there may have been increasing difficulty in obtaining shell beads.

Shell Ornaments Associated with Individual 2

As discussed previously, three perforated *Haliotis* shell ornaments were recovered around the cervical vertebrae of Individual 2. *Haliotis* beads and other types of ornaments are commonly found at archaeological sites in California (see King 1990), with a host of shapes and sizes occurring in Early, Middle, and Late period contexts.

While the *Haliotis* ornaments found in association with the cervical vertebrae of Individual 2 (see Figures 10 and 11, Table 38) could not be matched precisely to any of the ornaments in King (1990:250-255), they appear to most closely resemble some of the rectangular examples in King's Figures 21 and 22. This resemblance is only in regard to the shape and size of King's specimens, as none of those ornaments has the same pattern of perforations as the ones found with Individual 2. Both the *Olivella* E1a beads found with Individual 2 displayed stringwear and may have been part of this *Haliotis* "necklace."

Ecofactual Remains

A number of botanical remains were recovered during screening from both the burial and hearth features (Table 40). There were also a few botanical specimens found in the soil sample from Hearth Feature 1. Due to the nature of this salvage operation, the botanical remains were not collected from stratigraphically controlled contexts. As such, their information potential is somewhat problematic, although many of them were burned, suggesting that they were culturally derived and part of the prehistoric site habitation. The botanical materials included burned and unburned juniper seeds and unidentified seeds, as well as a considerable amount of charcoal of unknown taxa, which is not included in Table 40.

A total of 388 faunal elements (using number of identified specimens [NISP] as the measure of quantification) were recovered from Burial Features 1, 2, and 4 and both hearth features (Table 41). The majority of these consisted of unidentified rodent, rat, or mouse remains (n = 252); also included were elements of unidentified small- to medium-sized mammals (n = 72), lagomorphs (n = 51; including 4 *Lepus* sp.), squirrels

Table 40. Botanical Remains from CA-KER-4619.

Cat. No. (CA-KER-4619-)	Associated Feature	Provenience	Taxon	Weight (in g)	Comments
0138	Burial Feature 1	screen	juniper	11.75	unknown number of seeds
0146	Burial Feature 1	screen	unidentified	0.03	seed fragments, unburned
0147	Burial Feature 1	screen	unidentified	0.06	seed fragments, burned
0514	Burial Feature 1	screen	juniper	0.10	1 seed
0522	Burial Feature 2	screen	juniper	1.70	22 seeds, mostly burned
0508-1	Burial Feature 4	screen	juniper	0.31	1 complete seed, 2 seed fragments, unburned
0508-2	Burial Feature 4	screen	juniper	0.06	4 seed fragments, burned
0508-3	Burial Feature 4	screen	unidentified	0.06	2 seeds, unburned
0554	Hearth Feature 1	in situ	unidentified	1.05	5 complete seeds, 22 seed fragments, burned

Table 41. Faunal Remains by NISP[a] from CA-KER-4619.

Cat. No. (CA-KER-4619-)	Provenience	Taxon	Element	Age	NISP	Comments
Associated with Burial Feature 1						
0132a	screen	lagomorph	long bones	adult	18	fragments, 13 burned
0132b	screen	lagomorph	incisor	adult	1	unburned
0132c	screen	unident. rodent	long bone	subadult	1	epiphysis, burned
0132d	screen	rat-sized	unident. frags	adult	14	fragments, unburned
0133a	screen	lagomorph	long bone	adult	1	fragment, unburned
0133b	screen	lagomorph	scapula	adult	1	burned
0133c	screen	lagomorph	distal tibia	subadult	1	unfused epiphysis, unburned
0133d	screen	squirrel-sized	radius	adult	1	burned
0133e	screen	rat-sized	tibia	adult	1	unburned
0133f	screen	rat-sized	distal tibia	adult	1	burned
0133g	screen	mouse-sized	distal tibia	adult	1	unburned
0133h	screen	unident. rodent	proximal femur	adult	1	burned
0133i	screen	medium mammal	tarsal	adult	1	unburned
0133j	screen	medium mammal	phalanx	adult	1	unburned
0133k	screen	medium mammal	calcaneus	adult	1	unburned
0133l	screen	small mammal	unident. frags	adult	2	fragments, unburned
0141a	screen	mouse-sized	phalanges	adult	6	5 unburned, 1 burned
0141b	screen	unident. snake	vertebra	adult	1	unburned
0141c	screen	unident. reptile	unident. frag	adult	1	unburned
0141d	screen	unident. rodent	long bones	subadult	2	epiphyses, burned
0141e	screen	unident. rodent	long bones	adult	17	fragments, unburned
0141f	screen	unident. rodent	long bones	adult	13	fragments, burned
0141g	screen	unident. rodent	unident. frags	adult	66	fragments, unburned
0141h	screen	unident. rodent	unident. frags	adult	19	fragments, burned
0515a	screen	mouse-sized	distal tibia	adult	1	burned
0515b	screen	mouse-sized	phalanx	adult	1	unburned
0515c	screen	rat-sized	long bones	adult	5	fragments, 4 burned
0515d	screen	rat-sized	unident. frags	adult	6	fragments, unburned
0515e	screen	medium mammal	long bone	adult	1	fragment, unburned
Subtotal	–	–	–	–	186	–
Associated with Burial Feature 2						
0523a	screen	lagomorph	phalanx	adult	1	unburned
0523b	screen	*Spermophilus* sp.	proximal ulnae	adult	2	unburned, 1 left, 1 right
0523c	screen	mouse-sized	humerus	adult	1	unburned
0523d	screen	mouse-sized	femur	adult	2	unburned
0523e	screen	rat-sized	incisor	adult	1	unburned
0523f	screen	unident. rodent	metapodial	adult	2	unburned

Table 41. *(continued)*

Cat. No. (CA-KER-4619-)	Provenience	Taxon	Element	Age	NISP	Comments
0523g	screen	unident. rodent	tibia	adult	1	unburned
0523h	screen	unident. rodent	cranial	adult	8	fragments, unburned
0523i	screen	unident. rodent	long bones	adult	13	fragments, 9 unburned, 4 burned
0523j	screen	unident. rodent	unident. frags	adult	5	fragments, burned
528	screen	*Lepus californicus*	mandible	adult	1	unburned
529	screen	cervid	tooth	adult	1	unburned
0533a	screen	lagomorph-sized	metapodial	adult	1	unburned
0533b	screen	lagomorph-sized	phalanges	adult	3	unburned
0533c	screen	lagomorph-sized	rib	adult	1	fragment, unburned
0533d	screen	rat-sized	scapula	adult	1	fragment, unburned
0533e	screen	mouse-sized	mandible	adult	1	fragment, unburned
0533f	screen	sm-med mammal	unident. frags	adult	40	fragments, unburned
0541a	screen	medium mammal	cranial	adult	1	fragment, unburned
0541b	screen	mouse-sized	unident. frags	adult	2	fragments, burned
0541c	screen	rat-sized	long bones	adult	9	fragments, unburned
0541d	screen	rat-sized	unident. frags	adult	33	fragments, unburned
Subtotal	–	–	–	–	130	–
Associated with Burial Feature 4						
0506a	screen	lagomorph	distal phalanx	adult	1	burned
0506b	screen	lagomorph	proximal scapula	adult	1	unburned
0506c	screen	lagomorph	rib	adult	1	fragment, unburned
0506d	screen	lagomorph	long bones	adult	12	fragments, burned
0506e	screen	squirrel-sized	acetabulum	adult	1	burned
0506f	screen	rat-sized	long bones	adult	7	fragments, burned
0506g	screen	sm-med mammal	unident. frags	adult	12	burned
0506h	screen	medium mammal	long bones	adult	4	fragments, unburned
0506i	screen	large mammal	unident. frag	adult	1	fragment, burned
0507	in situ	large mammal	long bone	adult	1	fragment, burned
Subtotal	–	–	–	–	41	–
Associated with Hearth Feature 1						
0551a	soil sample	*Lepus* sp.	calcaneus	adult	1	burned
0551b	soil sample	*Lepus* sp.	radius	adult	1	fragment, burned
0551c	soil sample	*Lepus* sp.	phalanges	adult	5	burned
0551d	soil sample	rabbit-sized	rib	adult	1	fragment, burned
0551e	soil sample	small mammal	scapula	adult	1	fragment, burned
0551f	soil sample	small mammal	vertebra	adult	1	burned

Table 41. *(continued)*

Cat. No. (CA-KER-4619-)	Provenience	Taxon	Element	Age	NISP	Comments
0551g	soil sample	small mammal	unident. frags	adult	3	fragments, burned
0552a	in situ	rat-sized	zygomatic	adult	1	unburned
0552b	in situ	rat-sized	long bones	adult	9	fragments, unburned
0552c	in situ	small mammal	unident. frags	adult	4	fragments, unburned
0553	in situ	unident. reptile	vertebra	adult	1	unburned
Subtotal	–	–	–	–	28	–
Associated with Hearth Feature 2						
0543	in situ	chelonian	carapace	adult	2	fragments, burned
0544	in situ	unident. rodent	long bone	adult	1	fragments, unburned
Subtotal	–	–	–	–	3	–
Grand Total	–	–	–	–	388	–

a. NISP = Number of identified specimens.

(n = 4; including 2 *Spermophilus* sp.), large mammals (n = 3; a cervid tooth, an unidentified burned long bone, and an unidentified burned fragment), two unidentified reptiles, two chelonians (turtle or tortoise), and one snake.

Of the 388 faunal elements, 124 (32 percent) were burned. Of those elements that were burned, 45 were from unidentified rodents, 40 were from lagomorphs (including *Lepus* sp. and rabbit-sized), 17 were elements of small or medium mammals, 16 were from rat- or mouse-sized rodents, and two each were elements of large mammals, squirrels, and chelonians. Four elements (all epiphyses) represented subadults (three unidentified rodents and one lagomorph); the rest were adult specimens. Due to the limited number of faunal remains, the fact that some were probably not part of the human site occupation (e.g., the unburned rats and mice), and the lack of stratigraphically controlled recovery of these remains, little can be determined about the faunal exploitation activities at the site. Nevertheless, it is clear that lagomorphs were a common resource, a pattern that has been observed in many parts of the western Mojave Desert (see Gardner 2007).

DNA Analysis

Over the last few decades, research has revealed that all Native American mitochondrial DNA (mtDNA) variation is derived from six founding maternal mtDNA lineages, designated A, B, C, D, M, and X (e.g., Eshleman et al. 2004; Johnson and Lorenz 2006; Eshleman and Smith 2007; Malhi et al. 2007). In the case of the three infants buried together at Cross Mountain, there was particular interest in determining the genetic relatedness of these individuals; as such, Mr. Wermuth allowed CSUB to remove one deciduous tooth from each infant for DNA analysis. DNA was extracted from two separate sections of each tooth, and polymerase chain reaction **(**PCR) testing was conducted (Wells 1998).

Results of the PCR test indicated that Individuals 3 and 4 came from the same mtDNA lineage (Lineage A) while Individual 5 came from Lineage B. These data demonstrate that the three infants had at least two different mothers. No determinations could be made regarding gender, migration patterns, how these infants may have been related to others in the burial

population, or the genetic relationship of the Cross Mountain population to other groups (see below for further discussion of the DNA results).

Dating the Site

Chronological data from the Cross Mountain site were derived from radiocarbon assays and artifact typologies (shell ornaments and projectile points). The following provides details of each of these categories for age assessment.

Radiocarbon Assays

A sample of human bone (two ribs) from Individual 3 was radiocarbon dated to 460 ± 60 RCYBP (Beta-98466). The results intersected the calibration curve in two different places, resulting in two date ranges, A.D. 1400 to 1520 (at 1 sigma) and A.D. 1570 to 1630 (at 2 sigma). Hearth Feature 1 was radiocarbon dated to 370 ± 60 RCYBP (Beta-100728), calibrated to A.D. 1430 to 1655 (at 2 sigma).

Shell Ornaments

The vast majority of the beads from Cross Mountain are Type E1a. Bennyhoff and Hughes (1987) placed the age for E1a (and E1b) beads in the Late Period (ca. A.D. 1500 to 1650). In addition, the beads from Individual 1, Individual 5, and Burial Feature 4 included Types G1 and K1. While the G1 beads have little temporal significance, K1 (cupped) beads are considered to be marker artifacts for the early Late Period (ca. A.D. 1150 to 1500) (Bennyhoff and Hughes 1987:137).

Based on a comparison with King's (1990) example specimens, the shape and size of the *Haliotis* ornaments associated with Individual 2 appear to date between A.D. 1250 and 1650 of the Late Period. It should be noted, however, that *Haliotis* ornaments, as well as those of steatite and clamshell, have occurred in various temporal contexts (see King 1990).

Projectile Points

Rose Spring series projectile points date to the Rose Spring Complex (ca. 1,800 to 900 B.P.), and Desert series points date to the Late Prehistoric Complex (ca. 900 B.P. to historic contact) (see Sutton et al. 2007). These dates are somewhat earlier than what the radiocarbon assays and bead data would suggest. It could be that the Rose Spring occupation did not occur until late in the complex and the site continued to be used, or possibly reused, after a period of abandonment, either by the same population or by a different one.

Discussion

The Cross Mountain site is interpreted as a large habitation site, or village, with a substantial cemetery. A cursory evaluation of the artifact assemblage indicates a broad range of activities, and the presence of a widespread midden and cemetery reflects a relatively long-term occupation. The following discussion provides interpretations about the Cross Mountain site based on the limited salvage excavations that were conducted by CSUB in 1996. The topics under consideration for this interpretation include environmental considerations, settlement and subsistence, ethnicity, status and age differentiation, the significance of the DNA results, health issues, and the potential significance of the nonmetric biological traits.

Environmental Considerations

At some point after the site had been occupied, the course of the stream that ran along the northern side of the site changed. As the stream receded in an easterly direction, it began to expose and erode the midden (and continues to do so), resulting in an exposure some 3 m deep and revealing a cultural deposit that is about 1.5 m deep. In addition, the stream action impacted a cemetery located within the midden, resulting in the loss of an unknown number of burials and the exposure of at least nine others. This suggests that the

area was drier during site occupation but later became more mesic.

Settlement and Subsistence

The role of the Cross Mountain site in the settlement and subsistence system of the southern Sierra Nevada is unknown, but a relevant model of such a system for the directly adjacent western Mojave Desert may be informative. In this model, Sutton (1990, 1991a, 1991b) proposed that the beginning of the Rose Spring Complex witnessed increasing precipitation and elevated lake levels, resulting in the development of villages. This was supported at Koehn Lake (CA-KER-875), located about 15 miles east of Cross Mountain, where Sutton (1990, 1991a, 1991b) excavated a large village dating between 1,430 and 970 RCYBP. According to the model, during this more mesic interval, there was intensive exploitation of the resources at Koehn Lake, with a relatively large human population in residence.

Subsequently, Koehn Lake began to desiccate, presumably as the result of the drought episode known as the Medieval Climatic Anomaly (see Gardner 2007), and the Koehn Lake site was eventually abandoned (Sutton and Hansen 1986:6). According to the model, the lake began to dry up, water became scarcer, and settlement and subsistence patterns began to shift away from lakes and toward more reliable springs and streams in the nearby southern Sierra Nevada and El Paso Mountains. This likely reduced site population size, and occupations may have been more seasonal in nature. Perhaps the Cross Mountain site represents one of those shifts from a lakeside adaptation to a streamside one.

Such a scenario does not adequately explain the size, diversity, and presumed length of occupation of the Cross Mountain site, however. One possible explanation for this was proposed by Gardner (2007:235), who suggested that the population shift modeled by Sutton (1990, 1991a, 1991b) beginning at the terminal Rose Spring Complex was brought about because "people would have begun to aggregate into more compact settlement units, as a way of 'joining forces,' so to speak, to make better use of diminishing resources as a result of environmental deterioration."

If this latter model is accurate, then "it should be evident in the archaeological record…in the form of site clusters, rather than scattered settlements" (Gardner 2007:235). These clusters would consist of several relatively small subsidiary or satellite sites to a major center of activity, such as the Koehn Lake site. While Cross Mountain is much smaller than the Koehn Lake site—although the dimensions were only approximate and it could easily be considerably larger—it may also have been a major center that was perhaps intermediate in size between Koehn Lake and other subsidiary/satellite sites.

Ethnicity

The ethnicity of the inhabitants of the Cross Mountain site remains questionable, as both the Kawaiisu and the Tubatulabal were known to have resided in the southern Sierra Nevada (Smith 1978; Zigmond 1986), although Tubatulabal territory is thought to have been north of the Cross Mountain region. In comparing the mortuary practices of these two groups, it has been reported that both practiced interment (Smith 1978; Zigmond 1986); however, Driver (1937:99) reported occasional cremations for the Kawaiisu, and an isolated Kawaiisu cremation was documented in the nearby Sand Canyon area (Siefkin and Sutton 1995). Both groups were said to have wrapped their dead in tule mats prior to burial, but the Kawaiisu would place the deceased under a rock cairn (Zigmond 1986:404) while the Tubatulabal buried the deceased in a shallow grave (Smith 1978:440). No cremations were found at Cross Mountain, and there was no evidence of tule mats or rock cairns. As such, there were no unique burial data to verify the ethnicity of the site inhabitants.

On the other hand, Sutton (1991a:181) proposed a late occupation of the southern Sierra Nevada by the Kawaiisu as the western Mojave Desert began drying up toward the end of the Rose Spring Complex. According to Sutton (1991a:181), these environmental conditions most likely triggered a major population movement by the Kawaiisu, who are known to have occupied the southern Sierra Nevada at historical contact (e.g., Zigmond 1986). As Tubatulabal settlement is thought to have been further north, then, the presence of the relatively late village at Cross Mountain strongly suggests that it was occupied by the Kawaiisu.

Status and Age Differentiation

The presence of numerous beads with Individual 1 may indicate that this young child was imbued with ascribed status, as children are typically not considered to have lived long enough to have achieved their own status. This suggests that Individual 1 may have been the child of a relatively high-ranked individual. While there is currently no direct link between this juvenile and the three infants, there does appear to have been some status differentiation among younger and older children at the site, as suggested by the absence of ornamental artifacts with the three infants.

It is important to note that this suggestion of status and age differentiation based on ornamentation suffers from at least two possible weaknesses: (1) the cemetery was not excavated in its entirety, leaving open the possibility that there were other individuals (adults and/or children) who were adorned in some fashion; and (2) the disparity in ornamentation may be due more to taphonomic processes than status differentiation, as erosion and bioturbation had significantly disturbed the site.

The differences in orientation, flexure, and position of the three infants are difficult to explain, although such considerations may have to do with status. Individual 3 was facing west, Individual 4 was facing east, and Individual 5 was facing north. This may have nothing to do with status, but may simply be judicious use of space within the burial pit for the placement of three infants at the same time.

In terms of flexure, Individual 3 was tightly flexed, Individual 4 was loosely flexed, and Individual 5 was semiflexed. These differences may be related to the age of these infants, as Individuals 4 and 5 were younger than Individual 3, perhaps by as much as a year given the upper age range for Individual 3 and the lower age range for the other two. Thus, since all three were apparently buried at the same time, perhaps the oldest of the three was interred in a different fashion because of that individual's age. Alternatively, the differences in flexure may have more to do with size, as Individual 3 (the oldest infant) was the largest of the three, requiring tighter flexure for placement in the grave, while Individuals 4 and 5 may have required minimal flexure due to their smaller size.

Interestingly, Individuals 3 and 4 were both in a supine position, while Individual 5 was placed laterally on the right side. Once again, this difference in position may have more to do with the size of the infants and the extent of the burial pit than with status. If status was a major consideration, one would expect all three to be treated relatively equally in terms of burial placement (and other mortuary practices), particularly since they shared the same space.

Significance of the DNA Results

Individuals 3 and 4 came from Lineage A, while Individual 5 came from Lineage B (Wells 1998). This suggests that Individuals 3 and 4 could have been siblings, while Individual 5 had a different mother. Although these results demonstrate that it is not possible that all three were siblings (and perhaps none of them were), the fact that they were buried together indicates

that they were most likely related either consanguineally (perhaps cousins) or through affinal kinship affiliation. Zigmond (1986:405) noted that Kawaiisu families tended to live near each other and cooperate in some activities. Perhaps families also came together for events such as the burial of three infants at the same time.

Health Issues

The Harris lines evident on one tibia of Individual 1 indicate at least one period of nutritional stress when normal bone growth was interrupted, causing bands to be formed in the growth areas of the bones. The Harris lines do not necessarily indicate that the nutritional stress was the proximate cause of death but may have been a contributing factor to this child's mortality. The physical evidence does provide some testimony, however, that the people at the Cross Mountain site during this child's lifetime probably experienced a resource/population imbalance that was significant enough to cause Harris lines in one of the children.

As noted above, the burial of the three infants was most likely a single event. As there was no evidence of trauma on any of these individuals (nor on any of the adults), the fact that all three were buried at the same time suggests that the proximate cause of the infants' deaths was disease. The incidence of acute disease is rarely manifested on the skeleton, even microscopically; most infectious conditions that can be seen on the bones are chronic diseases (Ortner 1992:5). As a result, with current technology, it is very difficult to detect evidence of past epidemics or other acute conditions by observations of human skeletal remains. DNA analysis has the potential to provide such crucial information (e.g., Donoghue et al. 2004; Mulligan 2006), although the techniques for this purpose are still being tested and are not readily available.

This issue is particularly important for the Cross Mountain site as the radiocarbon assay on the ribs from Individual 3 indicated that the burial of the three infants occurred between about 600 and 400 years ago. If the infants died of disease some time after A.D. 1500, this could reflect the transmission of European disease to native populations in the post-Columbian, pre-mission era (e.g., Preston 1996), a period of time (ca. A.D. 1500 to 1769) that has been argued to have been relatively disease-free for California native populations (e.g., Jackson 1994). The calibrated radiocarbon date for this burial indicates that there is a roughly 25 percent probability that Individual 3 was interred after about A.D. 1500. The bead data provide some support for this, although the dating of shell beads is problematic. While the statistical probability is higher that these infants died prior to ca. A.D. 1500, the possibility remains that they died afterwards.

Potential Significance of the Nonmetric Traits

Nonmetric traits, also referred to as discrete or discontinuous traits, are markers for population comparisons (Buikstra and Ubelaker 1994:85). The significance of such traits in ancient skeletal samples is that they may indicate genetic relatedness between individuals and populations. Nonmetric traits are at times observable in fragmentary and poorly preserved specimens (Buikstra and Ubelaker 1994:85).

Nonmetric traits were recorded for six of the nine individuals at Cross Mountain (Individuals 1 through 6). Many of the nonmetric traits listed in Table 3 were shared by all but Individual 2 (for whom no cranial elements were recovered), although the side and number of some of the traits (e.g., zygomatico-facial foramina) were not distributed equally. As such, no definitive pattern could be discerned relating to nonmetric traits, but the fact that many of the traits were shared by several individuals may indicate genetic relatedness of at least some of the members of the Cross Mountain burial population. This is supported in part by the DNA results.

Summary and Conclusion

The salvage excavation at the Cross Mountain site (CA-KER-4619) resulted in the recovery of at least five adults, a juvenile, and three infants, as well as artifacts associated with the burials and distributed across the surface of the site. The absence of any indicators of trauma on the remains of these nine individuals suggests that disease may have been the cause of death for at least some of the individuals. The radiocarbon assays and artifact typologies place site occupation sometime between about 1,800 and 400 years ago, perhaps at different times by different groups of people. Assuming that at least some of the actual site occupation was after ca. A.D. 1500, this evokes the possibility that European diseases had been transmitted to native populations in the region between about A.D. 1500 and 1769 (the year the first mission was established in California). Whatever the cause of death was for the infants at Cross Mountain, it must have been a tragic day in the village with the burial of three babies at the same time.

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Notes

1. Orientation was determined by drawing a line in the sketches along the main axis of the body—through the skull, spine, and pelvis—then measuring the angle of that line against true north, with the skull (or where it should be) being the upper end of the line.

2. The term “Late Period” is used in this article in reference to the shell bead typology. The chronological sequence of the Early, Middle, and Late periods is provided in Bennyhoff and Hughes (1987) and King (1990) based on sites primarily along coastal California containing shell beads. These terms are not commonly used for the western Mojave Desert, but the Late Period is roughly equivalent to the Late Prehistoric Complex.

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