Chapter 6
Approaches to Commingling Issues in Archeological Samples: A Case Study from Roman Era Tombs in Greece

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Human remains in archeological contexts frequently present the problem of commingling, especially when they are secondary deposits and involve multiple phases of funerary treatment and postdepositional disturbance. These problems are often compounded with incidents of recent looting and the prior undocumented removal of remains. Fortunately, the problems of interpreting such assemblages can be ameliorated with careful excavation and skeletal analysis related to context. As a case in point, this chapter focuses on the interpretation of evidence from chamber tombs of the Roman Empire at the site of Kenchreai in southern Greece. The systematic recovery and analysis of the commingled human remains from these tombs has contributed to a better understanding of local mortuary behavior and paleodemography. The study of this complex evidence presents an effective approach to samples of this kind, which are not uncommon in Mediterranean archaeological contexts.

Kenchreai and the Koutsongila Cemetery

Kenchreai is located on the eastern shore of the Isthmus of Corinth, facing the Saronic Gulf of the Aegean Sea (Fig. 6.1). This sizable settlement was the eastern port of the major city of Corinth throughout classical antiquity, but the harbor was especially prosperous during the Roman Empire (1st–7th centuries A.D.). Since 2002, Joseph L. Rife has directed the Kenchreai Cemetery Project (KCP), an interdisciplinary program of archaeological study and conservation sponsored by Macalester College under the auspices of the American School of Classical Studies at Athens (Rife 2003, 2004, 2005; Rife et al. in press). KCP has concentrated on the port town's primary cemetery, located immediately north of the harbor on a coastal ridge called Koutsongila. Although the Koutsongila Cemetery has been studied sporadically by Greek and American archaeologists since 1907, it has also attracted the attention of looters in recent years. So far KCP has documented 30 subterranean chamber tombs and 28 individual cist graves cut into the bedrock in more or less even

From: *Recovery, Analysis, and Identification of Commingled Human Remains*
Edited by: B. Adams and J. Byrd © Humana Press, Totowa, NJ

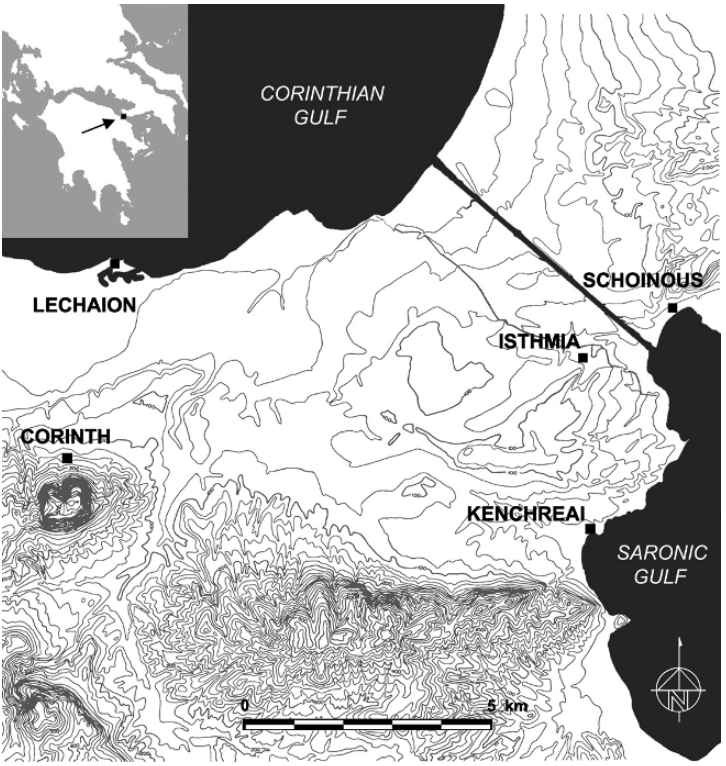

Fig. 6.1 Greece (inset) and the Isthmus of Corinth, showing the location of Kenchreai and other major sites of the Roman Empire (photo courtesy of J. L. Rife)

rows along the seaward slope of the ridge and the adjacent area to the north (Figure 6.2).

The well-preserved chamber tombs are particularly interesting, because they were large structures used over a long span of time for the burial of numerous persons (Rife in press-a). In each tomb, a stairway leads from the surface down into a rectangular chamber area carved from the bedrock measuring on average ca. 3.7 meters long by ca. 3.3 meters wide by ca. 2.5 meters high (Figs. 6.2 and 6.3). Several tombs were marked at ground level by a rectangular structure with a monumental façade, which both protected the entranceway and displayed the epitaph. The few preserved epitaphs reveal that the tombs were constructed and first used by parents and children, and then by their descendents and freedpersons. The interiors of the tombs were finished in white or painted plaster and equipped with benches and altars. Each tomb was designed to accommodate two different modes of corporeal disposal (Fig. 6.3). Some bodies were inhumed in long, narrow compartments (loculi) in the lower zone of the chamber walls. Others were cremated elsewhere, and a selection of incinerated bone was

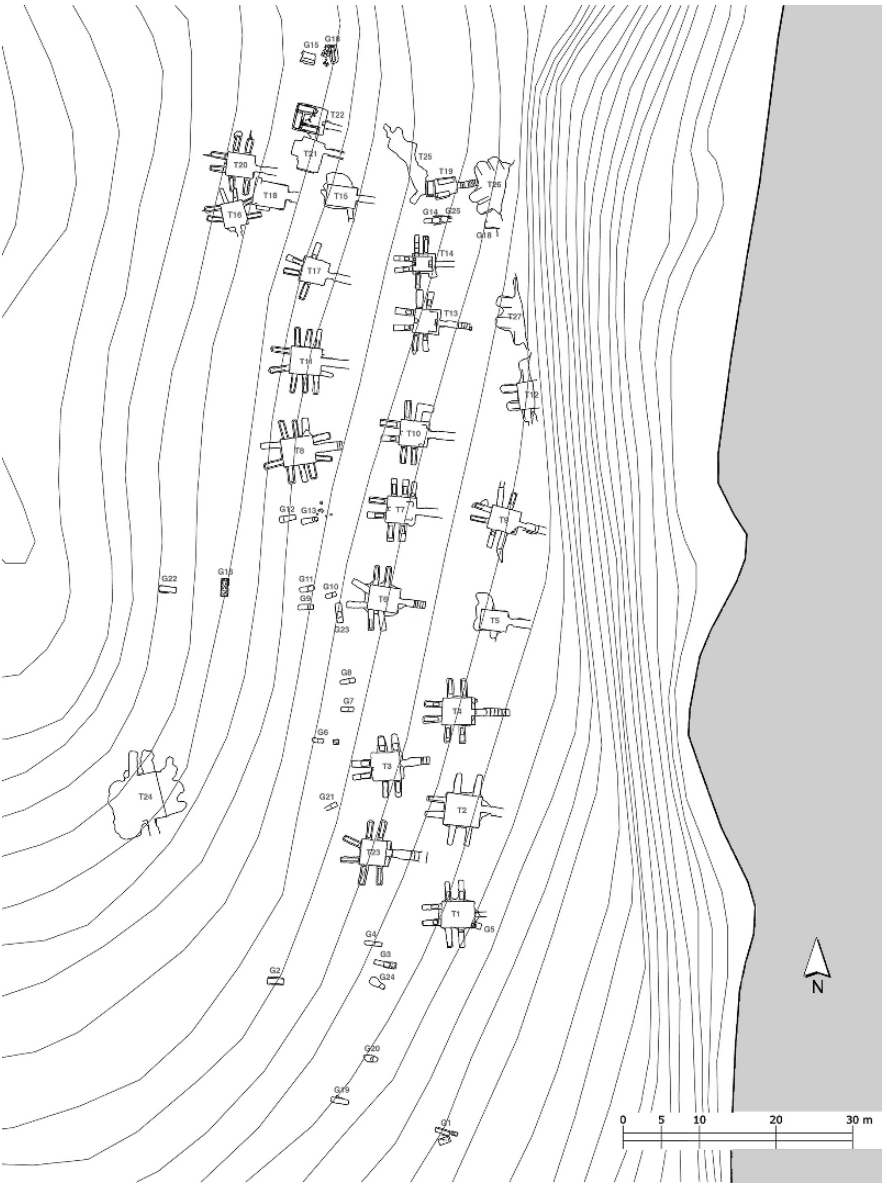

Fig. 6.2 The Koutsongila Cemetery, contour interval = 1 meter (courtesy of C. Mundigler, J. L. Rife, D. Edwards, and M. C. Nelson)

collected in urns, which were deposited in niches in the upper zone of the chamber walls.

The epitaphs and the objects buried with the dead and left by mourners after the funeral indicate that the tombs were primarily used for several generations during

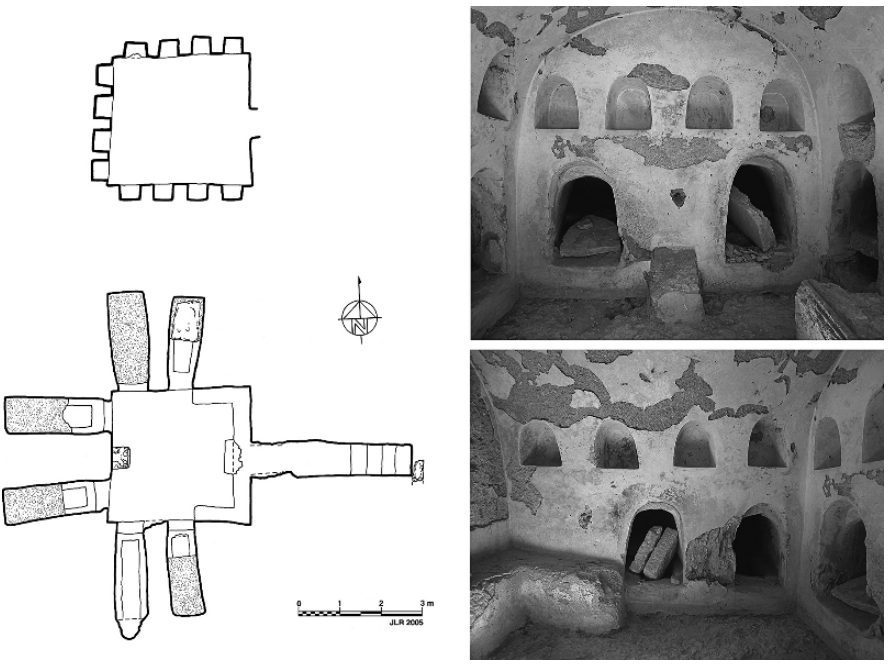

Fig. 6.3 Tomb 13, plan at level of loculi (below left) and niches (above right) and views of west (above right) and south walls (below right) (photo courtesy of J. L. Rife)

the Early Roman period (middle 1st–middle or late 3rd centuries A.D.) There is some evidence that the tombs were subsequently reopened for the continued inhumation of corpses in the loculi during the Late Roman period (ca. 4th–7th centuries A.D.) The monumental scale, rich decoration, and prominent location of these tombs indicate that they originally belonged to a group of elite families in the local community. The identity of later occupants of the tombs is uncertain, but there is no indication that they were either elites or relatives of the earlier occupants.

The Skeletal Assemblage and Its Depositional Context

The development of the skeletal assemblage in the Koutsongila Cemetery from ancient burial until modern study involved several stages of funerary activities and postdepositional disturbance. The initial burials in both the loculi and the niches represent multiple individuals with diverse mortuary treatments during the Early Roman period. Bodies were placed in the loculi, they were covered with a shallow layer of dirt, and the compartments were sealed with large terracotta tiles or limestone slabs, which were removed for the addition of corpses.

Cremated remains were placed in heavy, cylindrical urns, which were then deposited in the niches, though over time the urns were filled with the remains of several individuals. The next stage in the ancient use of the tombs for burial was the addition of corpses during the Late Roman period. Mourners at this time placed bodies over the tiles or slabs covering the loculi, but they might have also displaced, removed, or destroyed the long-since skeletonized remains of individuals interred during the Early Roman period. Thus, when the tombs were last used for burial in Late Antiquity (ca. 6th–7th centuries A.D.), they contained numerous individuals buried in separate periods, and the skeletal remains that had accumulated in confined burial spaces were already commingled and fragmentary.

Over the centuries following these funerary activities, both environmental and anthropogenic processes have affected the state of the skeletal assemblage. Water has continuously entered the chambers, loculi, and niches through the porous calcareous strata into which the tombs were cut, sometimes transporting fine sediment into burial contexts and stimulating the invasive growth of sinuous pine roots. Small rodents (mostly mice and rats) and terrestrial snails (mostly turriculate and discoid species) have also burrowed into burial contexts and nested there. These persistent natural conditions have encrustated bones and teeth with clay, caused superficial deformation and structural decay, and moved bones from their original locations.

Clandestine activity has had a greater impact on the skeletal assemblage. Looters have been active in the Koutsongila Cemetery probably since antiquity, but they have been especially active since the 1960s. Because they are chiefly seeking intact pottery and jewelry, the looters enter loculi, sometimes dislodge or remove covering tiles or slabs, and move the skeletal remains to the side. In this hasty and random operation, they use their hands, small picks, or trowels to dig through and scour the fill. As a result, the bones in the lower compartments have become well-mixed, cancellous tissues, and thin regions have broken down, and large elements, such as innominates and long bones, have repeatedly fragmented. Looters have had a lesser impact on the remains in the upper compartments, which they tend to avoid, because cremation burials at Kenchreai seldom (if ever) contain funerary artifacts. Few niches, however, have been found to contain either cremated bones or urns. This is apparently because the sturdy urns were often removed for secondary use elsewhere, and their contents were either poured out in the niches or onto the chamber floors. Cremated remains left in the niches often ended up on the chamber floors in any event, because they were either swept there by looters or thrown there during seismic ground shaking. Despite the anthropogenic disturbance of both niches and loculi, it seems that the commingling of human remains has occurred only within burial compartments. Looters have not moved remains from one loculus to another, or from the niches to the loculi. Thus, all bones and teeth found in single niches and loculi were deposited in those compartments during the Early or Late Roman period.

Analysis of the Commingled Human Remains

On account of their complexity and history, the tombs in the Koutsongila Cemetery present interesting challenges for the assessment of commingled human remains. In 2004 and 2005, the authors examined the spatial distribution of commingled bones *in situ* in one tomb (no. 13) and identified the skeletal remains recovered from an adjacent tomb (no. 14) with an identical history of use and a comparable depositional environment. These studies were particularly challenging, because of the narrowness of the burial compartments, the density of the commingled deposits, and the fragmentary state of the skeletal remains. The research objectives were to reconstruct the arrangement of the bodies when deposited; to understand better the activities surrounding the deposition of bodies; and to trace the demographic structure of the skeletal assemblage both within a tomb's individual compartments and within the entire tomb.

Spatial and Skeletal Analysis in Tomb 13

The close investigation of the distribution and character of commingled bone found in the loculi of Tomb 13 has shed light on mortuary behavior at Roman Kenchreai. J. L. Rife and Dhruva Jaishankar have studied the spatial distribution of separate anatomical elements among the human remains found over the stone coverings of two loculi, numbers I and V, which appeared most suitable for analysis (Jaishankar and Rife 2004). The deposits were comprised of thinly spread strata of highly fragmentary bone with almost no intervening soil matrix (Figs. 6.4 and 6.5). The commingled remains over the cover in Loculus I included 10,260 fragments weighing 2,250 grams (locus T13-033), while those over the cover in Loculus V included 8,302 fragments weighing 1,690 grams (locus T13-039). Each deposit was divided into 18 roughly square grids that filled the irregular interior space of the loculus. Then the skeletal remains were collected and identified by grid. The locations and dimensions of these grids (25 by 25 centimeters in Loculus I; 25 by ca. 35 centimeters in Loculus V) permitted a high degree of spatial control in tracking the distribution of anatomical elements within each burial context. A large majority of the fragments in each case were too small to identify with precision, but most of these fragments represented long bones and ribs. Numerous fragments from the axial and appendicular skeleton were, however, identifiable.

When the commingled remains from the two contexts were identified and plotted, several noteworthy patterns emerged. First, numerous bones from the hands and feet were found in both loculi. This demonstrates that the commingled remains were not secondary deposits, in which case one would expect a high frequency of major skeletal elements but a low frequency of minor ones. Second, both graves contained the remains of multiple individuals, at least three adults and one subadult in Loculus I and at least one adult in Loculus V. All of these individuals might have been placed in the compartments over the covers during the Late Roman period, well after the

Fig. 6.4 Commingled human remains above the covering tiles in Loculus I, Tomb 13: photo from south and plan showing grids (photo courtesy of D. Jaishankar and J. L. Rife)

initial use and final closure of the cists in the loculi during the Early Roman period. Third, the distribution of anatomical elements across the loculus broadly indicated the original position of the corpses in Loculus V. Almost all fragments of the cranial vault and teeth were located near the back, which suggests that bodies were interred head first, probably supine and extended, according to conventional practice at the time. While natural processes and looting have broken bones and moved them, here the commingled remains seem to have migrated only short distances from their original positions. Loculus V also contained a substantial amount of cremated bone (852 fragments weighing 1,010 grams), which was scattered across the cover slabs. Since cremation was not practiced in Late Roman Greece, these remains might well represent a final deposit of incinerated matter over the covering in the Early Roman period. This deposit was then disturbed and spread out when bodies were deposited on the same slabs at a later date.

Finally, it is striking that 21 permanent teeth and scattered fragments of cranial vaults but no facial or mandibular remains were found among the identifiable

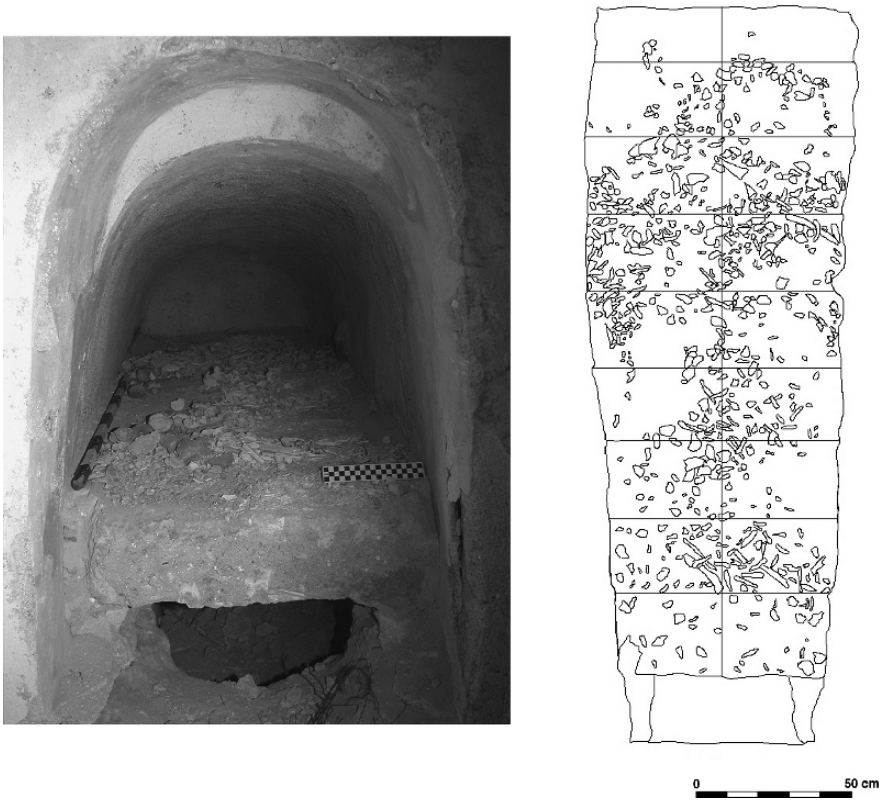

Fig. 6.5 Commingled human remains above the covering tiles in Loculus V, Tomb 13: photo from north and plan showing grids (photo courtesy of D. Jaishankar and J. L. Rife)

remains in Loculus I which represent all other parts of the human anatomy with relatively high frequency. Considering the durability of several osseous structures in the facial and mandibular regions, it seems unlikely that their absence is attributable to decay by environmental agents. One explanation is that the remains of skulls were preferentially removed from the loculi by mourners during the Late Roman period or the subsequent Byzantine era (ca. 7th–15th centuries A.D.). The handling and selective extraction of skeletonized bones from earlier burials was a widespread practice in the region during Late Antiquity and the Byzantine Middle Ages (Rife in press-b). Greeks during this time removed tractable bones, especially long bones and skulls, from preexisting burials for reburial or storage, because they considered them to be inherently valuable possessions that could preserve the memory or power of the deceased. This mortuary behavior seems to have been a popular corollary to the preservation of saints' relics, particularly bones, by the Greek ecclesiastical community (Meinardus 1970).

Skeletal Analysis in Tomb 14

The identification of all commingled remains from one typical chamber tomb (no. 14) has provided a more complete picture of the demographic profile and skeletal biology of several individuals representing subsequent generations of use. This study by Douglas H. Ubelaker shows how skeletal analysis can be coupled with careful archeological excavation to maximize the information derived regarding the number of individuals and their demographic structure. All commingled remains from Tomb 14 were recovered and studied as total samples of the surviving remains from the individual niches, from the individual loculi, from one anomalous burial compartment in the southeast corner of the chamber, and from stratified contexts on the chamber floor associated with neither niches nor loculi. Few bones in this tomb escaped disturbance by looters, who caused extensive commingling of remains within burial compartments. Therefore, the grid system and spatial analysis used in Tomb 13 was not applicable to Tomb 14. Instead, the human remains within separate loculi were collected in two samples, one representing everything inside the cist and the other representing everything above the cover. The following results of the skeletal analysis first retain this division of samples within the tomb and then combine data for overall tomb interpretations and comparisons of the contents of niches and loculi.

T14-046: Niche A

Only 5 grams of adult size bone fragments are present. Recognizable bone fragments include those from an innominate and long bone diaphysis. Age at death can only be estimated generally from bone size at greater than 6 years. No reliable estimate of sex can be made. Evidence of burning is confined to one cortical long bone fragment, which displays slight calcination and transverse fracturing, suggestive of burning in the flesh (Ubelaker 1999).

T14-047: Niche B

The sample weighs 205 grams. Adult-size bone fragments originate from long bones and the following others that could be recognized: scapula, left temporal, mandible, innominate, thoracic vertebra, right fifth metacarpal, one proximal hand phalanx, one middle hand phalanx, one first metatarsal, two proximal foot phalanges, one distal foot phalanx, and two left ribs.

Two subadult bones are also present: an unburned complete left clavicle and the sternal end of a rib. These likely originate from a child between the ages of 3 and 8 years.

Both burned and nonburned bones are present. The nonburned adult bones include the metacarpal and ribs. Calcined bones include the thoracic vertebrae, mandible, and most of the other fragments.

A lower left rib fragment displays evidence of healed fracture. The fracture is located on the lateral side of the rib, not on the head, neck, or sternal extremity.

T14-049: Niche D

Only one bone fragment is present, weighing less than 5 grams. No heat-related alterations are present, but due to fragmentation and small size it is not clear if it originates from human or nonhuman animal.

T14-050: Niche E

The sample weighs approximately 10 grams. The adult-size fragments originate from long bone diaphysis, a distal ulna, and ribs. A general age at death of 18 years or greater is likely. No reliable estimate of sex can be made. Calcination is confined to one long bone cortical fragment.

T14-051: Niche G

This 5-gram sample consists of one fragment of nonbone material, small cortical diaphysis fragments, and some fragments of cancellous bone. No reliable estimate of sex can be made. Bone morphology suggests the fragments originate from an individual of age 6 years or greater. No diagnostic evidence of burning is present.

T14-052: Niche H

This 25-gram sample contains one nonbone fragment and additional fragments of human origin. Recognizable bones include a cervical vertebra, distal ulna, ribs, and cranium. No reliable estimate of sex can be made. The extent of bone formation, bone morphology, and osteophytosis suggest an age at death between 18 and 35 years.

Fragments of a long bone diaphysis, a probable ulna, and a probable malar show evidence of calcination in the flesh (warping, transverse fracture patterns, etc.). All other fragments show no evidence of heat-related changes.

T14-053: Niche I

Only six fragments weighing approximately 5 grams are present. Of these, five represent nonbone material. One fragment represents bone, but of undetermined species.

T14-054: Niche J

This sample weighs approximately 80 grams. Recognizable adult bone fragments originate from the right clavicle, an innominate, a proximal hand phalanx, capitate, a right third metatarsal, a first metatarsal, and a coccygeal vertebra. The bones appear to be of adult origin (greater than 18 years), but no reliable estimate of sex can be made.

Two bone fragments are present originating from a child likely between the ages of 3 and 6 years. These fragments originate from a second cervical vertebra and a left rib.

Although most of the fragments are not burned, some evidence of heat exposure is present. Three cranial fragments and two long bone fragments are calcined. In addition, a capitate, two long bone fragments, and the two fragments from the immature individual show evidence of charring.

One fragment from the posterior aspect of a first metatarsal displays two areas of alterations consistent with sharp force trauma. No evidence of antemortem bone response in association with the linear cuts is present. The internal cut surface is slightly lighter in color than the unaffected external bone surfaces, suggesting the alteration has considerable antiquity but was made postmortem (Ubelaker and Adams 1995).

T14-055: Niche K

This sample weighs approximately 50 grams. Fragments of adult morphology are present representing the cranium, innominate, long bones, ribs, mandible, a middle hand phalanx, and a right fifth metatarsal. No reliable estimate of sex can be made. Age at death was likely 20 years or greater.

Fragments originating from a subadult are also present. Recognizable bones include a distal humerus, rib, and tarsal bone. An age at death of about 2 years is suggested by bone morphology.

Evidence of calcination is apparent on fragments originating from the cranium, innominate, long bones, ribs, and mandible. Charred fragments include those from a rib and middle hand phalanx. Other fragments lack evidence of burning including those originating from the cranium, long bones, ribs, and the fifth metatarsal.

T14-035: Burial in the Southeast Corner

Weight of this sample is only 10 grams. The six fragments present are calcined and originate from both cranial and long bones. No reliable estimate of sex is possible. Bone morphology suggests an age at death likely greater than 8 years.

T14-036: Loculus I Cover

The sample recovered from above the cover weighs 20 grams and shows no evidence of calcination. Adult bones (fragments) present include an innominate, two middle hand phalanges, a first, second, and third cuneiform, the left and right fifth metatarsals, two proximal foot phalanges, four middle foot phalanges, four distal foot phalanges, and one rib. Bone morphology suggests an age at death of 20 years or greater.

Also present is one subadult tooth. The permanent mandibular first or second molar displays one third crown formation, which suggests an age at death of either 1 year (if it represents a first molar) or about 5 years (if it represents a second molar).

T14-037: Loculus I, Cist

The sample weighs 1,820 grams. Fragments from the following bones were recognized: two left and two right humeri, two left and one right radius, two femora, two tibiae, two right fibulae, one left and one right clavicle, one left and one right scapula, one left and one right temporal, one left and two right sides of the mandible, one left and one right innominate, one left and three right patellae, two first cervical vertebrae, three other cervical vertebrae, six thoracic vertebrae, one lumbar vertebra, one coccyx fragment, one left and one right navicular, one left and one right lunate, one left and one right triquetral, one pisiform, two left and one right greater multangular, one right lesser multangular, two left and two right capitates, one left and two right hamates, two left and two right first metacarpals, two left and three right second metacarpals, three left and two right third metacarpals, one left and three right fourth metacarpals, one left and one right fifth metacarpal, 20 proximal hand phalanges, 21 middle hand phalanges, 15 distal hand phalanges, two left and two right calcanei, two left and two right tali, one left and one right cuboid, two left and one right navicular, one left and three right first cuneiforms, two left and one right second cuneiforms, two left and one right third cuneiforms, one left first metatarsal, three left and two right second metatarsals, two left and one right third metatarsals, one left and three right fifth metatarsals, five proximal first foot phalanges, 22 other proximal foot phalanges, five middle foot phalanges, six distal first foot phalanges, two other distal foot phalanges, six left and six right ribs, and other bones of the cranium.

Thirty-seven permanent teeth are present. Of these, nine (eight molars and one premolar) indicate the presence of at least two adults.

At least two subadults are present in the remains recovered from the cist. The bones presented include a left radius, left and right tibia, one fibula, right clavicle, right temporal, right maxilla, left and right mandible, left ilium, two left and one right ischium, one left and two right pubic bones, five ribs, 30 carpals and tarsals, and 14 vertebrae. Seven deciduous teeth and two forming permanent teeth are also present. The long bone lengths suggest a slightly younger individual (about 1.5 years) than the two developing permanent teeth (about 3.5 years). Since two subadults are indicated by duplication of the left ischium and right pubis, perhaps both ages are distinct and correct.

Of the adults, three individuals are suggested by the right patella, some metacarpals, the first right cuneiform, and the right fifth metatarsal. Additional bones suggest the presence of two individuals.

Analysis suggests that at least one of the adults is a female, likely between the ages of 25 and 40 years. A second adult is also likely of similar age at death, but sex is not apparent.

Some of the adult fragments show evidence of heat exposure. Calcined remains are represented by a left ischium, two cranial fragments, a femoral head, and a vertebra. Charred remains consist of two permanent mandibular molars, a calcaneus, and one vertebra.

Three of the deciduous maxillary incisors display a green color, possibly indicating contact with copper or a similar metal that can produce such stains.

Observations on bone pathology are confined to one healed fracture on the distal end of a proximal hand phalanx.

Loculus I Summary

Total sample weight from the loculus is 1,840 grams. In consideration of the bone representation and age and sex information, the individuals represented in the cover sample could also be represented within the cist. The subadult ages at death are slightly different, but these differences could fall within the range of variation of the timing of tooth development.

Remains from the cover lacked evidence of heat-related alterations, whereas such evidence was present within the cist. However, unburned bone was present within the cist as well, and the sample from the cover was comparatively small.

T-14-038: Loculus II Cover

The total sample weighs 10,035 grams. Most adult bones are represented. The presence of five individuals is suggested by left fifth metacarpals, left calcanea, second metatarsals, right third metatarsals, and right fifth metatarsals. Multiple adult individuals are indicated by most other bones as well. The detailed inventory of adult bones is as follows: three left and four right humeri, two left and two right radii, two left and two right ulnae, four left and four right femora, three left and two right tibiae, two left and two right fibulae, two left and three right clavicles, two left and two right scapulae, one maxilla, one left and two right mandibles, three gladiolus segments of the sternum, three left and three right innominates, four left and four right patella, two first cervical vertebrae, four second cervical vertebrae, 11 other cervical vertebrae, 28 thoracic vertebrae, 14 lumbar vertebrae, 4 sacra, six coccygeal vertebrae, three left and three right hand naviculars, two left and three right lunates, one pisiform, three left and three right greater multangulars, one left and two right lesser multangulars, three left and four right capitates, three left and four right hamates, three left and three right first metacarpals, four left and four right second metacarpals, three left and four right third metacarpals, four left and three right fourth metacarpals, five left and three right fifth metacarpals, 44 proximal hand phalanges, 43 middle hand phalanges, 42 distal hand phalanges, five left and three right calcanea, three left and three right tali, two left and two right cuboids, three left and three right foot naviculars, three left and two right first cuneiforms, four left and one right second cuneiforms, two left and one right third cuneiforms, three left and four right first metatarsals, five left and five right second metatarsals, four left and five right third metatarsals, four left and four right fourth metatarsals, three left and five right fifth metatarsals, 11 first foot phalanges, 43 other proximal foot phalanges, 10 middle foot phalanges, seven distal first foot phalanges, one other distal foot phalanx, three left and two right first ribs, seven left and four right other ribs, and two hyoid bones. Thirty-seven permanent fully formed teeth are present, representing at least two adults.

Subadult bones present consist of the following: left humerus, a femur, one left tibia, two fibulae, two left clavicles, one right scapula, one left temporal, one left and two right mandible halves, one left and one right ilium, one left and one right ischium, two right pubic bones, seven ribs, 71 carpals and tarsals, and 34 vertebrae. Eleven deciduous teeth and eight forming permanent teeth are present.

Adult bone morphology suggests that of the five adults present, at least one male and two females are present and that both young (18 to 35) and older (35 and older) adults are represented.

The bone inventory summarized above suggests that at least two immature individuals are present. Those bones complete enough to allow length estimates suggesting ages at death between 6 months and about 3.5 years. The immature dental evidence all indicates an age at death of approximately 9 years. Thus, the bone inventory considered with the evidence for subadult age indicates at least three subadult individuals are present: one between 6 months and 2 years of age, one about 3.5 years of age, and one about 9 years of age.

The subadult and adult analysis indicates that at least eight individuals are present in the cover sample, five adults and three subadults.

Both burned and unburned remains are present. Approximately 300 grams (3% of the total sample) of bones and teeth were calcined. These included the following bones: scapula, lumbar vertebra, iliac crest area of the ilium, long bone diaphysis, distal fibula, proximal femur, sciatic notch area of a likely male ilium, other pelvic fragments, cranium, distal humerus, and three tooth roots.

Approximately 40 grams (0.4% of total sample) of fragments showed evidence of charring. These fragments included a distal foot phalanx, long bone diaphysis, vertebrae, subadult ribs, and carpals.

The following pathological conditions were noted.

An adult fibula diaphyseal fragment approximately 205 mm in length displays irregular, well-remodeled enlargement of most of its surface, likely indicating antemortem infection.

The lateral aspect of a right clavicle displays extensive well-remodeled abnormal bone deposits on its anterior surface, likely produced by antemortem fracture.

One lumbar vertebra presents extensive osteophytosis, with extreme development on the right inferior surface near the midline.

A left second cuneiform displays irregular bone formation on the posterior aspect of the superior surface, probably representing healed antemortem trauma.

An apparent healed fracture is present on the superior third of a proximal hand phalanx with slight misalignment of the affected segments.

Extensive well-remodeled new bone formation is present on the lateral side of the articular surface of the distal first foot phalanx.

A first rib displays extensive cartilage ossification on its sternal end.

Four rib segments present evidence for antemortem healed fractures; all are well remodeled with extensive new bone formation.

T14-039: Loculus II Cist

This sample weighs approximately 2,710 grams. At least two adults are present as indicated by the following bone inventory: one left radius, two femora, one right tibia, one left and one right fibula, one left and one right scapula, one left and one right temporal, one mandible, one sternum, one right patella, one first cervical vertebra, two other cervical vertebrae, 10 thoracic vertebrae, three lumbar vertebrae, one sacrum, one coccyx, one right navicular, one left lunate, one left lesser multangular, one left hamate, one left and one right first metacarpal, one right fourth metacarpal, 20 proximal hand phalanges, 10 middle hand phalanges, eight distal hand phalanges, one left and two right calcanea, two left and one right talus, two right cuboids, two left and one right navicular, one left and one right first cuneiform, one left second cuneiform, two left and two right third cuneiforms, one left and two right first metatarsals, one left and one right second metatarsal, one left third metatarsal, one left and one right fourth metatarsal, one left and one right fifth metatarsal, one proximal first foot phalanx, six other proximal foot phalanges, one middle foot phalanx, two first distal foot phalanges, one other distal foot phalanx, five left and three right ribs, three hyoid cornu, and cranial fragments.

Twenty-three permanent teeth are present. Two duplicate mandibular first and second molars indicate the presence of two individuals.

All subadult bones present are those of an adolescent. Bones present consist of a right humerus, right femur, two ribs, 30 carpals and tarsals, and four vertebrae.

No reliable estimate of sex can be made due to the fragmentary and incomplete nature of the remains.

An age of death of between 25 and 40 years is suggested for at least one adult by bone formation and the extent of vertebral osteophytosis. The subadult age at death is likely between 12 and 16 years based on the extent of bone formation and epiphysis fusion. One forming permanent third molar is also present with 50% root formation, suggesting an age at death of about 15 years.

The remains are fragmentary but well preserved. Light brown soil is present on most bone surfaces. Some periosteal surfaces display slight erosion reflecting taphonomic influences.

Twelve fragments weighing approximately 20 grams are calcined. The color range of these fragments varies from gray to white, suggesting exposure to extreme heat.

Loculus II Summary

The total Loculus II sample weighs 12,745 grams. The ages at death and the general bone inventories of the adults recovered from the cist and the cover are similar and thus cannot rule out the possibility that some adults may be represented in both samples. Careful comparison of the detailed bone inventories for both samples reveals that at least six individuals are represented in the total sample by the presence of six left calcanea (five in the cover sample and one in the cist sample), six right first metatarsals (four in the cover sample and two in the cist sample), six left and right

second metatarsals (five in the cover sample and one in the cist sample), and six right fifth metatarsals (five in the cover sample and one in the cist sample).

Four subadults were detected in the total sample: three (ages 6 months, 3.5 years, and 9 years) in the cover sample and one (age about 15 years) in the cist. The subadult bone inventories for the cover and cist overlap, but the individual ages at death of each of the four subadults present in the total sample are sufficiently distinct to indicate that a minimum of four subadults is present in the total sample.

Remains in both the cover and cist sample show some evidence of burning. Remains showing evidence of heat exposure (calcination and charring) constitute 3.4% of the cover sample and only 0.7% of the cist remains. The higher percentage of heat-altered remains in the cover sample argues against the possibility of past random mixing of the two samples.

T14-040: Loculus III Cover

The cover sample (Fig. 6.6) weighs 5,170 grams. Bones of adult morphology suggest the presence of at least four individuals. The detailed inventory is as follows: two left and two right humeri, one left and two right radii, one left and three right ulnae, two left and three right femora, two left and two right tibiae, one left, one right, and three other fibulae, one left and one right clavicle, two right scapulae, one left temporal, one left maxilla, two mandibles, one sternum, two right innominates, three left and four right patellae, two first cervical vertebrae, eight other cervical vertebrae, 32 thoracic vertebrae, 13 lumbar vertebrae, two sacra, two coccyx bones, two left and three right hand naviculars, three left and four right lunates, two left and two right greater and lesser multangulars, four left and three right capitates, one left and one right hamate, three left and three right first metacarpals, three left and two right second metacarpals, two left and two right third metacarpals, two left and three right fourth metacarpals, two left and one right fifth metacarpals, 33 proximal hand phalanges, 22 middle hand phalanges, nine distal hand phalanges, one left calcaneus, three left and two right tali, two left and two right cuboids, three left and two right foot naviculars, three left and three right fist cuneiforms, two left and two right second cuneiforms, one right third cuneiform, one left and two right first metatarsals, three left and three right second metatarsals, three left and two right third metatarsals, two left and three right fourth metatarsals, one left and one right fifth metatarsal, four proximal first foot phalanges, 14 other proximal foot phalanges, four distal first foot phalanges, four other distal foot phalanges, 13 left and 13 right ribs, and cranial fragments. Thirteen permanent teeth are also present.

Subadult bones present consist of the following: two left and one right humerus, two right radii, one left and one right ulna, two left and one right femur, one left tibia, one right clavicle, one left and one right scapula, one left temporal, one right mandible, one left and one right ilium, one left and one right ischium, two left pubic bones, five left and five right ribs, 37 carpal or tarsal bones, 29 vertebrae, and cranial fragments. Seven deciduous teeth and two forming permanent teeth are also present.

Adult bone morphology suggests the likely presence of one male and two females. Morphological features on two preserved female left pubic bones, in con-

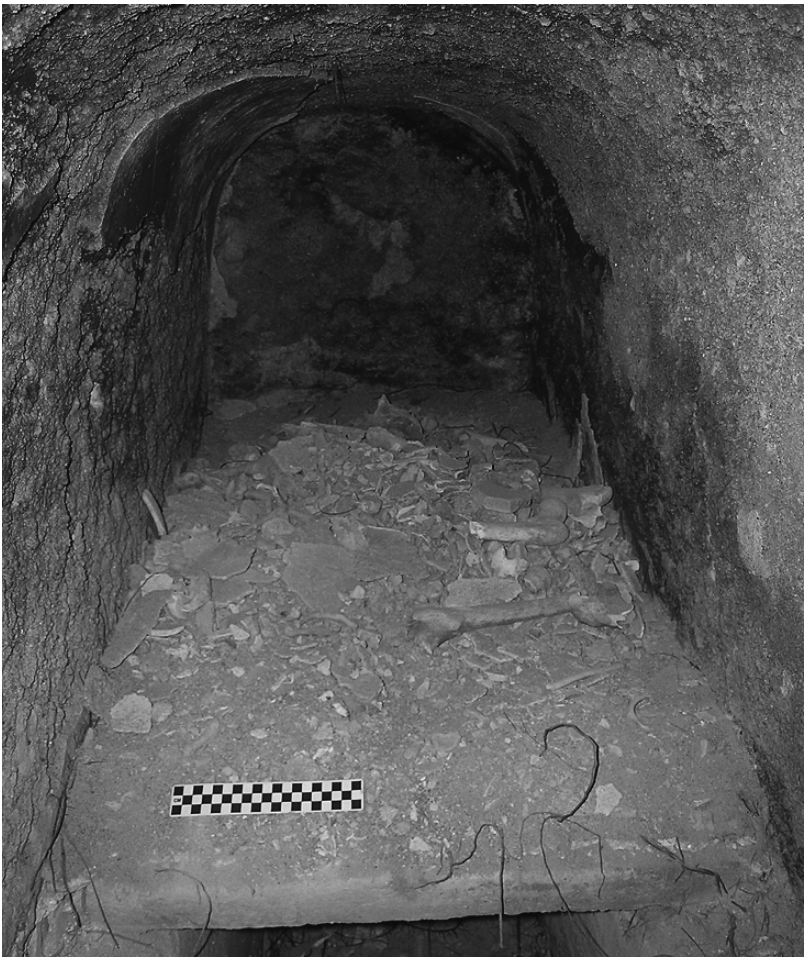

Fig. 6.6 Commingled human remains above the covering tiles in Loculus III, Tomb 14: photo from east (photo courtesy of J. L. Rife)

sideration of other age indicators, suggest ages at death of between 35 and 45 years for one female and 45 to 55 years for the other female. Other age indicators in the adult sample suggest a younger age at death, likely 20 to 30 years for a third individual, sex unknown.

Within the subadult sample, most of the bone and dental evidence is consistent with origin from an individual of about 2 years of age. Some evidence is also present of an older individual likely between the ages of 13 and 20 years. Note that the patellae and carpal bones of this older subadult would appear mature and may be represented as the fourth individual on the adult bone inventory.

Consideration of the detailed bone and dental inventories, as well as the assessments of age and sex, suggests that at least five individuals are represented in the

cover sample: three adults (two females ages 35 to 45 and 45 to 55) and one male (probably age 20 to 30) and two subadults, ages 2 years and about 16 years.

Light brown soil is adhering to many bone surfaces, in some cases forming a uniform layer over the periosteal surface. Exfoliation of the periosteal bone surface is apparent on some fragments. No evidence of burning was noted.

One adult proximal hand phalanx displays extensive remodeled bone on the proximal end, likely suggesting antemortem trauma and/or infection.

T14-041: Loculus III Cist

The cist sample weighs approximately 2,800 grams. Adult bones present consist of the left and right humerus, radius, femur, tibia, temporal, innominate, patella, third metacarpal, calcaneus, talus, cuboid, foot navicular, and first metatarsal, three left and two right ulnae, two fibulae, one clavicle, one left scapula, one cervical vertebra, seven thoracic vertebrae, four lumbar vertebrae, one sacrum, three coccygeal vertebrae, one left hand navicular, one right lunate, one right capitate and hamate, two left and two right first metacarpals, one left second metacarpal, two left and one right fourth metacarpals, one right fifth metacarpal, seven proximal hand phalanges, four middle hand phalanges, two distal hand phalanges, one left second cuneiform, one left third cuneiform, one right fourth metatarsal, one proximal first foot phalanx, one other proximal foot phalanx, two middle foot phalanges, four rib fragments, and cranial fragments. Nine fully formed permanent teeth are also present.

The following subadult bones are present: left and right humerus and femur, right radius, left ulna, a tibia, two fibulae, right clavicle, scapula, mandible, ilium, sternum, left ischium, two patellae, three left and six right ribs, 34 carpal and tarsal bones, 13 vertebrae, and cranial fragments.

Within the adults, the large size and robusticity of some remains suggest male sex for one individual. Morphological features on a left ilium suggest female sex.

Within the adult remains, the extent of cranial suture closure, occlusal dental attrition, and other factors suggest an age at death of between 35 and 45 years. Bone morphology and dental features of the subadult remains are consistent with an age at death of approximately 12 years.

The preponderance of evidence suggests that at least three individuals are present in the cist sample: two adults (one male and one female) and one subadult.

Light brown soil is adhering to many of the remains. No evidence of burning is present.

Loculus III Summary

Total sample weight from the loculus is 7,970 grams. The possibility of mixing of individuals between the cover and cist samples cannot be ruled out from this study due to the similarity of ages and sexes within the two samples. The analysis suggests that at least eight individuals are represented within the loculus: five adults and three subadults. Of the adults, three are female and two are male. Ages of the subadults

are approximately 2, 12, and 16 years. No evidence of burning was detected within the loculus samples.

T14-043: Loculus IV Cover

The cover sample weighs 2,380 grams. Adult bones represented include the right humerus, two right ulnae, two left and one right femur, one left and two right tibiae, one left and one right fibula, one right maxilla, a mandible, one left and one right innominate, two left and three right patellae, one first cervical vertebra, two other cervical vertebrae, 10 thoracic vertebrae, six lumbar vertebrae, one sacrum, two left and one right hand navicular, two left lunates, one left greater multangular, one left and one right lesser multangular, two right capitates, two left and two right hamates, one left and one right second metacarpal, two right third metacarpals, one left and one right fourth metacarpal, one right fifth metacarpal, 14 proximal hand phalanges, 19 middle hand phalanges, 10 distal hand phalanges, one left and one right calcaneus, two left and two right tali, one left and one right cuboid, three left and one right navicular, two left and three right first cuneiforms, two left and two right second and third cuneiforms, two left and one right first metatarsal, two left and two right second metatarsals, one left and one right third and fourth metatarsals, two left and one right fifth metatarsals, six proximal first foot phalanges, 15 other proximal foot phalanges, five distal first foot phalanges, and rib and cranial fragments. Eighteen permanent fully formed teeth are present as well.

Subadult bones present consist only of the right humerus, right radius, a femur, fibula, left ischium, left calcaneus, 18 carpals and tarsals, and cranial fragments.

Within the adult sample, no reliable estimates of sex or age at death are available, although there is some evidence for the presence of an elderly individual (greater than 50 years). The bone inventory is highly variable, but at least three adults are indicated by right patellae, left foot naviculars, and right first cuneiforms.

Age at death analysis of the subadult remains suggests the presence of two individuals, one with an age at death of about 6 months and a second with an age at death of about 4.5 years.

Although the remains are relatively clean, some light brown soil is adhering to some fragments. Two fragments show evidence of calcination, one from a thoracic vertebra and one from a long bone diaphysis (probably femur).

T14-042: Loculus IV Cist

The cist sample weighs approximately 3,380 grams. Fragments displaying adult morphology originate from the following bones: one left and one right radius, fibula, clavicle, capitate, second and third metacarpals, second cuneiforms, two left and two right femurs, tibiae, first and fourth metacarpals, calcanea, cuboids and all metatarsals, one left and two right humeri, one left and two right ulnae, one left and two right scapulae, one sternum, one left innominate, one first cervical vertebra, three other cervical vertebrae, 12 thoracic vertebrae, seven lumbar vertebrae,

two sacra, one left hand navicular, one right lunate, two right fifth metacarpals, 22 proximal hand phalanges, 15 middle hand phalanges, 11 distal hand phalanges, two left and three right tali, two left and one right foot navicular, two left and one right first cuneiform, two left and one right third cuneiform, three proximal first foot phalanges, 12 other proximal foot phalanges, three distal first foot phalanges, seven left and three right ribs, and cranial fragments. Ten fully formed permanent teeth are also present.

Immature bones present consist only of a clavicle, three ribs, one carpal or tarsal bone, and two vertebrae.

Analysis suggests that at least two females and one male are present. An age likely between 30 and 35 years is suggested for one female and between 33 and 40 for the other. Although relatively few subadult bones are present, their variation in size and formation suggests they originate from four individuals of ages less than 6 months (young infant), about 3 years, about 5 years, and about 15 years. This analysis suggests a minimum number of individuals of six for this sample: the two adult females, an adult-size male, which might be presented by the immature clavicle, and the three young subadults (children and infant).

The remains display a coating of light brown soil. Some of the fragments display a thin sedimentary crust on their exposed surfaces. Some fragments also display a slight green stain. No evidence of burning was noted within the sample.

One left fibula (sex unknown) displays a maximum length of 370 mm. This suggests a living stature of about 171 cm if the individual is male and about 169 cm if the individual is female using the formulae of Trotter for Whites (Ubelaker 1999).

Loculus IV Summary

The total loculus sample weighs 5,760 grams. In consideration of the inventory information and the sex and age distribution, it is possible that some individuals are represented in both the cover and cist samples.

Of concern are the few small bones that represented evidence for the third adult in the cover sample. Although it is unlikely these originated from the young subadults in the cover sample, it is possible they relate to the adolescent in the cist sample if commingling between the samples occurred.

Evidence for burning was confined to the two calcined fragments in the cover sample.

T14-045: Loculus V Cover

This cover sample weighs only 300 grams. Recognizable adult bones include the right temporal, left hand navicular, rib, long bone, and cranial fragments. Subadult remains are limited to two arches from cervical vertebrae. No reliable estimate of

sex can be made. The extent of cranial suture closure of the adult remains suggests an age at death likely between 30 and 45 years. The immature remains originate from an infant of about 1.5 years of age.

Approximately 120 grams or 40% of the sample is calcined with transverse fracturing and warping. Affected bones include a temporal, long bone, cranial, and rib fragments. The remaining portion of the sample shows no evidence of heat-related changes.

T14-044: Loculus V Cist

The cist sample weighs 1,960 grams. Although the adult remains are fragmentary, the following bones could be recognized: one left and one right humerus, radius, fibula, hand navicular, lesser multangular, capitate, second and third metacarpals, calcanea, first cuneiforms and all metatarsals, one right ulna, scapula, temporal, lunate and greater multangular, one left mandible, patella, talus and foot navicular, two first cervical vertebrae, one second cervical vertebra, five other cervical vertebrae, 10 thoracic vertebrae, three lumbar vertebrae, one sacrum, one coccyx, two left and one right first and fourth metacarpals, one left and two right fifth metacarpals, 13 proximal hand phalanges, eight middle hand phalanges, three distal hand phalanges, two proximal first foot phalanges, six other proximal foot phalanges, one distal first foot phalanx, and rib and cranial fragments. Twelve fully formed permanent teeth are present.

Subadult remains are limited to the left clavicle and one left and one right rib.

Bone morphology suggests that at least two adults are present: one male and one female. Morphology of the female pubic symphysis suggests an age at death of between 35 and 45 years. The few subadult bones present likely originate from a young child of approximately 3 years of age.

The remains display a coating of light brown soil. Calcination with transverse fracturing is present on approximately 25 grams of the sample. Bones showing calcination include a first cervical vertebra and four long bone fragments.

An adult proximal tibia displays a prominent exostosis on its proximal articular surface, likely reflecting antemortem trauma to the area.

Loculus V Summary

The entire loculus sample weighs approximately 2,260 grams. Given the similarity of the age and sex distribution and limited inventory within the cover sample, the possibility cannot be excluded that some individuals could be represented within both samples. The evidence is strong for at least two adults within the entire loculus sample; the possibility of a third adult is dependent upon the extent (if any) of commingling between samples. Calcined bone is present in both samples but more common in the cover sample (40% of the total weight) than in the cist sample (only 1.3% of the total weight).

T14-010 to T14-034: Tomb Floor Outside Loculi and Niches

Material in this sample weighs at least 3,260 grams and presents a combination of calcined bone with transverse fracturing and warping as well as bone showing no evidence of heat-related changes. The material is quite fragmentary, and relatively few bones could be recognized in the assemblage. Those of adult morphology represented at least one young adult, likely between the ages of 23 and 35 years, as well as an older adult likely of greater than 35 years. Estimated ages of the relatively few subadult remains in this sample were about 6 months, about 3 years, about 5 years, and about 10 years. Individuals matching these demographic profiles are well represented in the other samples from within the tomb. No non-age-related bone pathology was noted in this sample. A small quantity of additional fragments from this area had been recovered but had not been sufficiently processed to allow analysis and inclusion in this report.

Tomb 14 Summary

The total weight of the studied Tomb 14 sample is approximately 34,235 grams. Of this amount, 37.2% originated from Loculus II, 23.3% from Loculus III, 16.8% from Loculus IV, 6.6% from Loculus V, 5.4% from Loculus I, 9.5% from outside the loculi and niches, and only 1.2% from the nine niches and the sample from the southeast corner. Of the 30,575 grams of material recovered from loculi, 17,905 grams (58.6%) were recovered from covers and 12,670 grams (41.4%) were recovered within cists. These proportions reveal that the number of individuals buried in the loculi varied considerably. It is significant that Loculi II and III seem to have been the most frequently used, because they are the most centrally located compartments on the back (west) wall facing the entrance. This focal placement in the plan of the tomb seems to have encouraged their preferential use. Moreover, it is clear that little remains in the niches after the removal of the cinerary urns, perhaps for reuse elsewhere, and the displacement of cremated remains. If bodies deposited inside cists represent Early Roman burials and those deposited above the slabs represent Late Roman burials, then it appears that local residents frequently used the loculi for interment during both periods. However, a low degree of commingling between remains interred above and below the coverings is probable. Presumably this has been caused by the forceful displacement of tiles or slabs during looting.

The minimum number of individuals in Tomb 14 is 52. Of these, 30 are adults, 19 are subadults, and 2 individuals are of very uncertain age. This estimate assumes not only that samples from the niches were not commingled with those from loculi, but also that separate loculi were not commingled with each other, as has been proposed. It also assumes that remains found within the tomb but associated with neither the niches nor the loculi could have originated from them. Adults were detected in all samples except Niche G and the burial in the southeast corner. They might have also been present in these two contexts, because extreme fragmentation allowed age estimates of only greater than 6 and 8 years for these two samples.

Ages at death were assigned for all individuals in Tomb 14. Among individuals for whom age was estimated as a range, the mean value of the range was utilized. Among individuals for whom age was estimated as "greater than" a minimal age, the maximum age for the sample was set at 65 and the mean value was calculated within the range established. This approach established the following age distribution for the entire tomb sample: thirteen between birth and 4; three between 5 and 9; one between 10 and 14; three between 15 and 19; three between 25 and 29; four between 30 and 34; four between 35 and 39; 17 between 40 and 44; two between 50 and 54; and one between 55 and 59. The mean age at death for the entire sample is 26.3 years. Although fragmentation limited the ability to assess sex of the remains, analysis suggested that at least five males and nine females are present, all adults. Males were present in Loculi 2 (cover), 3 (cover and cist), 4 (cist), and 5 (cist). The nine females were found in samples from Loculi 1 (cist), 2 (cover), 3 (cover and cist), 4 (cist), and 5 (cist).

This demographic profile corroborates the interpretation based on epitaphic and artifactual evidence that the tombs were used by several generations of families and their emancipated associates during the Early Roman period and then reused for burial in the Late Roman period. Such a protracted burial chronology would lead to the accumulation of numerous corpses of both sexes and all ages. It seems plausible, but it cannot be proven, that individuals buried together inside loculi were closely related to each other, such as spouses, parents and children, or siblings.

Although all samples contained at least some unburned bone, many presented evidence of heat exposure ranging from slight blackening to complete calcination. In addition, four samples (Niche A, Niche H, and Loculus V both cover and cist) presented not only calcination but the warping and transverse fracture pattern that strongly indicates cremation in the flesh. It is possible, if not likely, that other burned remains also were cremated in the flesh, but without the patterns described above, the evidence is not diagnostic. Some evidence of burning was apparent in all samples except Niche G, Loculus I cover, Loculus III cover and cist, and Loculus IV cist. Burning patterns reflect complex factors, including fire heat and duration, the extent of exposure of the remains to direct heat, the size of the fire, and the condition of the remains at the time of exposure.

Of the remains showing traces of burning, all appeared to originate from adults except for fragments of subadults in the Niche J sample and the Loculus II cover sample. Due to the extreme fragmentation and heat-related alterations in morphology, no more exact estimations of age at death are possible for the individuals represented. One adult pelvic fragment from the Loculus II cover sample with evidence of burning displayed morphological characteristics suggestive of female sex. Assuming that the samples from the niches, the loculi, and the southeast corner burial are not commingled, the evidence suggests that the minimum number of individuals represented by burned remains is 15, including 13 adults (at least one female) and 2 subadults.

As documented in Table 6.1, charred and calcined remains comprised a relatively minor component of the total bone assemblage. Of the 34,235 grams of remains present in the entire sample, only about 7% displayed evidence of heat alteration.

Table 6.1 The Weights of Human Remains from Contexts in Tomb 14 Showing the Relative Amounts of Charred, Calcined, and Unburned Remains

	Charred		Calcined		Charred and Calcined		
Context	Grams	%	Grams	%	Grams	%	Total Weight
A	0	0	1	20	1	20	5
B	0	0	175	85	175	85	205
D	0	0	0	0	0	0	5
E	0	0	1	10	1	10	10
G	0	0	0	0	0	0	5
H	0	0	8	32	8	32	25
I	0	0	0	0	0	0	5
J	5	6	8	10	13	16	80
K	10	20	25	50	35	70	50
SE Corner	0	0	10	100	10	100	10
Loc I Cover	0	0	0	0	0	0	20
Cist	25	1	30	2	55	3	1, 820
Loc II Cover	40	< 1	300	3	340	3	10, 035
Cist	0	0	20	< 1	20	< 1	2, 710
Loc III Cover	0	0	0	0	0	0	5, 170
Cist	0	0	0	0	0	0	2, 800
Loc IV Cover	0	0	15	< 1	15	< 1	2, 380
Cist	0	0	0	0	0	0	3, 380
Loc V Cover	0	0	120	40	120	40	300
Cist	0	0	25	1	25	1	1, 960
Total	80	< 1	738	2	818	3	30, 975
Other	73	2	1, 580	49	1, 653	51	3, 260
Total	153	< 1	2, 318	7	2, 471	7	34, 235

Evidence of heat alteration in individual contexts varied from none in seven samples to 100% in the small sample from the southeast corner. Note that all samples presenting evidence of heat alteration contained calcined remains, whereas evidence of charring was lacking from some of these contexts. While it is uncertain how much cremated material has been removed from the tombs, perhaps in cinerary urns, it appears that mourners invested more effort in inhumation in the loculi than in cremation and deposition in the niches. Those who did cremate the dead seem to have burned the corpse shortly after death at high temperatures for a long period, which caused thorough calcination, and in some cases fracturing and warping.

The distribution of cremated remains throughout the tombs is also noteworthy. Cremated bone occurs in small quantities over several coverings in loculi. The traces of cremated remains inside the cists presumably came to rest there when the coverings were disturbed by looters and contiguous, overlying bones were dispersed. The cremated remains left over the coverings might well have been deposited there during the Early Roman period, as has been suggested in the case of Loculus V in Tomb 13. It is unclear why mourners did not place these cremated remains in niches, unless they meant to express and commemorate a special relationship between the inhumed and cremated individuals deposited in single loculi. The fact that most cremated remains from Tomb 14 were found outside burial compartments on the chamber floor supports the scenario noted above, in which cremated remains have

been either swept or ejected from the niches, or dumped there before urns were carried from the chamber.

The major taphonomic observations on the commingled remains in Tomb 14 are general structural degradation and the adherence of brown soil to the surfaces of many fragments. These postmortem alterations were caused by a burial environment exposed to water and roots entering through relatively soft, porous limestone. The encrustation of bones in several contexts points to the pooling of water that had washed in from the surface through crevices. The cuts observed on the metatarsal fragment in Niche J were probably produced after death but long before discovery, perhaps by early looters. Two samples (Loculi I cist and IV cist) presented remains with characteristic green stains suggesting contact with copper or a similar metal capable of producing such stains. The excavation of Loculus I cist produced a bronze coin (KC004) that had been placed in or on the mouth of the deceased after the ancient custom of "Charon's obol," or the final fare for the Stygian ferryman (Stevens 1991). The excavation of Loculus IV cist did not produce metal artifacts, but it is an unusually moist burial environment, in which case any bronze objects would have disintegrated before discovery.

Five samples contained remains with non-age-related pathological conditions. These consisted of the rib fracture from niche B, the phalanx fracture in Loculus I cist, the evidence for trauma and/or infection on the proximal hand phalanx from Loculus III cover, and the tibia displaying trauma from Loculus V cist. The Loculus II cover sample presented the most evidence for pathological conditions: a fibula with evidence of infection, a fractured right clavicle, a fractured left second cuneiform, a fractured hand phalanx, evidence of infection in a first foot phalanx, and four fractured ribs. All these conditions reflect conditions suffered antemortem with evidence of bone response, and they were all sustained months if not years before death.

Conclusion

Careful excavation, systematic recovery, and skeletal analysis have greatly enhanced the interpretation of commingled human remains from chamber tombs dating to the Roman Empire at the port of Kenchreai in Greece. Another crucial component in this study was the evaluation of the environmental and anthropogenic processes that have shaped the skeletal assemblage over time from deposition to discovery. The examination of commingled remains from Tomb 13 involved the spatial analysis of skeletal elements by anatomical region. In the investigation of the much larger skeletal sample from Tomb 14, it was possible to assess the full extent of commingling, to establish the minimum number of total individuals buried over time, and to construct a demographic profile by considering the numbers of individual bones and teeth represented and their side, age at death and sex, bone morphology and pathology, the nature of cremation and taphonomic alterations, and archaeological context. This multifaceted approach has shed light on the complex history

of mortuary behavior in the Koutsongila Cemetery, including the use of tombs by familial groups, multiple burial by both inhumation and cremation, the placement of corpses, and, possibly, the extraction of bones for ideological reasons. This study also offers a methodological model for the study of similar burial environments involving the long-term accumulation and disturbance of commingled human remains.

Acknowledgments This research was conducted under the auspices of the American School of Classical Studies and with the permission and direct oversight of the Ministry of Culture of the Greek State, as represented by Alexandros Mandis and the staff of the 37th Ephoreia of Classical and Prehistoric Antiquities at Archaia Korinthos. The authors gratefully acknowledge the generous financial support of the Office of the Provost of Macalester College, Dan Hornbach, and the International Catacomb Society of Boston.

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