BIOARCHAEOLOGICAL ANALYSIS OF COMMINGLED SKELETAL REMAINS

FROM BEE CAVE ROCKSHELTER (41VV546),

VAL VERDE COUNTY, TEXAS

THESIS

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TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS iv

LIST OF TABLES vii

LIST OF FIGURES viii

CHAPTER

I. INTRODUCTION 1

The Site 1
Present Environment 5
Past Environment 8

II. LOWER PECOS ARCHAEOLOGY 9

History 9
Chronology 10
Bioarchaeology 16

III. MATERIALS AND METHODS 22

Preparation 22
Inventory and MNI 23
Skeletal Analysis 23
Dental Analysis 26

IV. RESULTS AND DISCUSSION 27

Taphonomy and Preservation 27
Bundle Burial 30
Minimum Number of Individuals 32
Demography 34
Stature 37
Osteometrics 37
Nonmetric Traits 43
Pathology 47

Cranial Trauma 57
Dental Analysis 62
Sorting of Commingled Remains 68

V. SUMMARY AND CONCLUSIONS 84

APPENDIX A 87

APPENDIX B 112

APPENDIX C 122

APPENDIX D 146

APPENDIX E 149

REFERENCES CITED 152

LIST OF TABLES

Page

Table 1. Minimum Number of Individuals 33-34

Table 2. Subadult Age Ranges Based on Diaphyseal Lengths 35

Table 3. Bee Cave Individual Age Ranges 36

Table 4. Comparative Lower Pecos Demography (%) 36

Table 5. Stature of Bee Cave Adults (cm) 37

Table 6. Adult Craniometrics (mm) 38

Table 7. Comparison of Lower Pecos Cranial Indices (%) 40

Table 8. Adult Infracranial Osteometrics by Individual (mm) 41-42

Table 9. Nonmetric Traits in Bee Cave Adults 45-46

Table 10. Frequency of Periostitis in Long Bones 48

Table 11. Frequency of Osteoarthritis 52

Table 12. Frequency of Osteophytosis 54

Table 13. Adult Dental Pathologies by Individual 62

Table 14. Dental Pathology Frequencies (%) 63

Table 15. Adult Antemortem Tooth Loss Frequencies (%) 64

Table 16. Antemortem Loss of Molars (%) 64

Table 17. Dental Attrition Scores 66

LIST OF FIGURES

Page

Figure 1. Rock art from Bee Cave Rockshelter 3

Figure 2. Note included with commingled remains 3

Figure 3. Bee Cave Rockshelter: Cave Detail 4

Figure 4. Bee Cave Rockshelter: General View 4

Figure 5. Lower Pecos Region 5

Figure 6. Blair's Biotic Provinces of Texas 7

Figure 7. Comparison of Lower Pecos Chronologies 11

Figure 8. Rodent gnawing on Individual 6 29

Figure 9. Green staining from brass adornments on Individual 7 29

Figure 10. Bee Cave Bundle Burial 31

Figure 11. Nonmetric Traits 44

Figure 12. Periostitis in Individual 5 50

Figure 13. Lipping of trochlear notches of Individual 3 52

Figure 14. Osteoarthritis in the temporo-mandibular joint of Individual 2 53

Figure 15. Unusual hand pathology 53

Figure 16. Pathology of left auricular surface of Individual 4 54

Figure 17. Osteophytosis of a lumbar vertebra 54

Figure 18. Antemortem Injuries in Individual 2 56

Figure 19. Healed fracture of a proximal hand phalange 57

Figure 20. Possible perimortem trauma to the left zygomatic of Individual 2 59

Figure 21. Cranial trauma to Individual 3..61

Figure 22. Dental pathology in Individual 4...63

Figure 23. Examples of attrition and alveolar resorption 65

Figure 24. Varying levels of attrition...66

Figure 25. Adult mandibular dentitions showing varying levels of AMTL 67

Figure 26. Nonmetric traits in subadult dentition 68

Figure 27. Cranium of Individual 1 70

Figure 28. Cranium of Individual 2 72

Figure 29. Cranium of Individual 3 74

Figure 30. Cranium of Individual 4 76

Figure 31. Cranium of Individual 5 78

Figure 32. Cranium of Individual 7 81

CHAPTER I

INTRODUCTION

The Site

Bee Cave Rockshelter (41VV546) is a 200 foot long shelter with a 30 foot overhang [Figures 3 and 4] located on the cliff of the east side of the Pecos River, 65 miles southwest of Ozona, Texas (Kirkland and Newcomb 1996). The site has previously been noted for its rock art: Pecos River Style pictographs and black pictographs [Figure 1] that resemble the petroglyphs in Lewis Canyon (Kirkland and Newcomb 1996). Bee Cave was discovered on the Everett Ranch and excavated in April 1937 by Joe T. Davidson, Joe T. Davidson, Jr., Ted N. White, and Thomas Everett [Figure 2]. The excavators reported finding nine skeletons, on top of which was a female skeleton holding a baby in a rabbit skin pouch (Naugher 2005; White 2005). The recovered skeletal remains and associated artifacts were stored at the Crockett County Museum in Ozona, Texas until 2005 when they were transferred to the Center for Archeological Studies at Texas State University-San Marcos.

Previous observers of the skeletal collection while it was stored in the Ozona museum had reported the presence of an infant bundle burial in a rabbit skin blanket and matting, with a tuft of red hair adhering to the skull (Banks and Rutenberg 1982; Naugher 2005; Turpin and Bement 1988; White 2005). Also reported was the presence of two to eleven adults showing evidence of periostitis and violence. The collection was also reported to contain basketry, matting, and projectile points (Banks and Rutenberg 1982; Turpin and Bement 1988). Although a few artifacts were included with the skeletal remains [Appendix E], the associated artifacts mentioned above were not transferred with the skeletal material. The goal of this project is to provide an accurate and thorough description of the Bee Cave collection in order to increase the number of methodically analyzed individuals from the Lower Pecos.

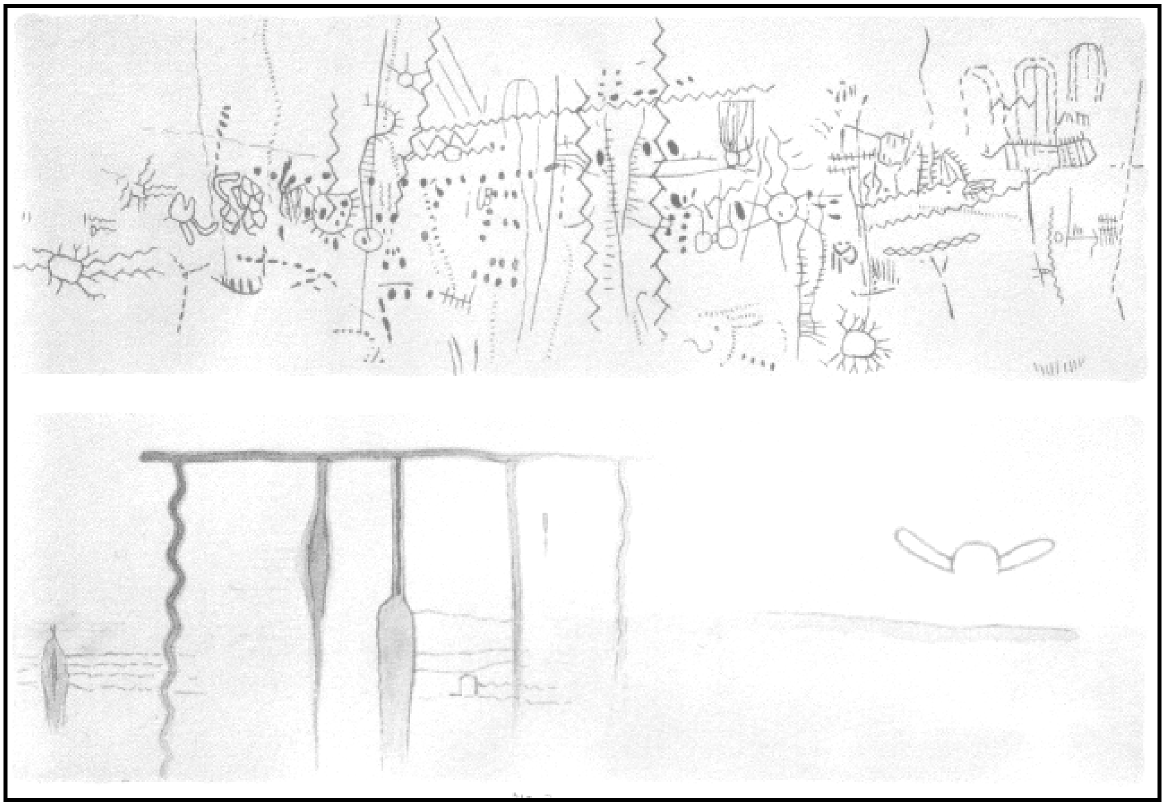
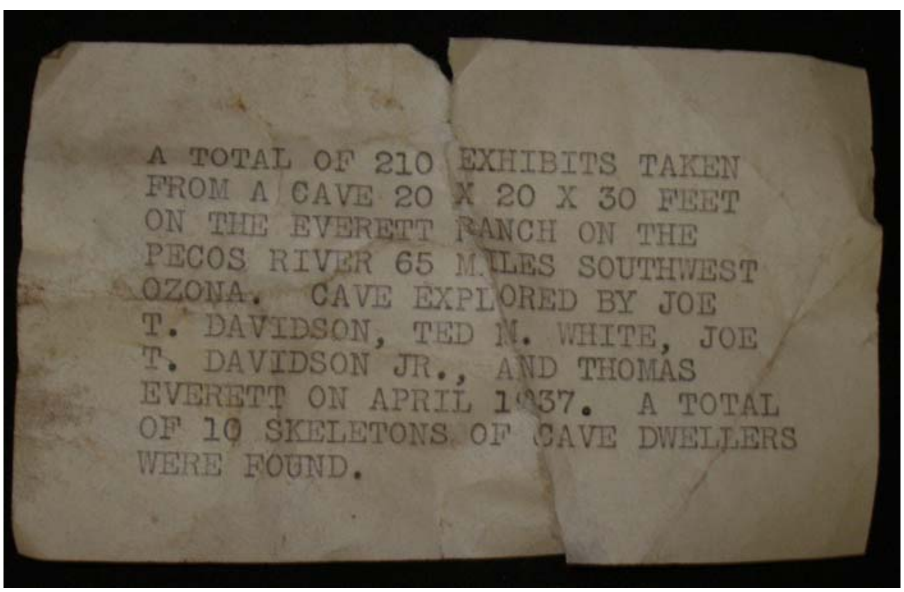


Figure 1. Rock Art from Bee Cave Rockshelter. (after Kirkland and Newcomb 1996)



A TOTAL OF 210 EXHIBITS TAKEN
FROM A CAVE 20 X 20 X 30 FEET
ON THE EVERETT RANCH ON THE
PECOS RIVER 65 MILES SOUTHWEST
OZONA. CAVE EXPLORED BY JOE
T. DAVIDSON, TED N. WHITE, JOE
T. DAVIDSON JR., AND THOMAS
EVERETT ON APRIL 1937. A TOTAL
OF 10 SKELETONS OF CAVE DWELLERS
WERE FOUND.

Figure 2. Note Included with Commingled Remains.

Figure 3. Bee Cave Rockshelter: Cave Detail. (Photograph by Ron Ralph)

Figure 4. Bee Cave Rockshelter: General View. (Photograph by Ron Ralph)

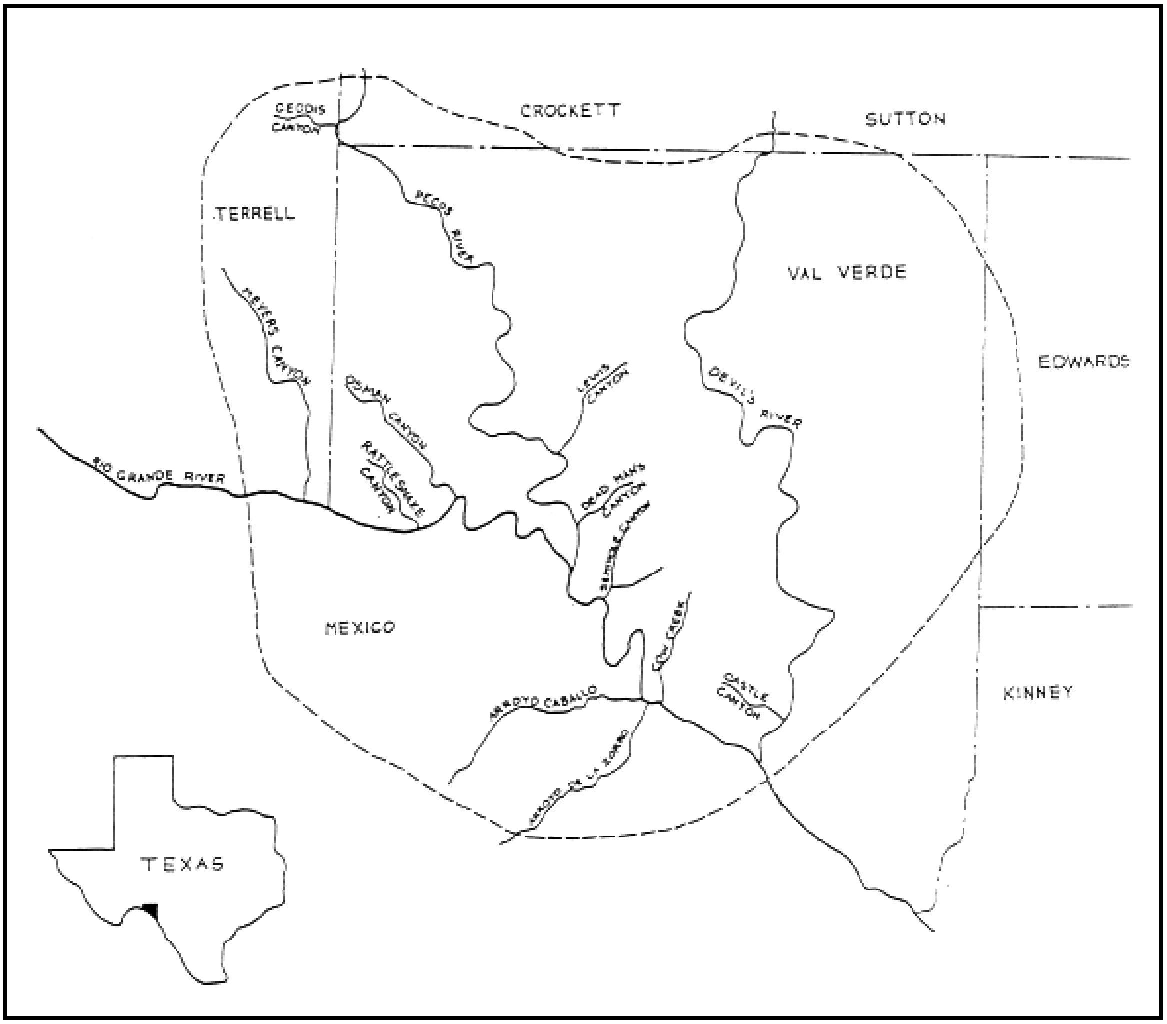


Figure 5. Lower Pecos Region. (after Bement 1989)

Present Environment

Bee Cave Rockhelter is located in Val Verde County, which itself comprises the majority of the Lower Pecos Region of Texas. The Lower Pecos Region includes the confluences of the Pecos and Devils Rivers with the Rio Grande [Figure 5]. The region represents the convergence of the southwestern edge of the Edwards Plateau, the eastern edge of the Stockton Plateau, and the northern edge of Coahuila, Mexico. The climate is described as semi-arid with an average annual rainfall of 12.22 occurring between April and October (Saunders 1992). Maximum summer temperatures average 98°F while winter temperatures average 53°F (Saunders 1992).

Geology

The Lower Pecos region consists of Early and Late Cretaceous limestone outcrops incised by the Pecos River, Devils River, and Rio Grande and their tributary canyon systems (Saunders 1992; Story and Bryant 1966). The canyon systems harbor numerous rockshelters and caves. The upland areas between canyon systems consist of a thin layer of soil formed on the weathered limestone (Saunders 1992:337).

Flora

Vegetation in the Lower Pecos consists of mostly xeric plants. The most common plants occupying the canyon slopes and upland areas near the canyon and river systems include lecheguilla (*Agave lecheguilla*), yucca (*Yucca* sp.), sotol (*Dasylirion wheeleri*), prickly pear cactus (*Opuntia* spp.), persimmon (*Diospyros texana*), and mescal bean (*Sophora secundiflora*) (Saunders 1992). In the interior upland areas further away from the canyon systems, juniper (*Juniperus ashei*) occurs in addition to sotol, lecheguilla, yucca, prickly pear, and persimmon (Flyr 1966; Saunders 1992).

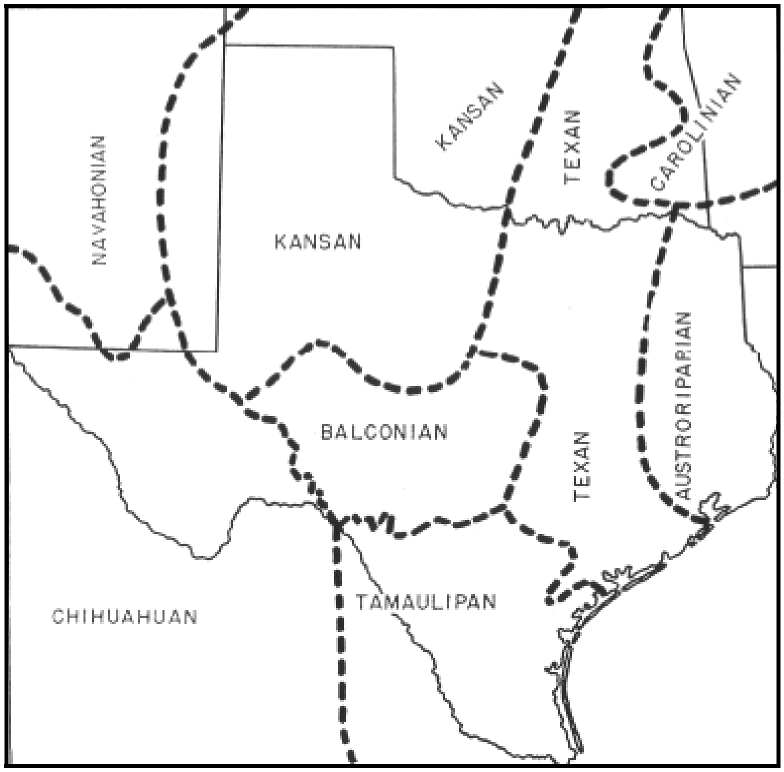


Figure 6. Biotic Provinces of Texas. (after Blair 1950)

Fauna

The fauna consists of a combination of Blair's (1950) Balconian, Tamaulipan, and Chihuahuan biotic provinces [Figure 6], and can be divided into three categories based on the types of environment they occupy. Species occurring on the canyon slopes include ringtails (*Bassariscus astutus*), gray fox (*Urocyon cinereaargenteus*), spotted skunk (*Spilogale* sp.), ground squirrels (*Spermophilus* sp.), deer mice (*Peromyscus* sp.), woodrat (*Neotoma* sp.), and cotton rats (*Sigmodon hispidus*) (Saunders 1992). Those occurring on the canyon slopes and upland areas include deer (*Odocoileus* sp.), cottontails (*Sylvilagus* sp.), and jackrabbits (*Lepus californicus*) (Saunders 1992). The third faunal zone occurs along the rivers and includes many species of fish and amphibians, raccoons (*Procyon lotor*), muskrats (*Ondatra zibethicus*), and beavers (*Castor canadensis*) (Saunders 1992).

Blair (1950) also discusses the presence of many species of snakes, lizards, and one species of land turtle (*Terrapene ornata*).

Past Environment

By the end of the Late Glacial period (14,000-10,000 B.P.), the Lower Pecos region consisted of a mosaic of pinyon and juniper woodlands, grasslands, and shrublands (Saunders 1992). The latter end of this period is described in Bryant's climatic model as the Medina stage in which the more mesic conditions also supported megafauna (Turpin 1991). From 10,000-7,000 B.P., the woodland and grassland areas decreased as shrublands expanded due to a drying trend known as Bryant's Stockton Stage (Bryant 1966; Saunders 1992). From 7,000-4,000 B.P., conditions became more xeric as Bryant's Stockton Stage culminated in an extremely hot and dry period known as the Ozona Erosional (Bryant 1966; Saunders 1992). Evidence of this period can be seen in sediments at the Devil's Mouth site which show extensive erosion and flooding (Saunders 1992). The last 4,000 years known as Bryant's Sanderson Stage has been characterized by increasing aridity with a brief mesic interval at 2400 B.P. known as Bryant's Frio Interval (Bryant 1966; Saunders 1992). The Frio Interval is evidenced archaeologically by changes in rock art, technology, site distribution, and by bison kills at Bonfire Shelter (Dibble and Lorrain 1968; Turpin 1987, 1991, 2004). Bryant's Juno Stage represents the resumption of the trend toward aridity after the Frio Interval and has continued until modern times (Bryant 1966; Turpin 1991).

CHAPTER II

LOWER PECOS ARCHAEOLOGY

History

Archaeological excavations of the Lower Pecos region can be divided into three periods. Excavations began in the 1930s when museums sent out expeditions to recover materials for display from the dry rockshelters of west Texas. Expeditions were sent out from the Witte Museum of San Antonio, the Smithsonian Institution, and the University of Texas at Austin (Turpin 2004). Unfortunately at this time, private individuals also excavated the rockshelters and many of the recovered materials that may now reside in museums have no provenience. Frank M. Setzler (1932, 1933, 1934, 1935) conducted many excavations and reported on many burials and artifacts found in rockshelters. Setzler also commented on the similarities between the cave dwellers and the Basket Makers of the American Southwest. Further excavations revealed that the Texas cave dwellers were different enough to merit their own classification. Sayles (1935) defined three cultural complexes among the cave dwellers, one of which was the Pecos River complex. Kelley et al. (1940) later defined the Pecos River Focus and compiled trait lists. Fate Bell Shelter served as the type site for the Pecos River Focus (Bement 1989).

Excavations subsided with the onset of World War II and did not resume again until salvage efforts began with the construction of the Amistad Reservoir. From 1958-1969, 188 archaeological sites and 49 pictograph sites were documented (Graham and Davis 1958). Many rockshelter and terrace sites were recorded and provided the majority of the information known today about the Lower Pecos region.

In the 1970s excavations continued and large-scale excavations were led by the University of Texas at San Antonio at Baker Cave and by Texas A&M University at Hinds Cave (Chadderdon 1983; Hester 1983; Shafer and Bryant 1977). These systematic excavations revealed perishable industries such as basketry and matting, coprolites for dietary studies, floral and faunal materials, and site usage. Seminole Canyon Park was established in 1979-1980 and during this time 38 new sites were recorded and many others were reevaluated (Turpin 1982). This time period also marks the discovery of Seminole Sink, a 5,000 year old sinkhole burial containing at least 21 individuals (Turpin 1988).

Chronology

There have been multiple chronologies proposed for the Lower Pecos, based on climate and projectile points (Hester 1988; Turpin and Bement 1988). The chronology presented here is based on the expansion of Dibble’s 11 part chronology [Figure 4] by Turpin and Bement (1988) to include archaeology, climate, site types, and other cultural characteristics (Turpin 1991).

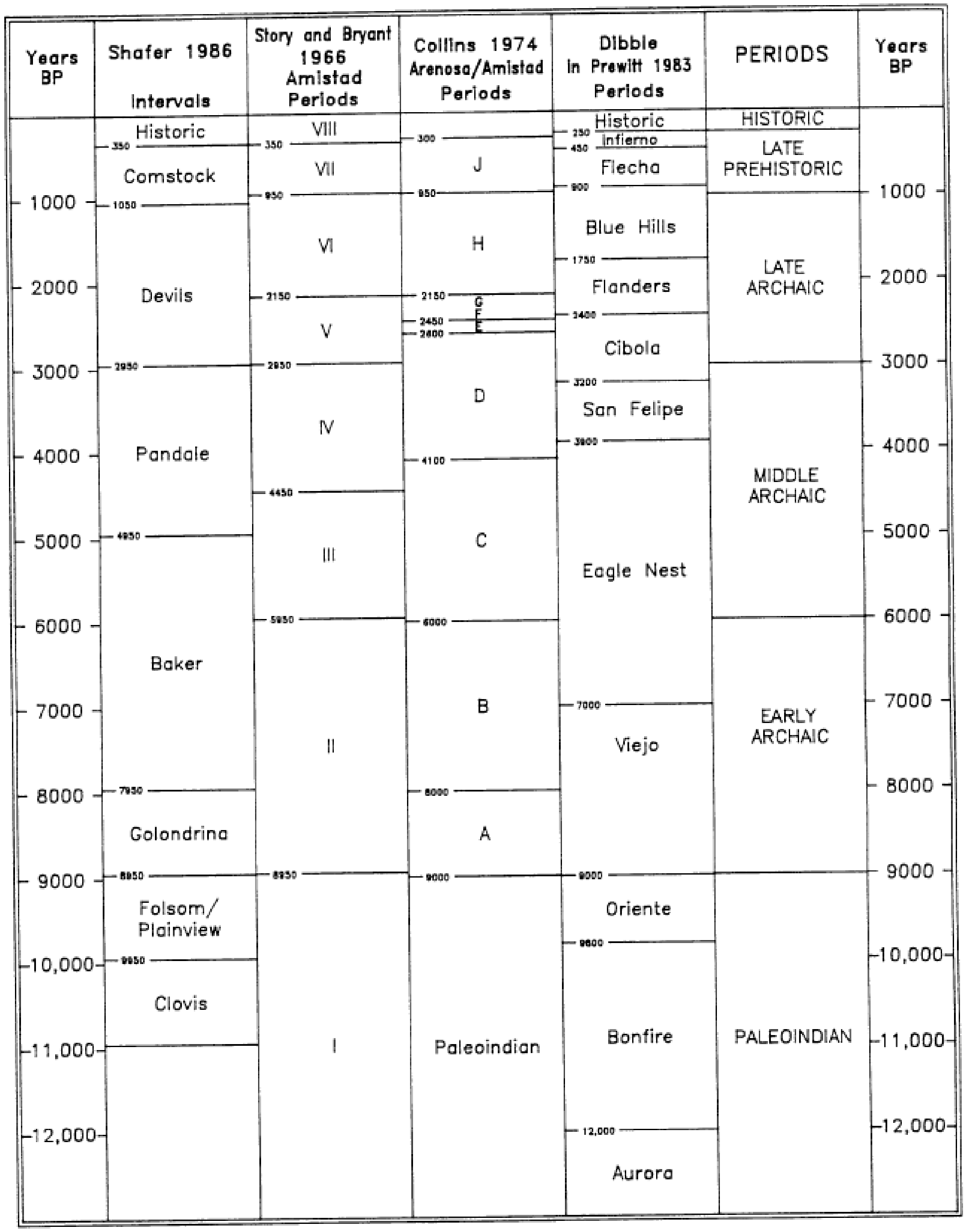


Figure 7. Comparison of Lower Pecos Chronologies. (after Turpin 1991)

Paleoindian Period <12,000-9800 B.P.

Aurora Subperiod 14,500-11,900 B.P.

The earliest inhabitants of the Lower Pecos region appear to fit the model of other Paleoindian inhabitants as big-game hunters. Although only 4 Clovis points have been found in the Lower Pecos, mass kill and butchering sites reveal the presence of a cultural system revolved around big-game hunting (Turpin 1991, 2004). Bonfire Shelter (41VV218), one of the best known Paleoindian sites in Texas, provides ample evidence of big-game hunting with remains of elephant, camel, horse, and bison (Bousman et al. 2004; Dibble and Lorrain 1968; Turpin 2004).

Bonfire Subperiod 10,700-9800 B.P.

The Bonfire Subperiod is named for Bone Bed 2 at Bonfire Shelter which contains extinct bison remains associated with Folsom and Plainview points (Dibble and Lorrain 1968; Turpin 2004). Multiple radiocarbon dates from Bone Bed 2 center on 10,000 B.P., a time period also known as a cooler mesic period which would have supported bison (Turpin 1991).

Oriente Subperiod 9400-8800 B.P.

The Orient Subperiod, also known as Late Paleoindian, is where the beginnings of the characteristic “Archaic adaptation” of the Lower Pecos first appear in the archaeological record (Turpin 2004). Baker Cave is the type site for this period containing Golondrina and Angostura points and evidence of a shift in subsistence strategy from big-game hunting to broad resource procurement (Chadderdon 1983; Turpin 1991, 2004).

Early Archaic 9000-6000 B.P.

Viejo Subperiod 8900-5500 B.P.

The Viejo Subperiod exhibits the full-blown Archaic adaptation with preferential rockshelter habitation, a fiber industry, and portable art in the form of clay figurines and painted pebbles (Turpin 2004). Projectile points include early barbed, early stemmed, early corner-notched, and the regionally specific Devils Triangular dart point (Turpin 2004).

Middle Archaic 6000-3000 B.P.

Eagle Nest Subperiod 5500-4100 B.P.

The Eagle Nest Subperiod is characterized by a shift to increased regionalization of projectile point styles and to more intensive processing of desert succulents due to a hot and dry climate shift (Turpin 1991, 2004). Pandale projectile points are characteristic of this subperiod.

San Felipe Subperiod 4100-3200 B.P.

The San Felipe Subperiod continues the increase in regionalization. Local projectile point styles include Langtry, Val Verde, and Arenosa (Turpin 2004). Many rockshelters seem to indicate an increased population density along the rivers at this time and an increase in upland sites seems to indicate greater exploitation of vegetational food resources (Bement 1989; Turpin 1991, 2004). The complex Pecos River Style of pictographs also emerges at this time, and Turpin (2004) suggests that this subperiod may represent the beginnings of labor division and social controls.

Late Archaic 3000-1000 B.P.

Cibola Subperiod 3150-2300 B.P.

The term "Cibola" means buffalo and this subperiod represents a cooler climate shift which once again supports the presence of bison, as seen in Bone Bed 3 at Bonfire Shelter (Bement 1989; Turpin 2004). The characteristic projectile point is the Montell although Marshall and Castroville also occur (Turpin 1991, 2004). There is a shift in frequencies of these points from rockshelters to open camp sites (Turpin 2004). Pictograph styles also change dramatically to the Red Linear style, depicting bison hunts and atlatls (Turpin 2004).

Flanders Subperiod ca. 2300 B.P.

The Flanders subperiod is known for a return to arid climate conditions and for the Shumla dart point style (Turpin 1991, 2004).

Blue Hills Subperiod 2300-1300 B.P.

The Blue Hills Subperiod reveals a return to broad resource procurement with an increase in upland sites and unifaces for plant processing (Turpin 2004). The fiber industry becomes more elaborate as painted mats are found associated with bundle burials (Turpin 2004). The most common projectile points are the Ensor and Frio (Turpin 2004).

Late Prehistoric Period 1000-350 B.P.

Flecha Subperiod 1320-450 B.P.

The Flecha Subperiod reveals many changes in artifact types, site types, settlement patterns, exploitation strategies, rock art styles, and mortuary customs (Bement 1989; Turpin 1991, 2004). Ring middens for bulk plant processing are found in open sites, fewer bundle burials occur, and the bow and arrow are adopted (Turpin 2004). Rock art styles show greater variation including the Red Monochrome, Bold Line Geometrics, and Lewis Canyon petroglyphs (Turpin 2004).

Infierno Phase 450-250 B.P.

The type site for the Infierno Phase is Infierno Camp, an open site of over hundred circles of paired stones (Turpin 2004). The hallmark of this phase is the tool kit consisting of small triangular stemmed arrow points, steeply beveled end scrapers, four-beveled knives, and plain ceramics (Bement 1989; Turpin 2004). These changes probably reflect the intrusion of Plains groups into the Lower Pecos (Bement 1989).

Historic Period 350 B.P.-present

Little attention has been paid to the Historic Period in the Lower Pecos. Most sites consist of rock art panels with little cultural debris and open sites near water sources for horses (Turpin 1991, 2004). A few historic burials have been reported and include such artifacts as brass bracelets, glass beads, bone or shell hairpipe beads, and metal arrow points (Hester 1968). Indigenous groups were replaced by the Apaches who themselves were replaced by the Comanches and all native people were eliminated by 1882 (Turpin 2004).

Bioarchaeology

Rockshelter Burials

Rockshelters have provided the majority of the cultural and dietary data on Lower Pecos inhabitants (Bement 1989). The rockshelters served as habitation sites for one or more family groups and eventually served as burial sites. Within Texas, the Lower Pecos region has the highest number of sites with burials and averages 5 burials per site (Steele et al. 1999). The dry protected environment provided shelter for family groups and preserved their cultural materials as well as their physical remains. Over 150 individuals have been excavated from Lower Pecos rockshelters, but few have been subjected to detailed studies or even published (Turpin and Bement 1988; Turpin et al. 1986).

Lower Pecos burials display a range of mortuary practices including extended, flexed, and semi-flexed burials, some with basketry or stones over the head, cremations, and bundle burials (Greer and Benfer 1963; Setzler 1934; Turpin et al. 1986). Individuals of all ages and both sexes have been reported, but infants make up 24% of Lower Pecos rockshelter burials (Turpin et al. 1986). The high number of infant burials is a result of the excellent preservation provided by dry rockshelters and may also be suggestive of high infant mortality. Very few burials have been subjected to sex or age determination and many exist without documentation.

The most unusual burial custom of the Lower Pecos region is the bundle burial. Bundled individuals are usually flexed, wrapped in woven mats or animal hides, and buried in a lined pit near the back wall of a rockshelter (Turpin et al. 1986). Although there appears to be no preference for age or sex for bundle burials, infant bundles are among the most elaborate, often including rabbit skin robes and cradle boards (Butler 1948; Turpin and Bement 1988; Turpin et al. 1986). The lack of preference for bundle burials confirms the probable egalitarian nature of Lower Pecos hunter-gatherers, but the high number of elaborate infant bundle burials appears to contradict traditional assumptions of hunter-gatherer infant burial practices (Turpin 1988; Turpin et al. 1986).

Unfortunately, many burials were excavated in the 1930’s without proper documentation and many are without provenience. Without the proveniences at excavation, temporal changes in Lower Pecos mortuary practices or biology may be difficult to elucidate, but systematic analyses of the skeletal remains can provide information about the individuals themselves and about their potential relatedness to nearby cultural populations. The Bee Cave burials are among those excavated in the 1930’s without provenience, but my analysis of them will provide some insight into the biology of Lower Pecos individuals and provide data for future population level studies.

Biology

The few burials that have been methodically analyzed from the Lower Pecos reveal a rather healthy population compared to others within Texas. Infectious disease rates appear to be low because the arid climate of the region does not facilitate the persistence of microorganisms. Coprolites from Baker Cave and Hinds Cave show no evidence of parasites (Sobolik 1991). Osteoarthritis and trauma are infrequent, while osteophytosis occurs in higher frequency (Marks et al. 1988; Steele et al. 1999). Although the broad spectrum of the Lower Pecos diet was nutritionally adequate, skeletal remains reveal the presence of nutritional stress during infancy and early childhood in the form of linear enamel hypoplasias on teeth and growth arrest lines in long bones (Banks and Rutenberg 1982; Marks et al. 1988). The high fiber diet may have made the weaning period difficult for most children and seasonal shortages would have left children more vulnerable to growth deficiencies due to nutritional inadequacies.

Previous researchers have reported Lower Pecos crania as dolichocranic, or long-headed, with accessory bones in the lambdoidal suture (Benfer and McKern 1968; Greer and Benfer 1963; Oetteking 1930). Lower Pecos individuals have also been reported to have smaller long bone lengths and therefore smaller statures than other Texas populations (Doran 1975). They have also been reported to have less sexual dimorphism than other Texas populations (Doran 1975). An evaluation by Stewart (1935) of twenty skulls and some infracrania described the populations of the Texas cave-dwellers as having small heads with short faces, low orbits, somewhat broad noses, and underdeveloped muscle attachments. Postcranial elements showed shorter humeri and flatter femoral cross-sections when compared to other Native American groups, and a high incidence of septal apertures in the left humeri of females (Stewart 1935). Observed pathologies include frontal bone scars, healed fractures, and osteoarthritis (Stewart 1935).

Lower Pecos individuals tend to have higher frequencies of dental pathology than other Texas populations (Steele et al. 1999). Lower Pecos individuals have the highest caries incidence across south Texas, more abscessing, and the highest antemortem tooth loss (Steele et al. 1999). Such a high incidence of dental pathology was also noted by Goldstein in 1948, who remarked that many of the West Texas crania of middle age adults had complete mandibular molar loss and alveolar resorption with the maxillary molars still intact. The high incidence of dental pathology occurs because of the fibrous and high carbohydrate diet (Steele et al. 1999).

Diet

Lower Pecos inhabitants were hunter-gatherers who relied on the abundant xeric plants and small mammals of this region for subsistence. Climate studies have indicated the persistence of xeric plants throughout Lower Pecos prehistory and excavations at Hinds Cave and Baker Cave have revealed the dependence on such plants for subsistence. The climatic trend established in the Archaic is thought to have initiated the broad spectrum diet which persisted throughout Lower Pecos prehistory despite brief mesic periods which would have shifted floral populations and brought in bison (Shafer 1988). Lower Pecos diet was dominated by fibrous plants rich in sugars such as agave, sotol, and prickly pear, with prickly pear dominating (Sobolik 1988, 1991). A study on the nutritional content of plants available in the Lower Pecos region revealed that a hypothetical meal would provide essential amino acids and enough calories to provide adequate nutrition for Lower Pecos foragers (Winkler 1982). The skeletal material seems to confirm this assumption, revealing little to no evidence of specific deficiencies (Hartnady 1988).

Coprolite studies have revealed the presence of faunal remains such as the bones of small rodents, birds, fish, and lizards, suggesting that many small animals were not processed and eaten nearly whole (Sobolik 1991). The lack of processing of small animals may be due to the early loss of dentition, especially mandibular molars. Although their remains are not visible in coprolites, larger mammals such as deer were more than likely procured as well, as their remains are found at Hinds Cave (Lord 1984).

Stable isotope studies are fairly recent to Lower Pecos bioarchaeology. Stable isotope analyses of carbon have been conducted on 13 individuals from three Lower Pecos sites, Seminole Sink, Conejo Shelter, and Skyline Shelter (Huebner 1991; Powell 1991; Turpin 1988). Because of the prevalence of desert succulents in the environment as well as in coprolites, stable isotope samples from the Lower Pecos are expected to show a CAM signal, a $\delta^{13}C$ average of −13.5‰, a value near the C4 average of −12.5‰ (Huebner 1991). Instead the values from Val Verde County range from −11.4‰ to −22.1‰, spanning the averages for both C3 and C4 or CAM plants (Bousman and Quigg 2007). This suggests a much greater variability in the diet of Lower Pecos individuals and the possibility of two dietary populations within the region during the Archaic period (Bousman and Quigg 2007).

Although nutritionally adequate, the diet of Lower Pecos populations was also detrimental to the dentition. The chewing of high fiber succulents accelerates attrition and releases high amounts of sugars that would decrease the pH of saliva and accelerate carious processes (Hartnady 1988; Turpin et al. 1986). The archaeological record has revealed the importance of fibrous desert plants for making cordage and matting in addition to nutrition. The use of these plants to make such items would require extensive processing probably with the teeth, contributing further to attrition and carious processes. Posterior teeth are more susceptible to carious processes rather than to attrition due to the increased surfaces available for caries, and anterior teeth are thought to be more susceptible to attrition rather than caries due to a lack of adequate surfaces for caries development (Hartnady 1988). The effect of desert plant processing was studied by Danielson and Reinhard (1988) by analyzing the effect of calcium oxalate phytoliths within desert succulents. The authors found that calcium oxalate phytoliths of agave and prickly pear were abundant in coprolites and that the phytoliths were hard enough to scratch enamel. The combination of damaging phytoliths and acid-producing sugars resulted in the high AMTL and other dental pathology present in Lower Pecos dentition.

CHAPTER III

MATERIALS AND METHODS

Preparation

The Bee Cave materials were transferred to the Center for Archaeological Studies in San Marcos, Texas by the Crockett County Museum in Ozona, Texas in 2005. The materials arrived in two barrels and three boxes, with one box containing the bundled infant as it had been displayed in the museum. The other two boxes contain one adult and one small bundle burial containing two infants from the Noelke Ranch in Crockett County: they were therefore not included in this analysis. The bones in the barrels were analyzed first, with each barrel inventoried and analyzed separately. Elements from each barrel were sorted according to side, cranial or infracranial, and subadult or adult. The first barrel (black barrel) contained many intact long bones, and some cranial elements with few fragmentary remains. The black barrel also contained some faunal bones and teeth, some of which may represent contemporary specimens based on their taphonomic condition and preservation of tissue. The second barrel (white barrel) contained additional crania and long bones, many more fragments and small bones, some of which were in a burlap sack at the bottom of the barrel. Other contents included stone artifacts and highly fragmented faunal elements. The faunal elements and artifacts were not analyzed for this study but the artifacts were photographed and are included in Appendix

E. Elements were cleaned with water, a damp cloth, or with only a brush to remove the thin layer of dirt. Elements that were especially fragile, such as cranio-facial elements, subadult materials, or those with unusual taphonomy were not cleaned.

Inventory and MNI

For each barrel, elements were inventoried and recorded as commingled remains according to the methods outlined by Buikstra and Ubelaker (1994). Each element was identified, sided, and scored for completeness by recording which segments were present and to what degree. Minimum number of individuals (MNI) was determined for each barrel separately and for both barrels together by examining the number of repeated elements by side and age. Fragments were identified as accurately as possible using appropriate osteological references and matched when possible to larger elements (Baker et al. 2004; Scheuer and Black 2004; Steele and Bramblett 1988; White and Folkens 2005).

Skeletal Analysis

Age

After elements were identified and sorted by side, methods of age and sex determination were applied to every possible element. Age was first assigned as adult or subadult based on epiphyseal fusion, size, and texture. More specific ages were assigned based on the degree of epiphyseal fusion (complete, partial, or absent) and on long bone length for subadult long bones (Baker et al. 2004; Brothwell 1981; Buikstra and Ubelaker 1994; Hoffman 1977). Cranial age determination was based on suture closure methods by Meindl and Lovejoy (1985). Pubic symphyses were used where available for age determination using the method of Brooks and Suchey (1990) and Todd (1921).

Sex

Sex was estimated for every possible element using both metric and nonmetric methods of determination in order to obtain the most detailed description of each element. Infracranial sex estimation was based on os coxae morphology (Buikstra and Ubelaker 1994; Phenice 1969), femoral and humeral head diameter (Dittrick and Suchey 1986), and radial head diameter (Berrizbeitia 1989). Cranial sex estimation was based on methods outlined by Buikstra and Ubelaker (1994). Sex was not estimated for subadult remains as there are no reliable methods for subadult sex determination.

Pathology and Trauma

Each element was examined for evidence of pathology. Pathology was recorded as to location, extent, and severity. Unusual pathology and suspected perimortem trauma were compared to references when needed for accurate diagnosis (Mann and Hunt 2005; Maples 1986; Ortner 2003; Roberts and Manchester 2005; Stewart and Quade 1969; Wakely 1997).

Metrics and Nonmetrics

All intact adult and subadult elements were subjected to standard osteometric analyses using spreading and sliding calipers and an osteometric board according to the standards outlined by Buikstra and Ubelaker (1994) and Moore-Jansen et al. (1994).

Presence and absence of primary nonmetric traits were also recorded on infracranial and cranial elements as described by Buikstra and Ubelaker (1994).

Stature

Stature was calculated using Mongoloid and Mexican formulas by Trotter and Gleser (1958). The formula with the smallest standard deviation according to the available bones was used.

Sorting into Individuals

Once detailed information about each element was collected, I attempted to sort the adult bones into individuals. Two individuals were easily sorted from the others based on taphonomy alone. The other individuals required matching on the basis of other gathered data including age, sex, osteometrics, nonmetrics, and especially complementary articulations. Female crania and os coxae were separated from male crania and os coxae. The two female crania were assigned to the two female os coxae according to age, as one was obviously older than the other. Sacra were matched to the os coxae according to articulations between the auricular surfaces.

Long bones were paired according to size, sex, age, and pathology. Once left and right long bones were paired, femora were matched to os coxae by matching sex and age criteria, but also by observing articulation of the femoral head with the acetabulum. Tibiae were matched to femora according to age and articulation between the distal femur and proximal tibia. Fibulae were matched to tibiae according to age and articulation. Among the arm bones, left and right bones were first paired to each other. Ulnae and radii were matched to each other according to articulation, taphonomy, and pathology. Ulnae could then be matched to humeri based on articulation of the trochlear notch with the distal humerus. Sets of arm bones could then be matched to os coxae and leg bones according to size, age, sex, taphonomy, and pathology. This method is similar to that outlined by Snow (1948). Biological profiles for each individual were then established based on the cumulative data from the individual elements.

Dental Analysis

Loose and intact teeth as well as tooth sockets were inventoried according to the standards outlined by Buikstra and Ubelaker (1994), indicating permanent or deciduous, maxillary or mandibular, which tooth, which parts were present, and degree of development. Each tooth was scored for dental wear according to Smith (1984) for incisors, canines, and premolars, and Scott (1979) for molars. Other characteristics were also noted such as number and location of caries, abscesses, and any other pathology or unusual nonmetric traits. Teeth were also examined for linear enamel hypoplasias, an indicator of nutritional stress. Complete dental inventories are listed in Appendix B.

CHAPTER IV

RESULTS AND DISCUSSION

Taphonomy and Preservation

Over 1,200 fragments, elements, and whole bones were identified among the Bee Cave remains. The inventory is divided into units according to how the remains were received. The black barrel (BB) is one unit; the white barrel is divided into two units, white barrel (WB) and white barrel sack (WBS) because bones were stored at the top of the white barrel and also in a burlap sack in the bottom of the barrel. The black barrel contained 145 identified elements plus six unidentified infracranial fragments. The white barrel contained 170 identified elements. The white barrel sack contained 667 identified elements, 36 unidentified cranial fragments, and 268 unidentified miscellaneous fragments. Cranial elements comprise 9% of the total fragments, while infracranial elements comprise 91%. Subadult elements were highly fragmented because of their more fragile condition, but still represent 23% of the entire assemblage. The complete skeletal inventory sorted by barrel is in Appendix A.

Preservation of most bones is good, with many of the fragments resulting from postmortem storage. Many fragments could be refitted to each other producing more complete elements. Most of the elements were stained a light brown color, many with small black dots covering most of the cortex. These elements were also covered with a thin layer of fine gray dirt which was easily removed with water or a dry brush. Elements for two individuals were different enough taphonomically to allow sorting of those individuals based on taphonomy alone. Individual 6 consists of long bones and os coxae that are highly bleached and weathered, with splitting and peeling cortex, and with highly damaged proximal and distal ends. The shafts of the both humeri have extensive rodent gnawing [Figure 8]. The weathering and the rodent gnawing suggest that Individual 6 was more exposed than the other individuals at some point after interment.

The bones, including the skull, of Individual 7 are covered with a layer of gray dirt embedded with fine root matter forming a dense covering over each element. The density of root matter and the preservation of tissue on the distal end of the left radius suggest that this individual represents a much more recent burial. Many of the bones of Individual 7 are stained bright green, a common sign of copper within the burial context [Figure 9]. The pattern of staining on the skeleton suggests personal adornments worn around the wrists, the neck, and possibly near the ear. However, no metal artifacts were transferred with the skeletal materials. An article by Hester (1968) of historic materials on display at the Crockett County Museum reported 13 brass wire bracelets, about 3 inches long, found with a burial at Bee Cave in Val Verde County. The presence of brass bracelets clearly date this individual to the Historic Period, a period for which scholarly research in the Lower Pecos has been lacking.

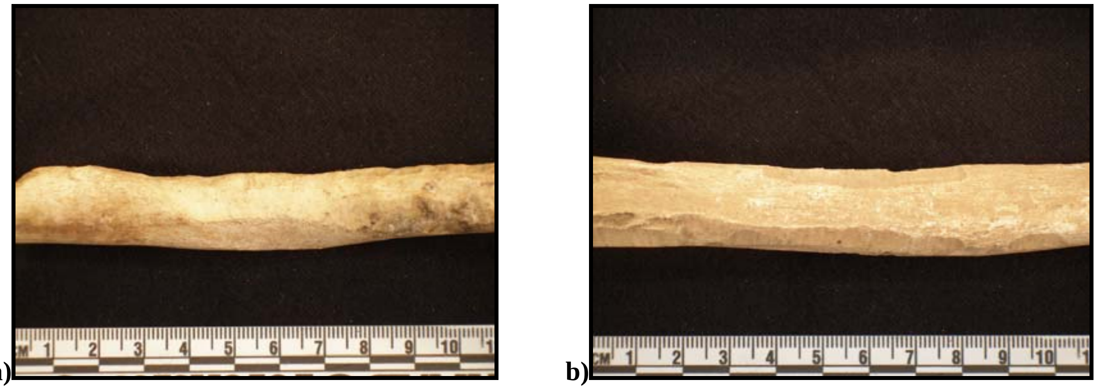


Figure 8. Rodent gnawing on Individual 6: a) left humerus; b) right humerus; note also the bleached condition of the shafts.

Figure 9. Green staining from brass adornments on Individual 7: a) distal ends of right radius and ulna-anterior view; b) right clavicle-superior view; c) right mastoid process.

Bundle Burial

The bundle burial was not analyzed for this study due to conservation concerns for the rabbit skin blanket. However the dentition was analyzed for age estimation. The presence of a full set of deciduous teeth suggests a minimum age of two years old while the lack of eruption of the first permanent molar suggests a maximum age of five years old. Tissue and hair are preserved on the right temporal and right parietal of the child's skull [Figure 10]. The infracranial skeleton is clearly disarticulated and no longer in its original condition. A few adult bones are arranged on either side of the child's skull, probably for display in the museum, and others can be seen mixed in with the child's infracranial skeleton within the blanket.

The blanket consists of strips of animal hide, presumably rabbit, twisted and woven between fiber cordage. Additional fiber cordage is wrapped around the bundle to secure it. Similar child bundles have been previously analyzed and reported, but usually not with so much fur intact (Banks and Rutenberg 1982; Butler 1948; Jackson 1937). The fur blankets were previously described by Setzler (1935) to be similar to those of Basket Maker II and III. Bundle burials are the dominant burial form in the Late Archaic, with radiocarbon dates ranging from 1700 ± 70 B.P to 1150 ± 70 B.P. (Maslowski 1978:36; Turpin, et al. 1986). No diagnostic artifacts were found with this bundle, but it probably dates to the Late Archaic considering the prevalence of such burials during that period.

Figure 10. Bee Cave Bundle Burial.

Minimum Number of Individuals

MNI of the commingled remains in the two barrels was determined by examining the maximum number of overlaps among all elements. Table 1 shows how elements were broken down by section, side, and subadult or adult. Adult MNI was determined to be seven, based on multiple elements, including the right tibia, right and left humeri, left radius, right and left femora, right scapula, and right and left os coxae. Subadult MNI was determined to be four, based primarily on the presence of four left temporal bones.

Table 1
Minimum Number of Individuals

Adult					Subadult			
Element	**L**	**U**	**R**	**Adult MNI**	**L**	**U**	**R**	**Subadult MNI**
Humerus-pe	6		7	7	0		1	1
p1/3	7		7	7	2		2	2
m1/3	7		7	7	2		3	3
d1/3	7		7	7	1		3	3
de	7		7	7	0		0	
Radius-pe	7		5	7	0		0	
p1/3	7		5	7	0		0	
m1/3	7		5	7	0		1	1
d1/3	6		5	6	1		1	1
de	6		5	6	0		0	
Ulna-pe	5		6	6	0		0	
p1/3	6		6	6	1		1	1
m1/3	6		6	6	1		1	1
d1/3	6		6	6	1		1	1
de	6		5	6	0		0	
Femur-pe	7		7	7	0		0	
p1/3	7		7	7	3		2	3
m1/3	7		7	7	3		2	3
d1/3	7		7	7	3		2	3
de	7		7	7	1		0	1
Tibia-pe	4		7	7	0		0	
p1/3	5		7	7	1	1	2	2
m1/3	5		7	7	1		2	2
d1/3	5		7	7	1		1	1
de	5		7	7	0		0	
Fibula-pe	2		4	4	0		0	
p1/3	2		4	4	1		2	2
m1/3	3		4	4	1		2	2
d1/3	3		3	3	1		2	2
de	3		3	3	0		0	
Clavicle	4		3	4	2		2	2
Scapula	6		6	6	2		1	2
Rib 1	2		5	5	1		1	1
Rib 2	3		6	6	1		1	1
Rib (3-12)	27		32	4	11		5	2
Ilium	6		7	7	2		1	2
Ischium	7		5	7	0		1	1
Pubis	6		6	6	0		0	
Acetabulum	7		7	7	0		0	
Sternal Body		5		5		0		
Manubrium		4		4		0		
Sacrum		6		6		7seg		2
Complete Skull		5		5		0		
Frontal		1		1	3		1	3

Table 1-Continued

	Adult				Subadult			
Element	**L**	**U**	**R**	**Adult MNI**	**L**	**U**	**R**	**Subadult MNI**
Temporal	1		3	3	4		2	4
Parietal			1	1	3		2	3
Sphenoid	2		1	2	2		2	2
Zygomatic	2		3	3	3		0	3
Maxilla	4		3	4	3		2	3
Mandible		5		5	1	1	1	2
Occipital		1	1	2		2	1	2
Atlas		5		5		0		
Axis		3		3		0		
C3-C7		21		5		2		1
Thoracic		52		5		16		2
Lumbar		26		6		4		1
Metacarpals	14		11	3	1		3	1
Carpals	6		6	1		0		
Hand Phalanges		22		2		1		1
Calcaneus	2		3	3	0		1	1
Talus	1		1	1	1		0	1
Tarsals	2		1	1		0		
Metatarsals	4		3	1		0		
Foot Phalanges	1	3	3	1		1		1
Final MNI				**7**				**4**

L = left
U = unsided
R = right

Demography

The sorting of the commingled adult remains into individuals based on the combination of age, sex, pathology, articulations, and taphonomy led to a final adult population of three females and four males. Final sex estimation for each individual was based on the combination of morphological criteria for the cranium and pelvis and metrical criteria of the infracranium. Appendix C lists aging and sexing criteria collected for each adult individual.

Final adult ages were determined by combining the age ranges from all elements for an individual and finding the range within which the majority of ranges overlapped. Methods used to age each element include degree of epiphyseal fusion, cranial suture closure, pubic symphysis morphology, and auricular surface aging. Final derived age ranges are provided in Table 3 along with the age categories suggested by Buikstra and Ubelaker (1994).

For subadult ages, Hoffman's (1977) method of estimating age from diaphyseal length was used and produced the ranges in Table 2. Table 2 shows five age ranges: .5-1.5, 1.5-3, 2-3.5, 3.5-5.5, and 4-7 years, from which I derived four age ranges: .5-1.5, 1.5-3.5, 3.5-5.5, and 4-7 years. Three subadult skulls with maxillary fragments match the three older age ranges based on dental eruption. The youngest age range is confirmed by a partial mandible with unerupted deciduous dentition.

Table 2
Subadult Age Ranges Based on Diaphyseal Lengths

Bone	Length (mm)	Age (years)	Possible Individual
L Femur	185	1.5-3	9
R Femur	186	1.5-3	9
R Femur	242	3.5-5.5	10
L Tibia	208	4-7	8
R Tibia	207	4-7	8
R Fibula	199	4-7	8
R Humerus	107	.5-1.5	11
R Humerus	140	2-3.5	9
R Ulna	115	2-3.5	9

As a population, the Bee Cave individuals represent a fairly typical Lower Pecos population although the proportion of subadults to adults is somewhat higher than expected (Steele et al. 1999). The dry protected rockshelters of the Lower Pecos provide unusual preservation of subadult remains which are normally more vulnerable to postmortem damage and destructive taphonomic processes. The sex ratio of adults is nearly 1:1 that is expected in human populations and compares favorably with the average reported by Steele et al. (1999) for the Lower Pecos region [Table 4].

Table 3
Bee Cave Individual Age Ranges

Individual	Sex	Age	Age Category
1	F	15-22	Adolescent/Young Adult
2	F	42+	Middle Adult
3	M	34+	Middle Adult
4	M	15-24	Adolescent/Young Adult
5	M	23-45	Young/Middle Adult
6	F	17-23	Adolescent/Young Adult
7	M	21-30	Adolescent/Young Adult
8	?	4-7	Child
9	?	1.5-3.5	Infant/Child
10	?	3.5-5.5	Child
11	?	.5-1.5	Infant
Bundle	?	2-5	Child

Table 4
Comparative Lower Pecos Demography (%)

	Subadults	Adults	Males	Females
Bee Cave	42	58	57	43
Skyline Shelter[1]	30	70	-	-
Seminole Sink[2]	52	48	-	-
Coontail Spin[3]	14	86	67	33
Langtry Cave[4]	17	83	40	60
Lower Pecos[5]	31	69	52	48

[1]Powell 1991; [2]Marks et al. 1988; [3]Benfer and McKern 1968; [4]Greer and Benfer 1963; [5]Steele et al. 1999.

Stature

Stature was calculated using the Mongoloid and Mexican formulas published by Trotter and Gleser (1958). The formula used for each individual was that with the lowest standard deviation based on the available bones. Table 5 lists the estimated statures for each adult and the bones used in the formula, and compares the differences between the Mongoloid and Mexican formulas. The formulas did not produce very different estimates, although the Mexican estimates are somewhat lower than the Mongoloid estimates. Converting to inches, the average female stature is 5’3” to 5’4” and the average male stature is 5’7”. Individuals from Langtry Cave in Val Verde County averaged 5’5” for females and 5’8” for males (Greer and Benfer 1963).

Table 5
Stature of Bee Cave Adults (cm)

	Bone	Mongoloid	Bone	Mexican
Individual 1	R Femur + R Fibula	161.62 ± 3.18	R Femur	159.93 ± 2.99
Individual 2	L Femur	168.89 ± 3.80	L Femur	167.98 ± 2.99
Individual 3	R Fibula	169.84 ± 3.24	L Femur	169.20 ± 2.99
Individual 4	L Femur + L Fibula	172.96 ± 3.18	L Femur	169.69 ± 2.99
Individual 5	L Femur	173.62 ± 3.80	L Femur	173.35 ± 2.99
Individual 6	R Humerus	156.62 ± 4.25	R Humerus	153.95 ± 4.24
Individual 7	L Femur	169.54 ± 3.80	L Femur	168.71 ± 2.99

Osteometrics

Osteometric data allow the calculation of various indices for individual and population comparisons. The Bee Cave remains contained many intact postcranial and cranial elements which could be subject to standard measurements outlined by Moore-Jansen et al. (1994). Table 6 lists craniometric data for adults.

Table 6
Adult Craniometrics (mm)

Individual / **Sex**	**1** **Female**	**2** **Female**	**3** **Male**	**4** **Male**	**5** **Male**	**7** **Male**
1. maximum cranial length	186	180	185	189	192	179
2. maximum cranial breadth	126	123	132	-	-	148
3. bizygomatic breadth	-	118	-	-	-	140
4. basion-bregma height	-	126	131	132	134	131
5. cranial base length	-	91	98	101	94	97
6. basion-prosthion length	-	90	-	101	-	95
7. maxillo-alveolar breadth	-	59	-	-	-	66
8. maxillo-alveolar length	-	55	-	-	-	56
9. biauricular breadth	112	111	126	117	121	132
10. upper facial height	61*	62	-	70	-	78
11. min. frontal breadth	88	87	90	93	93	96
12. upper facial breadth	-	99	101	104	-	108
13. nasal height	48*	46	-	52	-	58
14. nasal breadth	28	25	-	-	-	27
15. orbital breadth	-	36	-	-	41*	42R
16. orbital height	-	33	-	38R	34*	37R
17. biorbital breadth	-	93	-	96	-	101
18. interorbital breadth	20*	23	-	-	21*	22*
19. frontal chord	110	104	114	113	115	108
20. parietal chord	115	115	117	113	122	103
21. occipital chord	-	98	93	96	109	101
22. foramen magnum length	-	34	35	40	38	37
23. foramen magnum breadth	-	29	31	30	31	30
24. mastoid length	23	25	27L	31	26	30
Mandible						
25. chin height	29	31	29.5	37	-	32
26. body height at mental foramen	14	20	21	34	-	34
27. body thickness at mental foramen	10	14	12	16	-	15
28. bigonial diameter	90	93	98*	99	-	102
29. bicondylar breadth	111	111	113	121	-	128*
30. minimum ramus breadth	27	26	33	37	-	37
31. maximum ramus breadth	46	43.5	51	46	-	48
32. maximum ramus height	57	48	63.5	67	-	73
33. mandibular length	73	74	78	81	-	87
34. mandibular angle	116	121	115	109.5	-	104

*Measurements estimated due to damage.

For comparison with other Lower Pecos populations, cranial indices were calculated (Bass 1995; Steele and Bramblett 1988). Cranial indices serve as indicators of the shapes of the crania and facial features and allow comparison of those shapes between populations. Table 7 lists the cranial indices calculated for the Bee Cave adults, as well as those reported for other Lower Pecos sites. Lower Pecos individuals seem to be characterized by narrow or long heads with low to medium height, medium width faces, medium to broad noses, and wide orbits. Individual 7 is markedly different from the other individuals in having a broader or more globular head, narrow face, and narrow nose. While these indices clearly vary among Lower Pecos individuals, trends are still visible, such as having broad noses, wide orbits, and long heads. Individual 7 does not fit these trends, either due to changes over time in native populations or due to his intrusion from another population.

Table 7
Comparison of Lower Pecos Cranial Indices (%)

Indices	Cranial	Length-Height	Breadth-Height	Upper Facial	Nasal	Orbital
Bee Cave						
Individual 1	67.7	-	-	-	58.3*	-
Individual 2	68.3	70	102.4	52.5	54.3	91.7
Individual 3	71.4	70.8	99.2	-	-	-
Individual 4	-	69.8	-	-	-	-
Individual 5	-	69.8	-	-	-	82.9
Individual 7	82.7	73.2	88.5	55.7	46.6	88.1
Coontail Spin[1]						
2140	66.8	71.1	106.4	-	55.1	91.9
2139	62.4	-	-	-	47.8	97.1
Langtry Cave[2]						
2145	73.2	68.3	93.3	-	50	76.1
Brewster County & Val Verde County[3]						
891	67	68.6	102.3	53.8	57.4	79.1
892	73.5	75.7	102.9	41.7	49	77.3
893	74.9	72.1	96.4	52.6	50.9	75
894	70.6	68.9	97.6	-	50	79.1
895	68.8	69.8	101.5	54.1	51.8	80.95

*Index based on estimated measurements due to damage.
[1]Benfer and McKern 1968; [2]Greer and Benfer 1963; [3]Oetteking 1930.

The infracranial osteometric data in Table 8 allows calculation of comparative indices and stature, and in this case illustrates the correlations of measurements between sorted pairs of elements.

Table 8
Adult Infracranial Osteometrics by Individual (mm)

Measurements	Individual 1		Individual 2		Individual 3		Individual 4		Individual 5		Individual 6		Individual 7	
Sex	**Female**		**Female**		**Male**		**Male**		**Male**		**Female**		**Male**	
Humerus	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**
max length	269	271	325	313	310	313	340	339	-	334	-	274	-	334
epicondylar breadth	49	49	55	52	60	60	61	60	-	59	55	-	-	65
vertical diameter of head	36	36	39	39	41	43	44	45	43	43	-	-	49	50
max diameter at midshaft	17	17	19	19	20	21	19	22	-	23	-	-	-	26
min diameter at midshaft	12	13	14	13	14	15	15	165	-	17	-	-	-	18
Ulna														
max length	241	247	259	255	262	-	274	281	-	283	-	-	278	281
AP diameter	12	10	11	12	15	12	13	14	-	15	-	-	16	18
ML diameter	10.5	12	13	11	14	14	14	14	-	15	-	-	14	15
physiological length	213	220	235	228	231	-	243	250	-	247	-	-	248	250
min. circumference	30				31	-	37		35	41	-	-	34	-
Radius														
max length	224	229	249	237	250	-	268	269	-	266	-	-	259	263
AP diameter at midshaft	9	10	10	9	10	-	12	12	-	11	-	-	12	14
ML diameter at midshaft	11	12	13	12	12	-	13	14	-	15	-	-	14	16
max head diameter	18	18	20	20	22	-	20	21	21	21	19*	-	21	23
min head diameter	18	18	19	18	21	-	19	19	-	20	17*	-	20	22
Femur														
max length	417	415	448	446	453	-	455	462	470	465	-	-	451	453
bicondylar length	413	410	443	441	450	-	454	460	464	458	-	-	450	451
epicondylar breadth	66	66	74.5	-	-	-	81	82	81	81	-	-	82	-
max head diameter	38	38	42	42	44	44	47	47	44	45	-	41	50	50
AP subtrochanteric diam	26	23	24	23.5	24	23	24	26	30	27	21	20	-	31
ML subtrochanteric diam	24	27	27	30	32.5	32	33	29	26	31	29	29	-	34
AP midshaft diam	23	24	28	28.5	28	28	27	27	31	32	22	23	-	31
ML midshaft diam	22	24	25	26	27.5	26	30	28	27	28	23	21	-	27
midshaft circum	72		81	84	84	82	89		90	91	69	67	-	88

*Measurement estimated due to damage

Table 8-Continued

Measurements Sex	Individual 1 Female		Individual 2 Female		Individual 3 Male		Individual 4 Male		Individual 5 Male		Individual 6 Female		Individual 7 Male	
Tibia	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**
length	351	348	370	-	-	381	402	402	402	397	-	-	-	376*
max prox epi breadth	63	63	-	-	-	-	77	78	78	76	-	-	-	-
max distal epi breadth	44	43	-	-	-	51	55	55	57	52	-	42*	-	51
max diam at nutrient for	29	30	31.5	31	-	36	38	36	40	39	28	-	-	39
ML diam at nutrient for	22	22.5	20	21.5	-	23.5	22	22	25	24	20	-	-	23
circum at nutrient for	79	80	82	82	-	92	95	92	98	97	74	-	-	97
Fibula														
max length	-	334	-	-	-	372	-	-	-	-	-	-	-	-
max diam at midshaft	-	14	-	-	-	15	-	-	-	-	-	-	-	-
Os coxa														
height	-	-	-	-	-	207	208	205	-	205	-	-	211	-
iliac breadth	-	-	151	151	-	157	158	155	-	157	-	-	150*	-
pubis length	-	-	-	-	85	85	79	82	86	79	-	-	85	85
ischium length	-	-	80	-	84	89	88	84	79	85	-	-	94	-
Scapula														
height	-	-	-	-	-	-	-	-	-	-	-	-	-	158
breadth	-	-	-	-	-	-	-	-	-	-	-	-	-	96
Sacrum														
anterior length	-	-	84[1]	-	105	-	115	-	104[1]	-	-	-	-	-
anterior sup breadth	-	-	108	-	115	-	205	-	117	-	-	-	100	-
max trans diam of base	-	-	51	-	49	-	52	-	52	-	-	-	60	-
Clavicle														
max length	-	-	-	-	-	-	-	-	-	-	-	-	145	146
AP diam at midshaft	-	-	-	-	-	-	-	-	-	-	-	-	11	12
SI diam at midshaft	-	-	-	-	-	-	-	-	-	-	-	-	12	10

[1]Measurement does not include fused fifth lumbar.

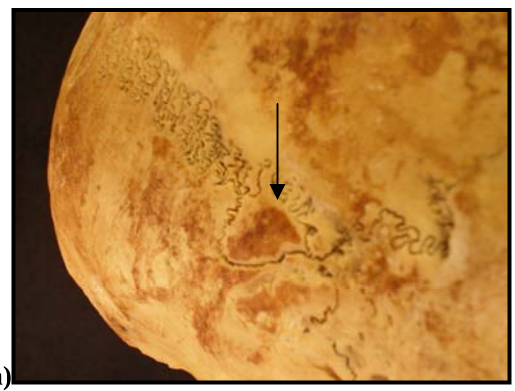
Nonmetric Traits

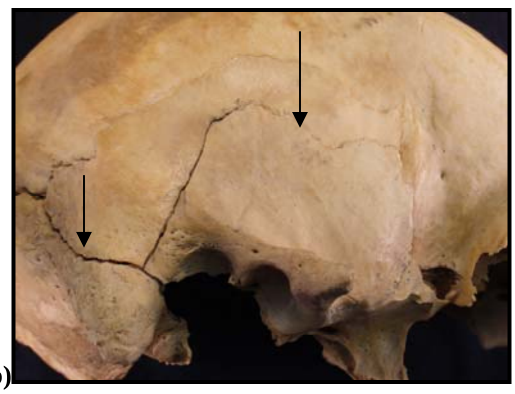
Nonmetric traits are those traits that cannot be measured. They are recorded as present or absent, although there can be varying degrees of expression due to their control by multiple genes (Grüneberg 1963; Saunders and Popovich 1978). As such, they are often referred to as discrete traits or quasicontinuous traits (Grüneberg 1952; Rightmire 1972). They also show familial inheritance in many species, including humans (Buikstra and Ubelaker 1994). Nonmetric traits are often used in biodistance studies to determine degrees of relatedness within and between populations (Lane and Sublett 1972; Laughlin and Jørgensen 1956). The traits scored for the Bee Cave population include those considered primary nonmetric traits by Buikstra and Ubelaker (1994). Complete scoring for each individual can be found in Table 9.

Accessory ossicles were observed in four individuals and included asterionic, lambdoidal, epipteric, and coronal ossicles. Individual 5 had unusual accessory ossicles and sutures on the right side of the cranium [Figure 11b]. An accessory suture ran inferior and parallel to the squamosal suture resulting in a large epipteric ossicle. Another suture ran from asterion, continuing from the lambdoidal suture across the mastoid process. Both of these sutures were visible endocranially as well. Mastoid foramina are present in the temporal bones of all six individuals with crania, as well as in the occipito-mastoid suture and on the occipital bone.

Complete septal apertures of the distal humerus were found in the left humerus of Individual 1, both humeri of Individual 2, and in the left humerus of Individual 5. Individuals 1 and 2 are female, and septal apertures appear to occur more frequently in females (Bass 1995). Septal apertures were also found in three of the females from

Langtry Cave (Greer and Benfer 1963). Individual 2 also had frontal grooves on the left and right side of the frontal bone. Sacralization of the fifth lumbar is found in Individuals 2 and 5. Sacralization occurs infrequently in both modern and archaeological samples (Mann and Hunt 2005; Roberts and Manchester 2005). Other nonmetric traits observed in elements that could not be assigned to individuals include complete lateral bridging in two atlas vertebrae, one left accessory transverse foramina in a cervical vertebra, and two right accessory transverse foramina in two cervical vertebra. See Figure 11 for examples of nonmetric traits observed in the Bee Cave population and Table 9 for complete data.

a) 

b) 

c) 

d) 

Figure 11. Nonmetric Traits: a) lambdoidal accessory ossicle in Individual 4; b) accessory sutures (arrows) forming an accessory ossicle in Individual 5; c) septal apertures in Individual 2; d) sacralized fifth lumbar vertebra in Individual 5.

Table 9
Nonmetric Traits in Bee Cave Adults

Trait	Side	Individual 1	Individual 2	Individual 3	Individual 4	Individual 5	Individual 7
Metopic Suture		A	A	A	partial	partial	A
Supraorbital Structures	L	notch	foramen	notch	notch	foramen	notch
	R	notch	foramen	notch	notch	foramen	notch & foramen
Infraorbital Suture	L	A	complete	U	A	A	complete
	R	U	complete	U	A	A	complete
Multiple Infraorbital Foramina	L	A	A	U	A	A	A
	R	U	A	U	A	A	A
Zygomatico-facial Foramina	L	multi small	1	U	A	A	1 small
	R	U	1 small	U	3 small	1 lg + small	1 small
Parietal Foramen	L	A	A	not internal	1 parietal	A	1 parietal
	R	1 parietal	A	A	1 parietal	1 parietal	1 parietal
Sutural Bones	L	asterionic	lambdoid	A	coronal/lambdoid	A	A
	R	A	A	A	lambdoid	epipteric	A
Inca Bone		A	A	A	A	A	A
Condylar Canal	L	U	present	present	present	present	U
	R	U	A	A	present	present	U
Divided Hypoglossal Canal	L	U	A	complete	complete	A	U
	R	U	U	complete	complete	A	U
Direction of Flexure for		R	R	R	R	R	U
Superior Sagittal Sulcus							
Foramen Ovale Incomplete	L	U	A	A	A	A	U
	R	A	A	A	A	A	U
Foramen Spinosum Incomplete	L	U	A	A	A	A	U
	R	A	A	A	A	U	U
Pterygo-spinous Bridge or Spur	L	A	A	A	trace	A	U
	R	A	A	U	trace	U	U

Table 9-Continued

Trait	Side	Individual 1	Individual 2	Individual 3	Individual 4	Individual 5	Individual 7
Pterygo-alar Bridge or Spur	L	A	A	trace	A	trace	U
	R	A	A	A	A	U	U
Tympanic Dihiscence	L	A	A	present	present	present	U
	R	foramen	A	present	present	U	U
Auditory Exostosis	L	A	A	A	A	A	A
	R	A	A	<1/3 occluded	A	U	A
Mastoid Foramen	L	1 temporal	2 temporal	1 temporal	2 suture	2 occ & temporal	1 sutural/1 temporal
	R	A	A	1 occipital	1 temporal	A	2 temporal
Mental Foramen Number		one	one	one	one	U	one
Mandibular Torus		A	A	trace	trace	U	A
Mylohyoid Bridge	L	absent	A	with hiatus	complete center	U	A
	R	complete center	A	with hiatus	complete center	U	A
Septal Aperture		L	L/R	A	A	L	A
Frontal Grooves		A	L/R	A	A	A	A

L = left
R = right
A = absent
U = unobservable

<u>Pathology</u>

The pathology observed among the Bee Cave individuals include periostitis, degenerative joint disease in the form of osteoarthritis and osteophytosis, and healed fractures.

Periostitis

Periostitis is a nonspecific inflammatory reaction of the periosteum due to bacterial infection or injury (Larsen 1997; Ortner 2003). The reaction is usually localized and results in lesions of woven bone that appear on the surface as if separate from the cortex (Ortner 2003). Healed periosteal lesions appear denser and smoothed over as they are incorporated into the cortex, but can still be recognized by a thickened appearance with longitudinal striations and/or porosity. Periosteal lesions are commonly observed in archaeological samples, although their etiology in such samples is difficult to determine (Ortner 2003). Periostitis is most commonly observed on the diaphysis of the tibia and as such is often associated with syphilis, but the unprotected anterior crest of the tibia may be more vulnerable to injuries that can also lead to periosteal lesions (Ortner 2003).

In the Bee Cave population, periostitis was observed on nine adult long bones belonging to four individuals. In most cases the lesions appear to be healed and not active at the time of death, as they are characterized by thickened areas with slight porosity, longitudinal striations, and smooth edges [Figure 12]. Frequencies by long bone are listed in Table 10. The total frequency of periostitis out of seventy-one long bones is 10.23%. Six of the affected long bones belong to Individual 5, resulting in 54.5% of his long bones exhibiting periostitis. The three other affected bones each belonged to different individuals. Such extensive periostitis in Individual 5 suggests a systemic or chronic disturbance, such as a systemic infection or a nutritional deficiency. Individual 5 also shows an area of porosity and irregularity on the right zygomatic just below the infraorbital foramen. This lesion is not striated and does not resemble the periosteal lesions on the long bones, but is porous with a bubbly appearance. It may be due to an injury or it may be related to the systemic disturbance that caused the periosteal lesions on the long bones. Singular occurrences of periostitis, like those observed in the three other individuals, suggest an isolated cause such as injury, trauma, or localized infection.

Table 10
Frequency of Periostitis in Long Bones

Bones	**# Bones**	**# Affected**	**Frequency**
Humerus	18	0	0
Radius	13	1	7.7%
Ulna	14	3	21.4%
Arm Bones	**45**	**4**	**8.9%**
Femur	19	0	0
Tibia	15	3	20.0%
Fibula	9	2	22.2%
Leg Bones	**43**	**5**	**11.6%**
Total	**88**	**9**	**10.2%**

Although the frequency of affected long bones is low (10.2%), the number of individuals affected by periostitis is high (36.4%). No subadults show signs of infection, but the adult infection rate is 57.1%. Compared to other Lower Pecos sites with an occurrence of 6%, the Bee Cave infection rate is much higher than expected (Steele et al. 1999). The arid environment of the Lower Pecos is thought to facilitate a low infection rate compared to other Texas populations where infection rates are much higher because of moist environments allowing infectious agents to persist. The lower frequency of periostitis in other Lower Pecos samples may be due to a lack of recognition of periostitic lesions, due to their degree of healing or due to fragmented remains. The small sample size of analyzed specimens may also contribute to the lower reported frequency of periostitis.

Figure 12. Periostitis in Individual 5: a) left ulna: medial view of distal shaft; b) right fibula midshaft c) right tibia: anterior view of distal shaft.

Degenerative Joint Disease

Degenerative joint disease (DJD) is a general term referring to the degeneration of amphiarthrodial and diarthrodial joint surfaces over time (Larsen 1997). Diarthrodial joints are highly mobile and with extended time or physical stress can show signs of degeneration such as pitting of the joint surfaces, lipping around the articular surfaces, and in more advanced stages eburnation, or polishing, of the joint surfaces. Degeneration of diarthrodial joint surfaces is generally referred to as osteoarthritis. Amphiarthrodial joint surfaces, such as intervertebral surfaces, are not as mobile, but can still show signs of degeneration known as osteophytosis. In osteophytosis, lipping occurs along the borders of the vertebral bodies eventually forming large spurs or osteophytes, which may overlap and cause fusion of adjacent vertebral bodies.

In the Bee Cave population, osteoarthritis was found on 120 fragments, while osteophytosis was found on 28 vertebral and sacral elements [Tables 11 and 12; Figures 13-17]. There was only one occurrence of eburnation, a sign of advanced osteoarthritis, on the dorsal articular facet of a left calcaneus. All other expressions of osteoarthritis were slight to moderate. An unusual observation was made on the left auricular surfaces of the os coxa and sacrum of Individual 4. The corresponding surfaces were irregular with large pits and lipping. The presence of such pathology may be due to an antemortem injury that caused secondary osteoarthritic changes in the auricular surfaces. A set of fused metacarpals and a matching deformed metacarpal may represent osteoarthritis of the hand. There is also a misshapen right capitate that may come from the same individual as the fused metacarpals. Osteophytosis is also slight to moderate with no occurrences of vertebral fusion due to osteophytic activity.

Figure 13. Lipping of trochlear notches of Individual 3.

Table 11
Frequency of Osteoarthritis

Element	**N Bones**	**N Affected**	**Frequency (%)**
Humerus	18	7	39
Radius	13	4	31
Femur	19	4	21
Scapula--glenoid	12	10	83
Rib--head	75	12	16
Acetabulum	14	6	43
Sternum	9	5	56
Lumbar	26	6	23
Sacrum	6	3	50
Ulna	14	8	57
TMJ	12	3	25
Mandibular condyles	10	3	30
Clavicle	7	3	43
Patella	2	1	50
Thoracic	52	31	60
Cervical	21	4	19
Atlas	5	1	20
Occipital Condyles	11	2	18
Calcaneus	5	2	40
Hand Phalanges	22	1	4.5
Metacarpals	25	3	12
Carpals	12	1	8


a)


b)

Figure 14. Osteoarthritis of the temporo-mandibular joint of Individual 2: a) left TMJ showing pitting and flattening; b) pitting of left mandibular condyle.


a)


b)


c)

Figure 15. Unusual Hand Pathology: a) fused and deformed metacarpals; b) and c) deformed vs. normal right capitate.

Figure 16. Pathology of left auricular surface of Individual 4 (note normal organization of right auricular surface).

Table 12
Frequency of Osteophytosis

Bone	N Bodies	N Affected	Frequency (%)
Cervical	29	3	10
Thoracic	52	8	15
Lumbar	28	14	50
Sacrum	5	2	40
Vert Body	3	1	33

Figure 17. Osteophytosis of a lumbar vertebra.

Fractures

Healed fractures in an archaeological population can be indicators of violence or of the harshness of hunter-gatherer lifestyles. Fractures to the distal shaft of the radius, known as Colles' fractures, are usually due to falls and are seen quite frequently in archaeological populations (Roberts and Manchester 2005). Colles' fractures result in a characteristic posterior displacement of the shaft below the fracture and may also result in injuries to the styloid process of the ulnar head (Mays 2006). Fractures to the ulna are also commonly seen and may be due to falls as well, but they may also represent defense wounds. Parry fractures of the ulna occur at midshaft or in the distal third of the shaft and result from an individual raising his or her arm to block the face from blows (Roberts and Manchester 2005). Accidental fractures to the ulna, especially due to a fall, should result in some corresponding injury, such as dislocation, to the radius (Roberts and Manchester 2005).

In the Bee Cave population, healed fractures occur four times in two individuals. A fifth healed fracture occurs in a hand phalange that was not assigned to an individual [Figure 17]. Individual 2 has a healed fracture of the left distal ulna with slight posterior displacement of the distal shaft below the fracture. She also has a healed Colles' fracture of the right distal radius with posterior displacement of the distal shaft and corresponding flattening of the styloid process and pitting of the right ulnar head. Both fractures are very well healed and may be from a single event [Figure 18]. Individual 3 also has two fractures, but both occur on the left ulna, one right at midshaft and one in the distal third. The shaft is slightly angled at both fractures creating a crooked shaft. Because Individual 3 has frontal depressions that appear to be healed injuries, his ulnar fractures may have resulted from self-defense wounds rather than from a fall. Larsen (1997) reports that self-defense may be indicated by the co-occurrence of forearm fractures and cranial injuries.

Figure 18. Antemortem Injuries in Individual 2 a) medial view of healed Colles fracture in right radius; b) lateral view of right ulnar head showing arthritic changes probably due to injury in a); c) medial view of healed fracture of distal left ulna.

a) b)

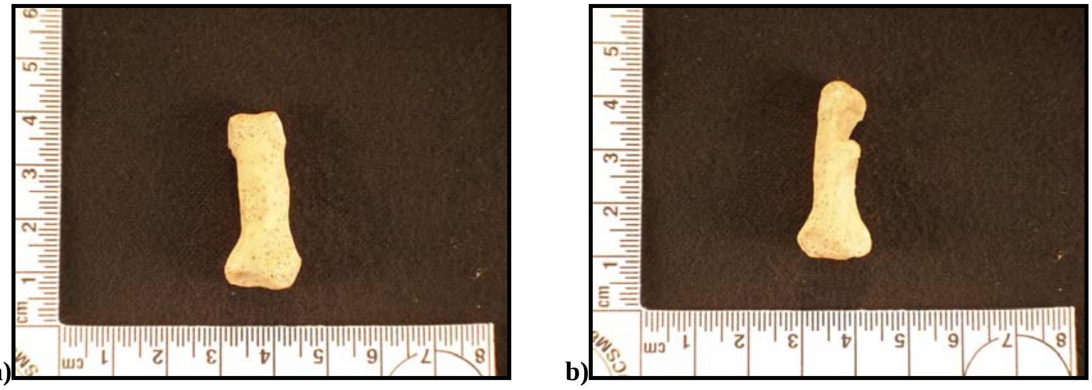


Figure 19. Healed fracture of a proximal hand phalange: a) dorsal view; b) side view.

Cranial Trauma

The diagnosis of antemortem or perimortem trauma can be difficult, especially when working with fragmentary remains. Trauma in archaeological populations can be indicative of levels of interpersonal violence or warfare and thus requires careful analysis and differentiation from postmortem damage. Evidence of violence is most often seen on the skull; it is assumed that such blows are meant to be fatal (Roberts and Manchester 2005). Differentiating perimortem cranial injuries from postmortem damage requires experience and an understanding of bone mechanics under perimortem and postmortem conditions.

One of the most distinguishing features of postmortem damage to bone is the color of the fractured edges compared to the surrounding bone. Fractures caused after deposition tend to be lighter than the surrounding bone, whereas fractures that occurred around the time of death will be stained the same color as the surrounding bone (Roberts and Manchester 2005). Perimortem fractures also show fracture patterning around injuries, such as radiating fractures or concentric fractures, whereas postmortem fractures tend to lack such patterning and tend to shatter due to the dryness of the bone (Maples 1986; Roberts and Manchester 2005). Dry bone fractures tend to have more irregular edges while fractures of fresh bone tend to be clean and more linear with striations across the cut edges left by the weapon (Maples 1986).

Cranial trauma is a likely sign of violence and is more often seen in males than females, and occurs more often on the frontal and parietals (Filer 1997). In the sample used by Steele, et al. (1999), cranial fractures were reported only once in the Lower Pecos, so evidence of perimortem trauma is unexpected in the Bee Cave population. My analysis revealed the presence of cranial trauma to Individuals 2, 3, and 5.

Possible perimortem trauma with no evidence of healing occurs on the left zygomatic of Individual 2 [Figure 20]. There appears to have been blunt force trauma to the zygomatic causing the zygomatic process to be separated from the zygomatic process of the left temporal. There are smaller fractured pieces still adhering to the zygomatic and there is a radiating fracture into the lateral margin of the left orbit. A clean horizontal fracture across the squamosal portion of the left temporal extends endocranially and may be the result of the blow to the left zygomatic.

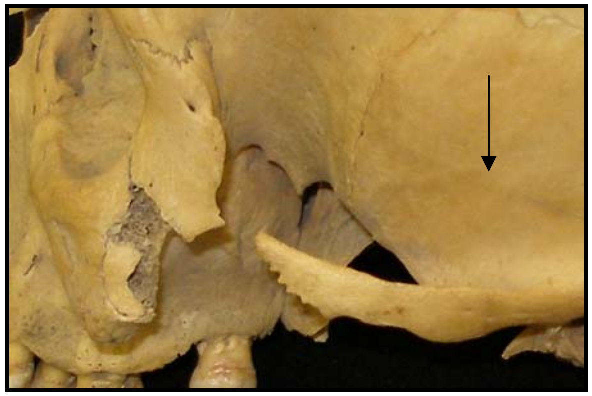


Figure 20. Possible perimortem trauma to the left zygomatic of Individual 2 (arrow points to horizontal fracture across left temporal).

Individual 3 shows evidence of perimortem cranial trauma that probably contributed to his death [Figure 21]. On the frontal bone just above the medial edge of the right orbit, is an injury (22mm x 13mm) which penetrates the frontal sinus. There are small depression fractures along the superior and lateral edges of the injury that bevel inward. The inferior edge is sharp and straight while the superior edge is more rounded. There are two fractures radiating from this injury, one hairline fracture radiating from the medial edge toward the left orbit and one large fracture radiating inferiorly into the right orbit. The second cranial injury occurs on the left greater wing of the sphenoid. The injury is penetrating with fractures radiating through the left temporal, left parietal, and left side of the frontal. Along the superior edge of the injury the greater wing of the sphenoid is depressed inward. These injuries show no signs of healing and may have contributed to cause of death.

Individual 3 also shows cranial pathology that may indicate active healing of past injuries. There are three depressions on the frontal bone above the left orbit. The most superior is 60mm above the left orbit and is roughly circular with a maximum diameter of 10mm. The edges of the pit are soft and rounded while the inside of the depression shows pitting and irregular bone growth. The second depression, located 45mm above the left orbit and lateral to the first, is more oval in shape with a length of 8mm and a height of 6mm. The pit features are similar to the first. The third depression is immediately above the left orbit just medial to the zygomatic process of the frontal. This depression shows the same features of the first two, but is more oval in shape. A similar depression on the frontal bone was reported in a male from Coontail Spin (Benfer and McKern 1968) and in other skulls from southwest Texas (Stewart 1935). Upon further inspection the depressions also appear to protrude endocranially. The presence of injuries to the left side of the cranium suggests the possibility of violence in the Lower Pecos, as most face-to-face attacks with a right-handed assailant result in injuries to the left fronto-parietal region (Filer 1997; Wakely 1997).

Individual 5 has the most traumatic cranial injury which most likely caused death. A large wedge-shaped injury with sharp edges occurs on the left frontal and parietal with fractures radiating across the frontal to the right orbit, and into the left side of the occipital. Much of the left side of the cranium is missing. The extensive damage to the left side of the cranium may be due to a combination of postmortem damage as well as multiple perimortem blows to the head.

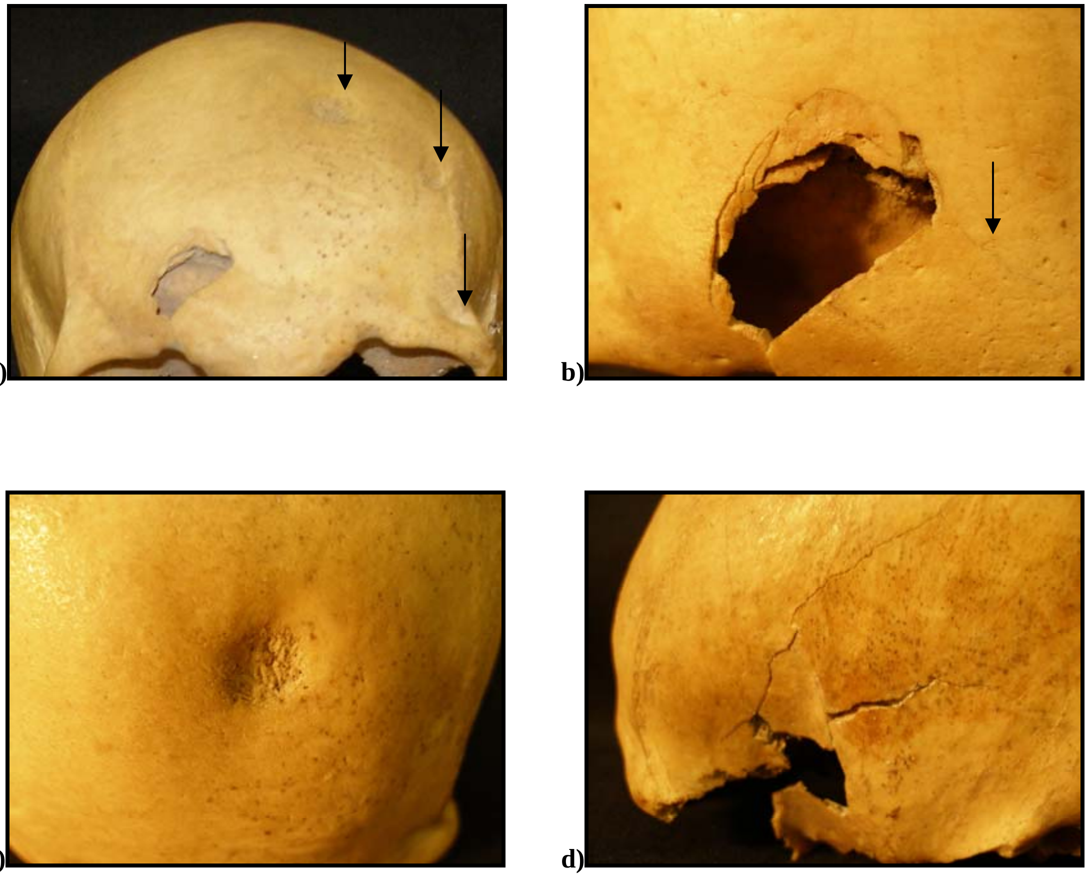


Figure 21. Cranial trauma to Individual 3: a) anterior view of frontal showing perimortem and antemortem trauma (arrows pointing to three depressions); b) closeup of perimortem injury to right frontal (arrow pointing to radiating fracture); c) close-up of superior-most depression; d) perimortem trauma to left temporal, sphenoid, and left parietal (note radiating fractures).

Dental Analysis

Dental inventory was recorded to indicate the presence and condition of loose teeth, teeth in the socket, and observable tooth sockets according to the standards outlined by Buikstra and Ubelaker (1994). Recorded observations include antemortem tooth loss (AMTL) and alveolar resorption, postmortem tooth loss, caries, abscessing, attrition, hypercementosis, linear enamel hypoplasias, periodontal disease, and nonmetric traits.

Table 13
Adult Dental Pathologies by Individual

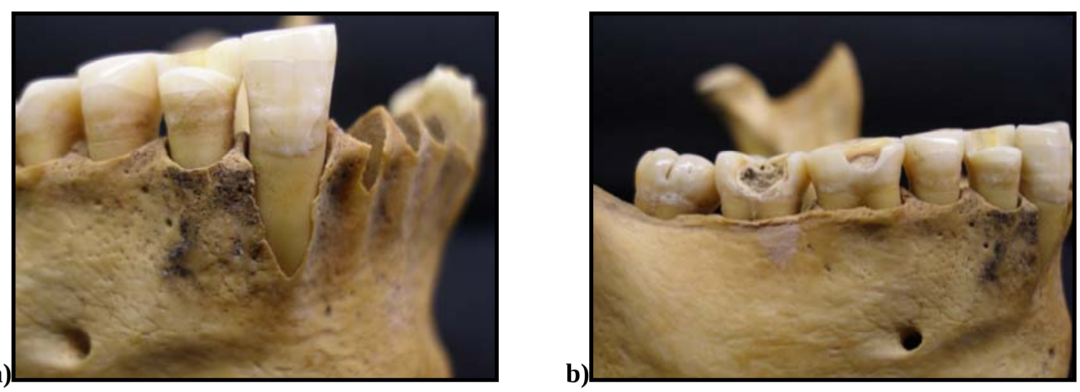
	Individual 1	Individual 2	Individual 3	Individual 4	Individual 7
Sex	**F**	**F**	**M**	**M**	**M**
# Antemortem Loss	26	20	13	0	1
# Observable Sockets	27	32	16	24	32
% AMTL	96.3	62.5	81.3	0	3.1
% Abscesses	11.1	6.25	0	4.2	0
% Caries	0	25.0	0	70.0	26.3
% Hypercementosis	0	50.0	0	0	0
% Periodontal Disease	0	62.5	0	30.0	0
% Linear Enamel Hypoplasias	0	0	0	20.0	5.3

Table 13 shows dental pathology frequencies observed per individual with scorable teeth and/or sockets. Table 14 shows the pathology frequencies for all adult dentition. The frequencies for each type of pathology appear low within the population due to the high antemortem tooth loss and postmortem loss of anterior dentition. The frequency of linear enamel hypoplasias would most likely increase if more anterior teeth were present. Individual 4 provides a glimpse of Lower Pecos dentition leading up to tooth loss [Figure 22]. Although a few teeth are missing postmortem or damaged, the ten observable teeth within Individual 4 have large caries and high levels of attrition. The first right mandibular molar shows the highest level of attrition, while the other mandibular and maxillary molars are much less worn due to their large caries that may have inhibited normal chewing.

Table 14
Dental Pathology Frequencies (%)

Pathology	**Frequency**
Abscesses[1]	5
Caries[2]	35
Hypercementosis[2]	9
Linear Enamel Hypoplasias[2]	6.5
Periodontal Disease[2]	17

[1]N = 132 observable sockets
[2]N = 46 observable teeth



a) b)

Figure 22. Dental Pathology in Individual 4: a) linear enamel hypoplasias; b) large occlusal/buccal caries and flat attrition of right mandibular teeth.

Table 15
Adult Antemortem Tooth Loss Frequencies (%)*

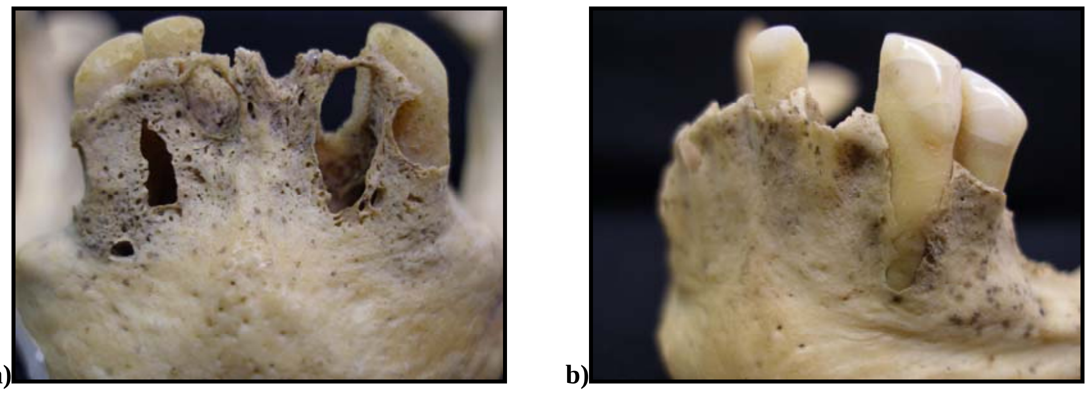
Maxilla	Left	Right	Total	Mandible	Left	Right	Total
Incisor	66.7	33.3	50	**Incisor**	40.0	30.0	35.0
Canine	33.3	33.3	33.3	**Canine**	20.0	20.0	20.0
Premolar	50.0	25.0	35.7	**Premolar**	50.0	60.0	55.0
Molar	33.3	18.2	25.0	**Molar**	66.7	60.0	63.3
Average	45.8	25.0	34.6	**Average**	50.0	47.5	48.8

*Frequencies calculated by dividing the quantity showing antemortem loss by the number of observable sockets for each tooth type.

Table 16
Antemortem Loss of Molars (%)

Maxilla	Left	Right	Total	Mandible	Left	Right	Total
M1	0	25.0	12.5	**M1**	60.0	60.0	60.0
M2	66.7	25.0	42.9	**M2**	80.0	60.0	70.0
M3	33.3	0	16.7	**M3**	60.0	60.0	60.0

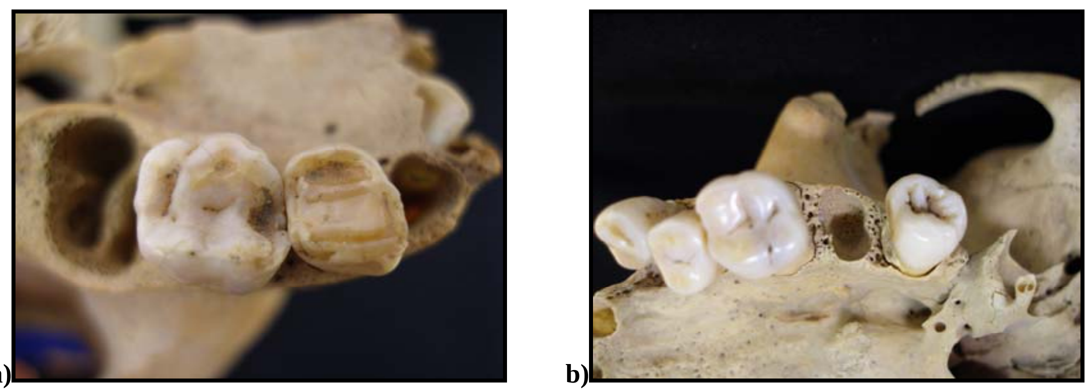
Dental attrition in the Bee Cave population ranges from slight to severe. In most cases the teeth are worn flat with rounded edges and with a very smooth polish. The high level of attrition is most likely due to the processing of desert plant materials that are very fibrous. These plants were processed for food and also for the making of cordage, matting and basketry. Attrition is even found on deciduous molars to a slight to moderate degree. Although manos and metates are found in the Lower Pecos, SEM analyses of the microwear on teeth are not consistent with damage caused by stone grit or hard seeds, nor do coprolites support either as major dietary inclusions (Danielson and Reinhard 1998). Desert succulents such as prickly pear and agave have high concentrations of calcium oxalate phytoliths, which are overwhelmingly represented in coprolites, and which have a hardness equivalent to that of enamel (Danielson and Reinhard 1998). It is highly likely that the processing of prickly pear and agave contributed to the levels of attrition observed in the Lower Pecos. Plant processing is evident even in the anterior dentition of individuals with complete antemortem loss of posterior dentition [Figure 23]. Anterior dentition would not have been effective in chewing food, but was more likely worn by processing succulents for their fibers.



a) b)

Figure 23. Examples of Attrition and Alveolar Resorption: a) anterior dentition of Individual 3 showing continuous eruption, resorption, and attrition into dentin; b) anterior dentition of Individual 2 showing angled attrition (from mesial to distal) of left mandibular first premolar.

Table 17 shows the average dental attrition scores for each tooth type in all adult Bee Cave dentition, loose and bound. Anterior dentition and premolars were scored using Smith's (1984) eight point scale, while molars were scored using Scott's (1979) four quadrant method, yielding scores from 0 to 40. Many molars could not be included in the calculation of average attrition because caries inhibited the scoring of one or more quadrants. In the Bee Cave population, molar wear ranges in adult permanent dentition from as low as 4 to as high as 36. Most molars in Lower Pecos individuals do not reach such a high score as 36 because of antemortem loss due to caries (Hartnady 1988). The averages for maxillary and mandibular molar wear scores are not that different, but that is because of the one maxillary first molar with a score of 36. Without that score, the maxillary average becomes 12.3, which is still not significantly different from the mandibular average. In his analysis of remains from Skyline Shelter, Powell (1991) did find a significant difference in attrition values between maxillary and mandibular dentition. One deciduous second molar was scored at 15, exceeding the average scores for adult permanent molars. Figures 24 and 25 illustrate varying levels of attrition and AMTL in the Bee Cave population.



a) b)

Figure 24. Varying levels of attrition: a) attrition of deciduous molars in Individual 8; b) low rates of attrition in left maxillary dentition of Individual 2.

Table 17
Dental Attrition Scores

Maxilla	**Average**	**N**	**Mandible**	**Average**	**N**
Incisors	0	0	Incisors	6.25	4
Canines	3.5	2	Canines	6.5	4
Premolars	3.8	5	Premolars	4.6	5
Molars	14.0	12	Molars	14.9	8

Figure 25. Adult manidbular dentitions showing varying levels of AMTL: a) Individual 1; b) Individual 2; c) Individual 3; d) Individual 4; e) Individual 7.


a)


b)

Figure 26. Nonmetric traits in subadult dentition: a) shovel shaped incisor in unerupted right maxillary central incisor; b) Carabelli's cusp in deciduous maxillary second molar.

Nonmetric traits include shovel-shaped incisors as observed in unerupted permanent maxillary incisors and the presence of Carabelli's cusp in a deciduous maxillary molar [Figure 26]. Shovel-shaped incisors are common within Native Americans while Carabelli's cusp is rarely seen in Native Americans and is more frequently associated with Western Eurasians (Scott and Turner 1997).

Sorting of Commingled Remains

Commingling of skeletal remains is a long-standing problem encountered by physical anthropologists in both archaeological and forensic contexts. Physical anthropologists are often called to aid in victim identification in mass disasters, mass graves, and war situations in which human remains have become commingled. In archaeological contexts, the issue can be further complicated by the lack of clothing, soft tissue, or decomposition stages to aid in element separation. Elements buried in the same context for an extended amount of time can be expected to have experienced the same taphonomic changes and therefore to share color and staining patterns. Postmortem damage to elements especially during excavation and/or storage can further complicate the situation and make sorting more difficult. Physical anthropologists rely on pair matching, articulation, osteometrics, taphonomy, pathology, stature, age, sex, and process of elimination to sort commingled remains into individuals (L'Abbé 2005; Schaefer and Black 2006).

The nature of the Bee Cave remains allowed sorting of the crania, os coxae, and major long bones into individuals. This provides for more complete descriptions of the individuals and a basis for comparative studies between individuals of different age and/or sex. The following includes brief descriptions of the Bee Cave adults.

Figure 27. Cranium of Individual 1.

Individual 1

Individual 1 is an adolescent/young adult female, aged 15-22. She represents the second smallest of the Bee Cave adults, with a stature of 161.62 ± 3.18cm (5’2”-5’5”). The presence of two female crania facilitated the sorting of female from male infracranial elements. The long bones were easily sorted based on their gracility and active epiphyseal fusion. The cranium of Individual 1 was clearly younger than that of Individual 2, so the younger of the female infracranial elements were assigned to Individual 1. Nonmetric trait analysis of the infracranium revealed a septal aperture on the left humerus.

The cranium of Individual 1 is fairly complete with the craniofacial region showing the most postmortem damage. The frontal bone was taped to the left and right parietals with masking tape that left a residue on the surface when removed. The coronal and sagittal sutures are fairly straight and clearly show no fusion, corroborating the young age of this individual. Nonmetric cranial traits include an accessory ossicle at asterion on the left side and a mastoid foramen on the left temporal.

The most noticeable pathology in Individual 1 is in the dentition. Even at such a young age, antemortem tooth loss is nearly one hundred percent with all but one observable tooth socket showing alveolar resorption. The single tooth present, the left maxillary first molar, has a Scott (1979) wear score of 36 indicating attrition into the dentin and the presence of only a thin rim of enamel on all four quadrants, although some was broken off postmortem. Individual 1 also has evidence of three buccal maxillary abscesses. Above the left maxillary molars is an irregular area with pitting on the internal and external surfaces indicating the spread of infection from the dentition into the maxilla above the alveolus. The mandible shows complete resorption of the posterior alveolus and active resorption of the anterior alveolus. For such a young individual, the dental pathology is highly advanced, suggesting possible overuse of the dentition as tools.

Pathology of the infracranium consists of minor expressions of osteoarthritis. The left radius contains a single large pit in the superior surface of the head while the right radius contains two similar pits. The right ulna has irregular edges along the trochlear notch with two pits. Both scapula show slight porosity along the inferior edges, but the right scapula also shows porosity along the posterior edge and a slight irregular depression in the center of the glenoid fossa. These characteristics probably represent early stages of osteoarthritis, an unusual finding for such a young individual, but a possible indicator of physically demanding activities (Larsen 1997).

Figure 28. Cranium of Individual 2.

Individual 2

Individual 2 is a young/middle adult female, 27-45 years old, with a stature of 168.89 ± 3.80cm (5’5”-5’8”), much taller than Individual 1. Nonmetric infracranial traits include complete septal apertures on the distal ends of both humeri and a sacralized fifth lumbar vertebra. Nonmetric cranial traits include an accessory ossicle along the left side of the lambdoidal suture, a mastoid foramen in the left temporal bone, complete infraorbital sutures on left and right maxilla, and vascular grooves on the left and right sides of the frontal bone.

Individual 2 displays multiple healed fractures to the right radius and left ulna, with secondary osteoarthritis to the right ulna probably due to the fracture of the right radius. Individual 2 also exhibits signs of mild osteoarthritis in the form of slight porosity and/or lipping on articular surfaces, such as on the edge of the left humeral head, the trochlear notches of the left and right ulnae, the distal heads of both ulnae, and the superior articular facets of the atlas, all of which may be due to degeneration with age or physical activities (Larsen 1997). The left temporo-mandibular joint is also porous and appears filled in and flattened anteriorly. The corresponding left condyle on the mandible is irregularly shaped and pitted and shorter than the right condyle. This damage may have been due to an injury causing dislocation of the temporo-mandibular joint or may simply be a result of dietary factors or use of the dentition as tools (Larsen 1997).

Dental pathology is extensive with only eight teeth present, five maxillary and three mandibular. Attrition on all but one tooth is flat and smooth with rounded edges and a high polish. On the left mandibular first premolar, the wear is sharply angled from mesial to distal. Buccal abscesses are present on the right maxilla at the canine and lateral incisor. Caries occur on the right maxillary third molar and the left maxillary first molar. Hypercementosis occurs on four out of five maxillary teeth, the right third molar, left canine, left first molar, and left third molar. Periodontal disease is also evident on all five maxillary teeth with the alveolus pulling away from the cemento-enamel junction to reveal a large portion of the roots. The high sugar diet of the Lower Pecos may have contributed to the high incidence of periodontal disease in Individual 2 (Roberts and Manchester 2005).

Figure 29. Cranium of Individual 3.

Individual 3

Individual 3 is a middle aged adult male, 34+ years old with a stature of 169.965 ± 3.80cm (5’5”-5’8”). Nonmetric traits include the presence of an auditory exostosis of the right external auditory meatus, complete division of the left and right hypoglossal canals, mastoid foramina, a trace mandibular torus, and mylohyoid bridge near the mandibular foramen.

Like Individual 2, Individual 3 shows evidence of a healed fracture of the left ulna. However, Individual 3 has two healed fractures, one about midshaft and the second more distally located just above the pronator attachment. Subsequently, the distal head of the left ulna shows some lipping on the anterior/superior edge. The left radius also shows signs of secondary osteoarthritis consistent with injury of the left ulna. The radial head contains large pits on the medial surface as well as pitting and “denting” of the superior surface.

There are other forms of infracranial pathology consistent with early osteoarthritis. The right humerus shows some porosity on the posterior edge of the head and lipping on the superior and inferior edge of the head. The distal right humerus shows some porosity on the medial edge of the trochlea and the lateral edge of the capitulum. This coincides with pronounced lipping and irregularity on the trochlear notch of the right ulna. The left ulna shows similar lipping and porosity around the lunar notch. Other infracranial pathology includes a raised roughened area on the medial side of the anterior crest of the right tibia at midshaft, probably evidence of mild periostitis possibly due to an injury.

Individual 3 also has perimortem cranial trauma to the frontal and left spheno-temporal region. Evidence of past trauma occurs in the form of three depressions to the left side of the frontal. The corresponding parry fractures on the left ulna suggest a violent confrontation during the life of Individual 3.

The dentition of Individual 3 is represented only by the mandible as the cranio-facial region is highly damaged and the maxillae are absent. There are only three teeth present on the mandible, the left mandibular canine, the right lateral incisor, and the right mandibular canine. The three present teeth have no enamel and consist only of dentin that is worn to a smooth polish, suggesting continued use of the teeth even though pulp chambers were exposed. All other teeth were lost antemortem and show complete alveolar resorption in the posterior teeth and active resorption in the anterior teeth.

Figure 30. Cranium of Individual 4.

Individual 4

Individual 4 is an adolescent/young adult male, aged 15-23 with a stature of 172.96 ± 3.18cm (5’7”-5’9”). Nonmetric cranial traits include the persistence of a trace of the metopic suture 12mm above nasion, accessory parietal foramina, sutural bones along the coronal and lambdoidal sutures, and left and right mastoid foramina on the occipito-mastoid suture and on the temporal bone, respectively. Individual 4 had three ossicles, coronal and left and right lambdoidal.

Infracranial pathology includes pitting on the medial condyle of the right femur. The left fibula exhibits periostitis at midshaft on the posterior surface. The auricular surfaces of the left os coxa and sacrum show evidence of pathology, possibly due to infection or injury, in the form of large pits and irregularity of the surfaces. The mandible shows slight pitting on the posterior surfaces of both condyles and the corresponding TMJs are also slightly porous.

Dentition is represented by a complete mandible and only the right maxilla. Although not all teeth are observable due to postmortem loss and/or damage, Individual 4 shows no alveolar resorption indicative of antemortem tooth loss. However, the dentition shows high attrition and multiple large caries. Three molars could not be scored for attrition in all four quadrants because of large caries that obliterated one or more quadrants. All teeth show flat smooth wear. The mandibular canines also have linear enamel hypoplasias. One buccal abscess occurs on the left mandible at the first molar. The maxillary teeth show evidence of periodontal disease with slight exposure of the roots.

Individual 4 and Individual 1 are similar ages, yet the dentitions of the two individuals are in sharp contrast. Individual 1 has lost nearly all teeth antemortem while Individual 4 has lost none. This contrast may reflect differences in diet or plant processing between males and females, but larger sample sizes are needed to explore this possibility.

Figure 31. Cranium of Individual 5.

Individual 5

Individual 5 is a middle adult male, 35-45 years old with severe cranial trauma and extensive infracranial periostitis. Stature based on the left femur is 173.62 ± 3.80cm (5’7”-5’10”). Nonmetric traits include the presence of a partial metopic suture above nasion, an epipteric bone at the junction of the frontal, right parietal, right temporal, and sphenoid, two mastoid foramina on the left temporal and occipital, a septal aperture on the distal left humerus, and a sacralized fifth lumbar. He has an unusual accessory ossicle in the right temporal, with an accessory suture inferior and parallel to the squamosal suture. What appears to be a fracture extends inferiorly from the posterior end of this suture down to the mastoid process. The mastoid itself has an accessory suture extending from the posterior edge of the external auditory meatus to asterion. These sutures are visible endocranially as well.

This individual exhibits the most extensive pathology of all the Bee Cave individuals, in the form of periostitis throughout the infracranium and slight periostitis on the right zygomatic below the zygomatic foramen and extending about 18mm wide by 20mm long. Periostitis occurs on the left and right ulnae, right radius, left and right tibia, and right fibula. The right tibia exhibits the multiple occurrences of periostitis, with the largest area covering nearly the entire distal third of the shaft. The extensive presence of periostitis suggests a systemic disturbance, such as a nutritional deficiency, rather than widespread infection.

Other pathology includes mild osteoarthritis. The head of the right fibula is enlarged and deformed. Porosity occurs on the superior edge of the left and right acetabula, the medial and lateral condyles of the right tibia, the distal head of the right ulna, the distal articulations of the left humerus, and the antero-lateral edges of the left and right occipital condyles. The styloid process of the right ulna is flattened. There is also some lipping on the right humerus around the edge of the head, the antero-superior edge of the capitulum and trochlea, and on the postero-lateral edge of the capitulum. Corresponding to the lipping of the right humerus is lipping of the inferior margin of the trochlear notch of the right ulna. The fifth lumbar, fused to the sacrum, exhibits minor osteophytes on the anterior edge of the body.

Cranial trauma occurs in Individual 5 in the form of a large wedge-shaped injury to the left side of the frontal. The edges are straight and sharp and show no evidence of healing. Much of the left side of the cranium is missing, possibly due to a combination of postmortem damage and multiple perimortem blows to the head.

Individual 6

Individual 6 is represented by the fewest infracranial remains which are all highly bleached and weathered and subsequently damaged. This is the only individual with such extensive weathering, suggesting long-term exposure to the sun at some point during interment. The few available long bones show some epiphyseal fusion in progress, suggesting an adolescent/young adult, age 17-23 years old. The highly fragmented os coxae retain enough of the sciatic notch to suggest a female. The very gracile long bones also suggest a female. Stature was roughly estimated using the right humerus to be 156.62 ± 4.25cm (5’0” to 5’3”).

Figure 32. Cranium of Individual 7.

Individual 7

Individual 7 represents the most complete and the most unusual of the Bee Cave individuals. He is an adolescent/young adult male, 21-30 years old, with an estimated stature of 169.535 ± 3.80cm (5’5”-5’8”). Taphonomic condition allowed assignment of a complete skull to a nearly complete infracranial skeleton for this individual. All bones were covered with a thick coating of dirt and small dense root fibers and some bones were slightly bleached. The third distinguishing feature of this individual, which will be further discussed below, was the presence of bright green stains on many bones. The skull was slightly bleached with a large cross painted onto the superior surface of the cranial vault with some type of clear glaze or lacquer and contained a typed note which stated “Skull and bones from the cave.”

Skeletal pathology for Individual 7 was limited to a few indicators of slight osteoarthritis in the form of pitting and/or porosity of articular surfaces. Porosity was observed on the medial and lateral ends of the right clavicle, head of the left humerus, radial notch and distal head of the right ulna, the anterior surfaces of vertebral bodies, the right and left lamina of T10, and the heads of some ribs.

The dentition of Individual 7 was in excellent condition compared to the other Bee Cave individuals. Only one tooth, the left second mandibular molar, showed antemortem loss and alveolar resorption. The other maxillary and mandibular molars showed moderate wear and the presence of small caries. Many anterior teeth were lost postmortem, but those present exhibited moderate wear with slight dentin exposure. Linear enamel hypoplasias were observed on the right mandibular first premolar.

Nonmetric cranial traits in Individual 7 include complete infraorbital sutures on the left and right maxillae, left and right parietal foramina, one sutural and one temporal mastoid foramina on the left temporal, and two temporal mastoid foramina on the right temporal.

The bright green stains on Individual 7 are probably due to the presence of brass adornments within the burial context. Brass bracelets would have caused staining of the radii and ulnae, while a necklace may have caused staining of the right clavicle, second left rib, posterior right humerus, right scapula, right mandibular ramus, occipital, and right mastoid process. Additional staining of the left anterior iliac crest and of the right greater trochanter may have been caused by contact with the bracelets if the body was interred in an extended position. Hester (1968) observed and described brass bracelets identified as accompanying a burial from Bee Cave in the Crockett County Museum. Similar bracelets from the White site in Yoakum County were described by Suhm (1962). The bracelets are incomplete ovals and include both decorated and undecorated examples. Suhm reports that such bracelets were popular in the 18th and 19th centuries with many Native American groups; therefore tribal affiliation would be difficult to establish.

CHAPTER V

SUMMARY AND CONCLUSIONS

The artifacts associated with the Bee Cave burials are not diagnostic and do not contribute an age estimate for the site. The presence of an elaborate child bundle burial suggests the Archaic, possibly Late Archaic, when such burials seem to predominate. Individuals 1-5 are in the same taphonomic condition and appear to have been interred at the same time. Their shared nonmetric traits may suggest a familial connection among these individuals. The extensive weathering of Individual 6 indicates significant exposure and possibly a more recent burial if located on or near the surface. Individual 7 is most likely from the Historic Period and provides an opportunity to study biology and mortuary practices from this time period. Radiocarbon dates of all the Bee Cave individuals will provide a more accurate framework for interpreting the relationships of the individuals to each other and to other burials in the Lower Pecos.

The biology of the Bee Cave individuals compares well with others from the Lower Pecos. Many of the same nonmetric traits and pathology are observed. However, there also appears to be more variation in the presence of additional subadults, stature, pathology frequencies, dental pathology, and cranial trauma. The amount of variation in the Bee Cave population suggests that there is no typical biological profile, and instead suggests biological variability which may contribute to understanding the relatedness of

Lower Pecos individuals to surrounding populations. Although cultural materials have been used to distinguish the Lower Pecos as a distinct cultural region, biological comparisons have yet to be made due to a lack of published analyses of the numerous burials.

The presence of perimortem cranial trauma disrupts the supposedly peaceful hunter-gatherer lifestyle by implying the presence of violence within the local population or from outside populations. If Individuals 1-5 date to the Late Archaic, their cranial trauma would coincide with other cultural changes observed for this time period. The Cibola Period of the Late Archaic represents a period when bison returned to the Lower Pecos possibly accompanied by intrusive bison hunters, as suggested by a shift in projectile point concentrations to open terrace sites as opposed to rockshelters (Turpin 1991). Violence would suggest negative interactions between the indigenous and intrusive populations that may have had effects on social structure (Turpin 1991).

The Bee Cave sample provides data which will be useful in making inter- and intra-population comparisons. Thoroughly analyzed individuals provide opportunities for population level analyses to assess changes in biology, diet, pathology, and mortuary customs. Stable isotope analyses of individuals with assigned sex and age will help clarify data that suggest two dietary populations in the Lower Pecos and provide possible cultural implications of such distinctions. Bioarchaeology has become more focused on population level analyses based on sufficient data to make such assessments. The numerous burials from the Lower Pecos provide this opportunity but only when they have been analyzed and published. The lack of provenience for many of the burials is unfortunate, but the lack of publication of skeletal analyses for such a rich and unique region is even more unfortunate. The data that can be obtained from methodical analyses by skeletal biologists are extensive and provide a biological framework for cultural interpretation. This analysis of the individuals from Bee Cave Rockshelter is by no means complete, but it provides a data set to be used for future studies and more importantly it contributes to a better understanding of the dynamic lives of Lower Pecos individuals.

APPENDIX A:

COMPLETE SKELETAL INVENTORY

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
BB	1	tibia	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-22		
BB	3	tibia	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/1	1	A	15+		Periostitis
BB	4	tibia	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-22		
BB	2	tibia	R	pe-p1/3-m1/3-d1/3-de	2/3/1/1/2	3	A	15+		
BB	7	tibia	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/1	1	A	14+		
BB	6	humerus	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/2	1	A	14-23		
BB	7	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	3	A	14+	M	
BB	4	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14-23	?	
BB	5	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14+	?	OA
BB	3	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14+	?	OA
BB	1	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14-22	F	
BB	7	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17-22	M?	OA
BB	4	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17-22	F	
BB	7	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/2	1	A	17+	M	
BB	5	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	?	OA
BB	2	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	?	OA
BB	3	femur	R	pe-p1/3-m1/3-d1/3	1/1/1/2	1	A	17+	?	OA
BB	6	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/2	1	A	14-21	F	
BB		femur	R	p1/3-m1/3-d1/3	1/1/1	1	S	3.5-5.5		
BB		femur	R	p1/3-m1/3-d1/3	1/1/1	2	S	1.5-3		
BB		humerus	L	p1/3-m1/3	1/1	1	S	<14		
BB	5	fibula	R	pe-p1/3-m1/3	1/1/1	1	A	14+		Periostitis
BB	4	fibula	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14-21		
BB		clavicle	R	all but lateral end	1	1	A	20+		
BB		scapula	R	all	1	2	A	15-25		OA
BB		scapula	R	glenoid/coracoid/lat.	1/2/1/2/2	2	A	15-25		OA
				border/medial border/sub						
				scapular fossa						

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
BB		scapula	R	acromion/glenoid/	1/1/2/1/1/3	1	A	15+		OA
				coracoid/sup.border/						
				scapular spine/medial						
				border						
BB	7	scapula	R	all	1	1	A	15+		
BB		metacarpal 2	R	all	1	1	A			
BB		metacarpal 3	R	all	1	1	A			
BB		rib 1	R	all	1	1	A	15-25		
BB		rib (3-12)	R	head-tubercle	1	1	A	15-25		
BB		rib (3-12)	R	head-tubercle-shaft	1	1	S			
BB		rib (3-12)	R	shaft	2	1	?			
BB		rib (3-12)	R	head-tubercle-shaft	1	1	S			
BB		rib (3-12)	R	head-tubercle	1	1	S			
BB	7	rib 3	R	head-tubercle-shaft	1	1	?			Green staining
BB		rib (3-12)	R	tubercle-shaft	2	1	A			
BB		rib (3-12)	R	head-tubercle	1	1	A	15-25		
BB		rib (3-12)	R	all	1	1	A	15+		OA
BB		rib (3-12)	R	head-tubercle-shaft	1	2	A	15+		OA
BB		rib (3-12)	R	all	1	2	A	15+		OA
BB		rib (3-12)	R	head-tubercle-shaft	1	1	A	15+		OA
BB		rib (3-12)	R	tubercle-shaft	2	1	A			
BB		rib (3-12)	R	all	1	1	A	15+		OA
BB		rib (3-12)	R	shaft-sternal end	2	1	A			
BB		rib (3-12)	R	shaft-sternal end	2	1	S?			
BB		rib (3-12)	R	shaft	2	1	?			
BB		rib (3-12)	R	sternal end	3	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
BB	7	os coxa	R	ilium-ischium-pubis-	1/1/1/1/2	1	A?		M	
				acetabulum-auricular						
				surface						
BB	4	os coxa	R	ilium-ischium-pubis-	1/1/1/1/1	1	A	<29	M	OA
				acetabulum-auricular						
				surface						
BB	2	os coxa	R	ilium-acetabulum-	1/1/1	2	A	60+	F?	OA
				auricular surface						
BB	3	os coxa	R	ilium-acetabulum	3/2	1	A	34-59	M?	
BB		sternum		manubrium/body	2/2	2	A			OA
BB		sternum		manubrium	1	1	A			OA
BB		vertebra		spinous process & RIAF	3	1	A			
BB		lumbar vertebra		body-neural arch	1/1	1	A			OA, OP
BB		lumbar vertebra		body-neural arch	1/1	1	A			OA, OP
BB	2	sacrum		all	1	1	A			OP
BB		clavicle	L	all	1	1	A	20+		
BB		clavicle	L	all	1	1	S	<25		
BB		scapula	L	acromion/glenoid/cora-	2/1/1/2/2/2	5	A			OA
				coid/med.border/lat.bor						
				der/fossa						
BB		rib (3-12)	L	head-tubercle-shaft	1	1	A	15-25		
BB		rib (3-12)	L	shaft-sternal end	2	2	S			
BB		rib (3-12)	L	sternal end	3	1	S			
BB		rib (3-12)	L	shaft	2	2	?			
BB		rib (3-12)	L	shaft	2	1	?			
BB		rib (3-12)	L	shaft	3	1	?			
BB		rib (3-12)	R	shaft, sternal end	2	1	A			
BB		rib (3-12)	L	shaft-sternal end	2	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
BB		rib (3-12)	L	shaft-sternal end	2	1	A			
BB		rib (3-12)	L	shaft-sternal end	2	1	A			
BB		rib (3-12)	L	shaft	2	1	A?			
BB		rib (3-12)	L	shaft	2	1	A?			
BB		rib (3-12)	L	shaft	2	1	A?			
BB		rib (3-12)	L	all	1	2	A			OA
BB		rib (3-12)	L	head-tubercle-shaft	1	2	S			
BB		rib (3-12)	L	head-tubercle-shaft	1	1	A	15-25		
BB		rib (3-12)	L	head-tubercle-shaft	1	1	S			
BB		rib (3-12)	L	head-tubercle-shaft	1	1	S			
BB		rib (3-12)	L	head-tubercle-shaft	1	2	S			
BB		rib (3-12)	L	head-tubercle-shaft	1	1	A	15-25		
BB		rib (3-12)	L	head-tubercle-shaft	1	1	S			
BB		rib (3-12)	L	head-tubercle-shaft	1	2	S			
BB		rib (3-12)	L	head-shaft	1	1	A	15-25		
BB		rib (3-12)	R	shaft-sternal end	2	1	S			
BB		rib (3-12)	R	shaft-sternal end	2	1	S			
BB	7	rib 2	L	all	1	1	A			
BB	7	rib (3-12)	L	head-tubercle-shaft	1	2	A			
BB	4	humerus	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	2	A	14-23	?	
BB	2	humerus	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14+	M?	OA
BB	7	humerus	L	p1/3-m1/3-d1/3-de	1/1/1/2	1	A	15+	M	
BB	1	ulna	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-23		
BB	4	ulna	L	pe-p1/3-m1/3-d1/3	1/1/1/1	1	A	13+		
BB	3	ulna	L	pe-p1/3-m1/3-d1/3	1/1/1/2	1	A	13+		OA, fracture
BB	7	ulna	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-23		
BB	5	radius	L	m1/3-d1/3-de	3/1/1	3	A	17+		
BB	4	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14-22	F	

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
BB	7	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17-22	F	
BB		femur	L	p1/3-m1/3-d1/3	1/1/1	2	S	1.5-3		
BB		femur	L	p1/3-m1/3-d1/3	1/1/3	3	S	<12		
BB	6	femur	L	pe-p1/3-m1/3-d1/3-de	2/1/1/1/2	1	A	17+		
BB	2	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	2	A	17+	?	
BB	4	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-19	M	
BB	3	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	?	
BB	1	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	F	
BB	7	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	2	A	17+	M	
BB	6	tibia	L	p1/3-m1/3-d1/3-de	1/1/1/1	1	A	14+		
BB		tibia	L	p1/3-m1/3-d1/3	1/1/2	1	S	4-7		
BB	2	tibia	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	3	A	15+		
BB	1	tibia	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-22		
BB	5	tibia	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15+		Periostitis
BB	4	tibia	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-22		
BB	1	fibula	L	m1/3-d1/3-de	1/1/1	1	A	14-20		
BB	2	fibula	L	m1/3-d1/3-de	2/1/1	1	A	14+		
BB	4	fibula	L	pe-p1/3-m1/3-d1/3	1/1/1/2	1	A	14-21		Periostitis
BB	7	os coxa	L	all	1	1	A	21-46	M	
BB	2	os coxa	L	ilium/ischium/acetabu-	1/1/1/1	2	A	42+	F?	OA
				lum/auricular surface						
BB	3	os coxa	L	ilium/ischium/pubis/ace-	2/1/1/1/1	4	A	34+	M	
				tabulum/auricular surface						
BB	5	os coxa	L	ilium/ischium/pubis/ace-	2/1/1/1/2	2	A	21-39	?	OA
				tabulum/auricular surface						
BB		cuboid	L	all	1	1	A			
BB		rib	R?	sternal end	3	1	A			
BB		tibia?	?	p1/3	2	1	S			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
BB		radius?	L?	d1/3	1	1	S			
BB		postcranial frag	?		3	6	?			
BB		scapula fragment	?	fossa	3	1	A			
BB		rib fragment	?	shaft	3	1				
BB		sphenoid	R	infratemporal crest	3	1				
BB	1	temporal	L	squama/petrous/mastoid	1/1/1	1	A			
BB		sphenoid	L		3					
BB	1	nasal	R&L		1/1	1	A			
BB	9	parietal	L		1	1	S			
BB	10	parietal	L	all	1	1	S			
BB	10	parietal	R	all	1	1	S			
BB	10	frontal		all	1	1	S	0-4		
BB		maxilla	R	frontal process, infra-			S	<6		
				orbital foramen						
BB	1	temporal	R	petrous/mastoid/EAM	2/1/1	1	A		F	
		occipital	R							
BB		temporal	R	petrous	2		?			
BB	5	parietal	R	all	1	1	A		M?	OA
		temporal	R	squamous/petrous	3/3					
		frontal	R	superior orbital margin	2					
		sphenoid	R	greater wing	3					
BB	5	occipital			2	1	A		M?	
		temporal	R	mastoid	1					
BB	3	skull		all but zygoma, maxilla,	1	1	A	30+	M	trauma
				partial nasal	3					
BB	7	mandible		all	1	1	A		M	
BB	4	mandible		all	1	1	A		M	OA
BB	2	mandible		all	1	1	A		?	OA

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
BB	3	mandible		left side/mental protub.	1/1	1	A		M	
BB	1	mandible			1	2	A			
BB		mandible		left side	1	1	S			
BB		dec. lat. Incisor	?	R lower or L upper	1	2	S			
BB		fibula	L	p1/3-m1/3-d1/3	1/2/3	1	S			
BB		ulna	L	p1/3-m1/3-d1/3	3/1/1	1	S			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WB	7	scapula	L	glenoid/all	1/2	2	A			
WB		scapula	L	glenoid/all	1/1	1	S	<15		
WB	7	clavicle	L	all	1	1	A			
WB		clavicle	L	all	1	1	A	20+		OA
WB		clavicle	L	all	1	1	S			
WB	6	os coxa	L	ilium/ischium/acetabu-	2/2/1/3	1	A		F	
				lum/auricular surface						
WB	3	os coxa	L	iliac crest	3	1	A			
WB	4	os coxa	L	ilium/ischium/acetabu-	1/1/1/1/1/1	1	A	<23	M	OA
				lum/pubis/auricular						
				surface/acetabulum						
WB	7	humerus	L	pe	1	1	A	14+	M	
WB	6	humerus	L	m1/3-d1/3-de	1/1/1	1	A			OA
WB	3	humerus	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14+	F	
WB	1	humerus	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14-22	F	
WB	2	ulna	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15+		OA, fracture
WB	3	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	F?	OA
WB	2	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	F	
WB	1	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	F	OA
WB	6	radius	L	pe-p1/3-m1/3	1/1/3	1	A		F	
WB	5	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15+	?	
WB		patella	L	all	1	1	A			OA
WB	7	rib 1	L	all	1	1	A			
WB	7	rib (3-10)(7ribs)	L	all	1	8	A			
WB	7	rib 11	L	all	1	1	A			OA
WB	7	rib 12	L	all	1	1	A			
WB	6?	rib (3-12)(6 ribs)	L	shaft	2	6	A?			
WB	4	sacrum			1	1	A			OA

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WB	1	sacrum			2	1	A			OA
WB	7	sacrum			2	1	A			
WB	7	sternum		body	1	1	A			
WB	10	occipital/R. parietal			2/3	1	S			
WB	5	frontal		nasals, parts of maxillae	2	1	A			
WB	1	maxilla	R		3	1	A			
WB	4	zygoma/maxilla	L		2/2	1	A			
WB	10	temporal	R		2	1	S			
WB	7	atlas		body/neural arch	1/1	1	A			
WB	7	axis		body/neural arch	1/1	1	A			
WB	7	C3		body/neural arch	1/1	1	A			
WB	7	C4		body/neural arch	1/1	1	A			
WB	7	C5		body/neural arch	1/1	1	A			
WB	7	C6		body/neural arch	1/1	1	A			
WB	7	C7		body/neural arch	1/1	1	A			OA
WB	7	T1		body/neural arch	1/1	1	A			OA
WB	7	T2		body/neural arch	1/1	1	A			
WB	7	T4		body/neural arch	1/1	1	A			
WB	7	T5		body/neural arch	1/1	1	A			
WB	7	T6		body/neural arch	1/1	1	A			
WB	7	T7		body/neural arch	1/1	1	A			OA
WB	7	T8		body/neural arch	1/1	1	A			OA
WB	7	T9		body/neural arch	1/1	1	A			OA
WB	7	T10		body/neural arch	1/1	1	A			OA
WB	7	T11		body/neural arch	1/1	1	A			OA
WB	7	T12		body/neural arch	1/1	1	A			OP
WB	7	L1		body/neural arch	1/1	1	A			OP
WB	7	L2		body/neural arch	1/1	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WB	7	L3		body/neural arch	1/1	1	A			
WB	7	L4		body/neural arch	1/1	1	A			
WB	7	L5		body/neural arch	1/1	1	A			
WB		tibia	R	p1/3-m1/3-d1/3	1/1/1	1	S	4-7		
WB	5	tibia	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-22		Periostitis
WB	4	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	M	OA
WB	1	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	F	
WB		fibula	R	p1/3-m1/3-d1/3	1/1/1	1	S	4-7		
WB	1	fibula	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14-21		Periostitis
WB	3	fibula	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/1	1	A	14+		
WB	1	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14-22	F	OA
WB	2	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	F	Fracture
WB	5	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	17+	F	Periostitis
WB	3	ulna	R	pe-p1/3-m1/3-d1/3	1/1/1/1	1	A			OA
WB	1	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-20		OA
WB	2	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15+		OA, periostitis
WB	5	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15+		OA, periostitis
WB	4	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-23		
WB	7	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	15-23		OA
WB	2	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1	A	14+	F	
WB	6	tibia	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/1	1	A	14+		
WB	6	os coxa	R	ilium/acetabulum/	2/1/3	1	A		F	
				auricular surface						
WB	3	os coxa	R	ilium/ischium/pubis/	2/1/1/2/1	4	A	34+	M?	
				acetabulum/auricular						
WB	5	os coxa	R	ilium/ischium/pubis/ace-	1/1/1/1/1	1	A	23-66	M?	OA
				tabulum/auricular						
WB		clavicle	R	all	1	1	A	20+		OA

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WB	7	clavicle	R	all	1	1	A			OA
WB	6?	rib (3-12)	R	shaft	2	1				
WB		rib (3-12)	R	head-tubercle-shaft	1	1	A			
WB		rib (3-12)	R	head-tubercle-angle	1	1	A			
WB		rib (3-12)	R	head-tubercle-shaft	1	2	A			
WB		rib (3-12)	R	head-tubercle-shaft	1	1	A			OA
WB		rib (3-12)	R	head-tubercle-shaft	1	1				OA
WB		rib (3-12)	R	head-tubercle-shaft	1	1	A			
WB	7	rib 1	R	head-tubercle-shaft	1	1	A			
WB	7	rib 2	R	head-tubercle-shaft	1	1	A			
WB	7	rib 4-9 (6ribs)	R	head-tubercle-shaft	1	6	A			1 OA
WB	7	rib 10	R	head-tubercle-shaft	1	1	A			
WB	7	rib 11	R	head-tubercle-shaft	1	1	A			OA
WB	7	rib 12	R	head-tubercle-shaft	1	1	A			
WB		atlas		body/neural arch	1/1	1	A			OA
WB	6?	cervical (3-7)		body/neural arch	1/1	1	A			
WB		thoracic (2-10)		body/neural arch	1/1	1	A			OA
WB		T1		body/neural arch	1/1	1	A			
WB		T5		body/neural arch	1/1	1	A			OA
WB		T6		body/neural arch	1/1	1	A			OA
WB		T7		body/neural arch	1/1	1	A			
WB		T8		body/neural arch	1/1	1	A			
WB		T9		body/neural arch	1/1	1	A			
WB		T10		body/neural arch	1/1	1	A			OA
WB		T11		body/neural arch	1/1	1	A			
WB		lumbar (L5?)		body/neural arch	1/1	1	A			OA, OP
WB		lumbar (L1?)		body/neural arch	1/1	1	A			
WB		lumbar (L2?)		body/neural arch	1/1	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WB		lumbar		body/neural arch	1/1	1	A			OP
WB		lumbar		body/neural arch	1/2	1	A			
WB		lumbar		body/neural arch	1/2	1	A			
WB	6	long bone frag	?	shaft	2	1	A			possible ulna
WB	9	maxilla	L		1	1	S			
WB	9	zygomatic	L		1	1	S			
WB	1	maxilla/zygomatic/	L		1/1/2	1	A			
WB	1	palatine								
WB	skull 1	frontal			1	2	A	<50	F	
		parietal	L		1	1				
		parietal	R		1	2				
		occipital			2	2				
		maxilla	L		3	1				
		maxilla	R		3	1				
		temporal	L		3	1				
WB	skull 9	frontal	L		3	1	S			
		occipital	L&R		1	4		<2		Basilar unfused
		temporal	L		1	1				
		sphenoid	L		3	1				
WB	skull 8	maxilla/zygomatic/	L		1/1/3/1	1	S	6-8?		
		sphenoid/palatine								
		temporal	L		1	2				
		frontal	L		2	5				
		parietal	L		2	1				
		parietal	R		2	2				
		occipital	R		3	3				
WB	2	complete skull				1	A	27-44	F	OA, trauma
WB	7	complete skull				1	A	<50	?	
WB	4	skull				2	A	20-45	M	

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		hamate	R	all	1	1	A			smaller of the two
WBS		hamate	R	all	1	1	A			
WBS		trapezoid	R	all	1	1	A			
WBS		trapezium	R	all	1	1	A			
WBS		capitate	R	all	1	1	A			OA, deformed
WBS		capitate	R	all	1	1	A			
WBS		mc1	R	all	1	1	A			smallest
WBS		mc1	R	all	1	2	A			largest
WBS		mc1	R	all	1	2	A			
WBS		mc2	R	all	1	1	A			
WBS		mc3	R	all	1	1	A			
WBS		mc4	R	all	1	1	A			smaller of the two
WBS		mc4	R	all	1	1	A			
WBS		mc5	R	all	1	1	A			smaller of the two
WBS		mc5	R	all	1	1	A			
WBS		calcaneus	R	all	1	1	S			unfused
WBS		calcaneus	R	all	1	1	A			
WBS		calcaneus	R	all	1	1	A			
WBS		calcaneus	R	all	1	1	A			
WBS		talus	R	all	1	1	A			
WBS		navicular	R	all	1	1	A			
WBS		mt1	R		2	2	A			
WBS		mt2	R	all	1	1	A			
WBS		mt3	R	all	1	1	A			
WBS	3	femur fragments	R	d1/3	3	6	A			
WBS	2	tibia	R	tuberosity	3	1	A			
WBS		femur	L	de	1	2	S			
WBS	2	os coxa	R	acetabulum/pubis	3/3	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS	3	mandible	R		1	1	A			
WBS	1	mandible	R	mandibular condyle	1	3	A			
WBS		rib	R		2	1	A			OA
WBS		rib	R			1	A			
WBS		rib	R	shaft	3	1	A			
WBS		ilium	R		1	1	S			
WBS		ischium	R		1	1	S			
WBS	1	os coxa	R	ilium/ischium/pubis/	1/1/3/1/1	1	A	30-34	?	
				acetabulum/auricular						
WBS		clavicle	R		1	2	S	<18		
WBS		clavicle	R		1	1	S	<18		
WBS		scapula	R	acromion and spine	3	1	S			
WBS		scapula	R	acromion and spine	3	2	A			
WBS	1	scapula	R		1	1	A			OA
WBS		scapula	R	glenoid, rest	1/2	6	A			OA
WBS		humerus	R	m1/3-d1/3	2/1	1	S	<9		
WBS		humerus	R	p1/3-m1/3-d1/3	1/1/1	1	S	.5-1.5		
WBS		humerus	R	p1/3-m1/3-d1/3	1/2/1	1	S	2-3.5		
WBS		ulna	R	p1/3-m1/3-d1/3	1/1/1	1	S	2-3.5		
WBS		long bone frag	?		3	6	?			
WBS		sternum		manubrium	3	2	A			OA
WBS		scapula	R	inferior angle	3	4	A			
WBS		zygomatic	L	lateral-inferior corner	2	1	S			
WBS		zygomatic	L	inferior orbital margin	2	1	?			
WBS	3	maxilla/zygomatic	R		2/2	1	A			
WBS	10?	maxilla	L		1	1	S	2+		
WBS	10?	maxilla	R		2	1	S	2+		
WBS	1	occipital	R	occipital condyle	3	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		mandible	R		3	1	S	2+		
WBS		mandible	?		3	1	S			
WBS	9	frontal		nasal area and orbits	3	1	S	0-4		
WBS		maxilla	?	alveolus	3	1	?			
WBS	1	zygomatic	R	lateral & inferior orbit	1	1	A			
WBS		sphenoid	R	foramen ovale&spinosum	3	1	S			
WBS		occipital		basilar	1	1	S			
WBS		sphenoid	R	pterygoid process	3	1	?			
WBS		maxilla	R	palate portion	3	1	S			
WBS		sphenoid	R	infratemporal crest	3	1	S			
WBS		temporal	L	no squamosa	2	2	S			
WBS		temporal	L		2	2	S			
WBS		temporal	R		2	2	S			
WBS		sternum		body	1	1	A			OA
WBS		sternum		body	1	1	A			
WBS		sternum		manubrium	1	2	A			
WBS		sternum		body	1	4	A			OA
WBS	5	temporal/sphenoid	R		2/3	1	A			
WBS	5	zygomatic/maxilla	R		1/3	1	A			Periostitis?
WBS	5	temporal/occ/sph	L		2/2/3	1	A			OA
WBS	3	sacrum			1	1	A			
WBS	5	sacrum			1	1	A			OP
WBS		rib 1	R		1	1	S			
WBS		rib 2	R		1	1	S			
WBS		rib (3/12)	R		1	1	S			
WBS		rib (3-12)	R		1	1	S			
WBS		rib (3-12)	R	sternal end	2	1	S			
WBS		rib 1	R		1	1	A	15-25		

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		rib 1	R		1	1	A	15-25		
WBS		rib 1	R		1	1	A			
WBS		rib 2	R		1	1	A	15-25		
WBS		rib 2	R		1	1	A			
WBS		rib 2	R		1	1	A			
WBS		rib 2	R	no head	2	1	A			
WBS		rib 2	R	shaft	3	1	A			
WBS		rib (3-12)	R		3	1	A			
WBS		rib (10-12)	R		1	3	A			
WBS		rib (10-12)	R		1	2	A			
WBS		rib (10-12)	R		1	2	A			
WBS		rib (3-10)	R		1	2	A			
WBS		rib (3-10)	R		1	1	A			
WBS		rib (3-10)	R		1	1	A	15-25		
WBS		rib (3-10)	R		1	2	A	15-25		
WBS		rib (3-10)	R		1	2	A			
WBS		rib (3-10)	R		1	3	A			
WBS		rib (3-10)	R		1	3	A			
WBS		rib (3-10)	R	tubercle	2	1	A			
WBS		rib (3-10)	R	tubercle	2	1	A			
WBS		rib (3-10)	R	sternal end	2	2	A			
WBS		rib (3-10)	R	sternal end	2	2	A			
WBS		rib (3-10)	R	sternal end	2	1	A			
WBS		rib (3-10)	R	sternal end	2	1	A			
WBS		rib (3-10)	R	sternal end	2	1	A			
WBS		rib (3-10)	R	sternal end	2	1	A			
WBS		rib (3-10)	R	sternal end	2	1	A			
WBS		rib (3-10)	R	sternal end	2	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		rib (3-10)	R	sternal end	2	2	A			
WBS		rib (3-10)	R	midshaft	3	1	A			
WBS		rib (3-10)	R	sternal end	2	1	A			
WBS	2	atlas		body/na	1/1	1	A			
WBS		atlas		body/na	1/1	1	A			bridging on left
WBS		atlas		body/na	1/1	1	A			L bridging
WBS		axis		body/na	1/1	1	A			
WBS		axis		body/na	1/1	1	A			
WBS		C3-C7		body/na	1/1	1	A			
WBS		"		body/na	1/1	1	A			R acc trans for
WBS		"		body/na	1/1	1	A			L acc trans for
WBS		"		body/na	1/1	1	A			
WBS		"		body/na	1/1	1	A			
WBS		"		body/na	1/1	1	A			OP, OA
WBS		"		body/na	1/1	1	A			OA, R acc trans for
WBS		"		body/na	1/1	1	A			OP
WBS		"		body/na	1/1	1	A			OP
WBS		"		body/na	1/1	1	A			
WBS		"		body/na	1/1	1	A			OA
WBS		"		body/na	1/1	1	A			
WBS		C3-C7		body/na	1/1	3	A			
WBS		C3-C7		na	1	2	A			
WBS		C3-C7		body	1	2	A			
WBS		C3-C7		body	2	1	A			
WBS		rib	L		3	1	A			
WBS		rib	L		3	2	A			
WBS		rib	L		1	1	A			
WBS		rib	L		2	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		rib	L		3	1	A			
WBS		patella	L		1	1	A			
WBS		patella	L		1	1	S?			
WBS		fibula	L	de	1	1	A	14+		
WBS		fibula	L	pe-p1/3	2/2	1	A	14-21		
WBS	5	ulna	L	p1/3-m1/3-d1/3-de	2/2/1/1	3	A	15+		periostitis
WBS	3	ulna	L	d1/3-de	1/1	1	A	15+		OA, fracture
WBS	4	ulna	L	d1/3-de	3/1	1	A	15-23		
WBS	5	radius	L	pe-p1/3	1/2	1	A	14+		
WBS		clavicle	L	all	1	1	A			
WBS		ilium	L		1	1	S			
WBS		ilium	L		2	2	S			
WBS	5	humerus	L	p1/3-m1/3-d1/3-de	2/1/1/1	6	A			OA
WBS	5	humerus	L	pe-p1/3	1/3	1	A	14+	?	
WBS	1	os coxa	L	auricular surface	3	1	A			
WBS	5	os coxa	L	auricular surface	3	1	A			
WBS	2	os coxa	L	pubis	2	1	A	42+	F	
WBS	1	os coxa	L	pubis/ischium/ acetabulum	1/1/1	1	A	19-40	F	
WBS		scapula	L		1	1	S			
WBS		scapula	L		2	3	A			OA
WBS		scapula	L		2	3	A			OA
WBS	1	scapula	L		1	4	A	17-22		OA
WBS		scapula	L		2	6	A			OA
WBS		hamate	L		1	1	A			
WBS		lunate	L		1	1	A			
WBS		trapezium	L		1	1	A			
WBS		scaphoid	L		1	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		capitate	L		1	1	A			
WBS		trapezoid	L		1	1	A			
WBS		MC1 (4 bones)	L		1/1/1/1	4	A			
WBS		MC2 (2 bones)	L		1/1	2	A			
WBS		MC3 (2 bones)	L		1/1	2	A			
WBS		MC4	L		1	1	A			
WBS		MC5 (2 bones)	L		1/2	2	A			
WBS		3rd cuneiform	L		1	1	A			
WBS		MT1	L		1	1	A			
WBS		MT2	L		1	1	A			
WBS		MT4	L		1	1	A			
WBS		MT5	L	distal half	2	1	A			
WBS		talus	L		1	1	A			
WBS		talus	L		1	1	S			
WBS		calcaneus	L		1	1	A			OA
WBS		calcaneus	L		1	1	A			OA-eburnation
WBS		rib 1	L		1	1	S			
WBS		rib (5 ribs)	L		1/1/1/1/1	5	S			
WBS		rib 1	L		1	1	A/S			
WBS		rib 1	L		1	1	A	15-25		
WBS		rib 2	L		1	1	A	15-25		
WBS		rib	L		3	1	A			
WBS		rib (6 ribs)	L		1/1/1/1/1/1	6	A			
WBS		rib	L		1	1	A	15-25		
WBS		rib	L		1	3	A	15-25		
WBS		rib	L		1	2	A			
WBS		rib	L		1	1	A			
WBS		rib	L		1	1	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		rib	L		1	2	A			
WBS		rib 2	L		2	1	S			
WBS		rib	L	t-shaft	2	1	A			
WBS		rib	L	t-shaft	2	1	A			
WBS		rib	L	t-shaft	2	1	A			
WBS		rib	L	t-shaft	2	2	A			
WBS		rib	L	t-shaft-sternal end	2	2	A			
WBS		rib 2	L	shaft	2	1	A			
WBS		rib (5 ribs)	L	shaft	3/3/3/3/3	5	A			
WBS		rib (5 ribs)	L	shaft w/sternal ends	3/3/3/3/3	6	A			
WBS		rib (5 ribs)	L	midshafts	3/3/3/3/3	6	A			
WBS		humerus	L	p1/3-m1/3-d1/3	1/1/2	1	S	<14		
WBS		C3-C7		na	1	2	S	2-8		
WBS		C3-C7		body/na	1/1	2	S	3+		
WBS		T2-T11		body/na	1/1	1	S	3+		
WBS		L1-L5		body/na	1/1	1	S	3+		
WBS		L1-L5		body/na	1/1	1	S	3+		
WBS		T1-T12 (9na)		na	1 for all	16	S	2-8		
WBS		L1-L5 (3na)		na	1/1/3	3	S	2-8		
WBS		T1-T12		na	2	1	S	2-8		
WBS		"		na	1	1	S	2-8		
WBS		"		na	3	1	S	2-8		
WBS		"		na	3	1	S	2-8		
WBS		"		na	1	3	S	2-8		
WBS		"		na	1	1	S	2-8		
WBS		"		na	1	1	S			
WBS		"		na	1	1	S	2-8		
WBS		"		na	1	1	S	2-8		

Appendix A: Complete Skeletal Inventory

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		"		na	3	1	S			
WBS		C3-C7		na (sp)	3	1	S			
WBS		vert frags		na	3	18	S	2-8		
WBS		C3-C7		centrum	1	1	S	2-8		
WBS		vert bodies (6)		centra	1/1/1/2/3/3	7	S	2-8		
WBS		prox hand phalanges	?		1 for all	13	A			OA
WBS		int hand phalanges	?		1 for all	8	A			
WBS		dis hand phalanges	?		1	1	A			
WBS		dis hand phalanges	?		1	1	S			
WBS		prox foot phal	L		1	1	A			
WBS		prox foot phal (3)	R		1	3	A			
WBS		prox foot phal	?		1	1	S			
WBS		prox foot phal (3)	?		1	3	A			
WBS		MC1	R		2/1	2	S			
WBS		MC2	R		1/1	2	S			
WBS		MC2	L		1	1	S			
WBS		MC5	R		1	1	S			
WBS		L1-L5		body/na	1/1	2	A			OP
WBS		L1-L5		body/na	1/1	1	A			OP
WBS		L1-L5		body/na	1/1	1	A			OA, OP
WBS		L1-L5		body/na	1/1	1	A			OP
WBS		L1-L5		body/na	1/1	1	A			OP
WBS		L1-L5		body/na	1/1	1	A			OP
WBS		"		"	1/1	1	A			
WBS		"		"	1/1	1	A			OP
WBS		"		"	1/2	1	A			
WBS		"		"	1/1	2	A			OA
WBS		"		body	2	1	A			OP

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		"		partial body/na	?/2	2	A			
WBS		"		body/na	1/1	5	A			OP
WBS		"		body/na	1/1	1	A			
WBS		T1-12		body/na	1/1	1	A			
WBS		"		"	1/1	1	A			
WBS		"		"	1/1	1	A			
WBS		"		"	1/1	2	A			
WBS		"		"	1/1	2	A			OA
WBS		"		"	1/1	1	A			OA
WBS		"		"	1/1	1	A			OA
WBS		"		"	1/1	1	A			OA
WBS		"		"	1/1	1	A			OA, OP
WBS		"		"	1/3	1	A			OA, OP
WBS		"		"	1/1	2	A			OA
WBS		"		"	1/1	2	A			OA
WBS		"		body	1	1	A			
WBS		T11		body/na	1/1	1	A			
WBS		T1-T12		body/na	1/1	1	A			OA
WBS		"		"	1/1	2	A			OA, OP
WBS		T11?		"	1/1	1	A			OP
WBS		T10 or T11?		"	1/1	1	A			OA
WBS		T1-T12		"	1/1	1	A			OA, OP
WBS		T8		"	1/1	1	A			OP
WBS		T9		"	1/1	1	A			OP
WBS		T10		"	1/1	1	A			OA, OP
WBS		T9?		"	1/1	1	A			
WBS		T10?		"	1/1	3	A			
WBS		T11?		"	1/1	2	A			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		L1		"	1/1	2	A			
WBS		T6		"	1/1	1	A			
WBS		T7		"	1/1	1	A			OA
WBS		T8		"	1/1	1	A			
WBS		T9		"	1/1	1	A			OA
WBS		T10		"	1/1	1	A			OA
WBS		T11		"	1/1	1	A			OA
WBS		T12		"	1/1	1	A			OA
WBS		vert frag Tor L		body	2	2	A			
WBS		vert frag T or L		body	2	4	A			OP
WBS		vert frag		body	3	12	A			
WBS		vert frag T		na	1	2	A			OA
WBS		vert frag T		na	1	1	A			OA
WBS		vert frag T		na	1	1	A			OA
WBS		vert frag L		na	3	1	A			
WBS		vert frag L		na	1	1	A?			
WBS		vert frag L		L tp	3	1	A			
WBS		vert frag L		Ltp	3	1	A			OA
WBS		vert frag L		Rtp	3	1	A			
WBS		vert frag		tp	3/3/3/3/3	5	A			
WBS		vert frag		articular facets	3/3/3	3	A			
WBS		fused bones	?		1/1	1	A			OA
WBS		deformed bone	?		1	1	A			OA
WBS		radius	R	m1/3-d1/3	1/1	1	S			
WBS		fibula	R?	p1/3-m1/3-d1/3	3/1/3	1	S			
WBS	3	femur	R	de	2	3	A			
WBS		femur	L	p1/3-m1/3-d1/3	3/1/3	4	S			
WBS		tibia	R	p1/3-m1/3	3/1	5	S			

Location	Individual	Bone	Side	Segment	Completeness	Count	Age 1	Age 2	Sex	Notes
WBS		sacral segment 1		na-centrum	1/1	1	S	2-7		
WBS		sacral segment 2?		na-centrum	1/1	1	S	2-7		
WBS		sacral segment 5		na-centrum	1/1	1	S	2-6		
WBS		sacral segment		L na-centrum	2/1	1	S	2-6		
WBS		sacral segment 1		L na	2	1	S	<5		
WBS		humerus	R	pe	1	1	S			
WBS		sacral centrum			1	1	S	<5		
WBS		sacral centrum			2	1	S	<5		
WBS		scapula frags		2=glenoid cavity	3/3/3/3/2	5	S			
WBS		vomer			1	1	S?			
WBS		maxilla/palatine/	L		3/1/3	1	A			
		sphenoid								
WBS		ribs (5 ribs)	R	sternal end	3/3/3/3/3	7	A			
WBS		rib	R	shaft	3	1	S			
WBS		ribs (2 ribs)	L	sternal ends	3	2	A/S			
		rib	L	shaft	3	2	S			
WBS		maxilla	L		3	1	A?			
WBS		rib frags	?	12 sternal ends	3	13	A			
WBS		rib frags	?	midshaft	3	38	A			
WBS		rib frags	?	head/neck pieces	3	5	A			
WBS		rib frags	?	9 sternal ends	3	11	S			
WBS		rib frags	?	shaft	3	41	S			
WBS		cranial frags			3	16	S			
		cranial frags			3	11	S?			
		cranial frags			3	4	A			
WBS		cranial frags		par-sq, 3sag, 1sag	3	5	S			
WBS		Fragments	?		3	268	?			

APPENDIX B:

COMPLETE DENTAL INVENTORY

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
BB	7	17	mand molar 3	L	2	13(3.4.3.3)	0		
BB	7	18	mand molar 2	L	4		0		
BB	7	19	mand molar 1	L	2	17(4.4.4.5)	0	1(occ/buc)	
BB	7	20	mand premolar 2	L	5		0		
BB	7	21	mand premolar 1	L	2	4	0		
BB	7	22	mand canine	L	7		0		
BB	7	23	mand incisor 2	L	7		0		
BB	7	24	mand incisor 1	L	5		0		
BB	7	25	mand incisor 1	R	2	5	0		
BB	7	26	mand incisor 2	R	2	5	0		
BB	7	27	mand canine	R	5		0		
BB	7	28	mand premolar 1	R	2	4	0		hypoplasias
BB	7	29	mand premolar 2	R	2	4	0		
BB	7	30	mand molar 1	R	2	12(3.1.5.3)	0	buccal	
BB	7	31	mand molar 2	R	2	14(4.3.4.3)	0	buccal	
BB	7	32	mand molar 3	R	2	19(5.4.5.5)	0	2(occ,buc)	
BB	4	17	mand molar 3	L	2	1		1(lab)	
BB	4	18	mand molar 2	L	7				
BB	4	19	mand molar 1	L	7		buccal		
BB	4	20	mand premolar 2	L	5				
BB	4	21	mand premolar 1	L	2			1(int dist)	
BB	4	22	mand canine	L	7				Hypoplasias
BB	4	23	mand incisor 2	L	7				
BB	4	24	mand incisor 1	L	5				
BB	4	25	mand incisor 1	R	5				
BB	4	26	mand incisor 2	R	5				
BB	4	27	mand canine	R	2	5			hypoplasias

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
BB	4	28	mand premolar 1	R	7				
BB	4	29	mand premolar 2	R	2	5			
BB	4	30	mand molar 1	R	2	28(9.5.9.5)		1(occ/buc)	
BB	4	31	mand molar 2	R	2	(?.3.?.4)		1 large	
BB	4	32	mand molar 3	R	2	12(3.3.3.3)		2(occ,buc)	
BB			dec incisor 2	Lu/Rl?	1				
BB	2	17	mand molar 3	L	4				
BB	2	18	mand molar 2	L	4				
BB	2	19	mand molar 1	L	4				
BB	2	20	mand premolar 2	L	4				
BB	2	21	mand premolar 1	L	2	6			
BB	2	22	mand canine	L	2	5			
BB	2	23	mand incisor 2	L	5				
BB	2	24	mand incisor 1	L	2	7			
BB	2	25	mand incisor 1	R	5				
BB	2	26	mand incisor 2	R	5				
BB	2	27	mand canine	R	5				
BB	2	28	mand premolar 1	R	4				
BB	2	29	mand premolar 2	R	4				
BB	2	30	mand molar 1	R	4				
BB	2	31	mand molar 2	R	4				
BB	2	32	mand molar 3	R	4				
BB	3	17	mand molar 3	L	4				
BB	3	18	mand molar 2	L	4				
BB	3	19	mand molar 1	L	4				

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
BB	3	20	mand premolar 2	L	4				
BB	3	21	mand premolar 1	L	4				
BB	3	22	mand canine	L	7	8			
BB	3	23	mand incisor 2	L	4				
BB	3	24	mand incisor 1	L	4				
BB	3	25	mand incisor 1	R	4				
BB	3	26	mand incisor 2	R	7	8			
BB	3	27	mand canine	R	7	8			
BB	3	28	mand premolar 1	R	4				
BB	3	29	mand premolar 2	R	4				
BB	3	30	mand molar 1	R	4				
BB	3	31	mand molar 2	R	4				
BB	3	32	mand molar 3	R	4				
BB	1	17	mand molar 3	L	4				
BB	1	18	mand molar 2	L	4				
BB	1	19	mand molar 1	L	4				
BB	1	20	mand premolar 2	L	4				
BB	1	21	mand premolar 1	L	4				
BB	1	22	mand canine	L	4				
BB	1	23	mand incisor 2	L	4				
BB	1	24	mand incisor 1	L	4				
BB	1	25	mand incisor 1	R	4				
BB	1	26	mand incisor 2	R	4				
BB	1	27	mand canine	R	4				
BB	1	28	mand premolar 1	R	4				
BB	1	29	mand premolar 2	R	4				
BB	1	30	mand molar 1	R	4				

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
BB	1	31	mand molar 2	R	4				
BB	1	32	mand molar 3	R	4				
BB		61	mand molar 2	L					empty crypt
BB		62	mand molar 1	L	?				
BB		63	mand canine	L	7				
BB		64	mand incisor 2	L	7				
BB		2	max molar 2	R	?				
BB		3	max molar 1	R	8				
BB		4	max premolar 2	R	7				
BB		5	max premolar 1	R	7				

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
WB	1	8,7,6,5	i1,i2,c, or p1?	R	4		buccal		
WB	9	56	max incisor 1	L	5--root				
WB	9	9	p max incisor 1	L	8				
WB	9	10	p max incisor 2	L	8				
WB	9	57	max incisor 2	L	5				
WB	9	58	max canine	L	5				
WB	9	59	max molar 1	L	5				
WB	9	60	max molar 2	L	5-root				
WB	9	14	p max molar 1	L	8				
WB	1	9	max incisor 1	L	4				
WB	1	10	max incisor 2	L	4				
WB	1	11	max canine	L	4		buccal		
WB	1	12	max premolar 1	L	4		buccal		
WB	1	13	max premolar 2	L	4				
WB	1	14	max molar 1	L	7	36(9.9.9.9)			
WB	1	15	max molar 2	L	4				
WB	1	16	max molar 3	L	4				
WB	8	56	d max incisor 1	L	5				
WB	8	57	d max incisor 2	L	?				
WB	8	10	p max incisor 1	L	8				
WB	8	58	d max canine	L	5				
WB	8	59	d max molar 1	L	2	5			
WB	8	60	d max molar 2	L	2	15(5.3.4.3)			
WB	8	14	p max molar 1	L	5				
WB	8	15	p max molar 2	L	8				crown partially visible

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
WB	2	1	max molar 3	R	2	9(2.2.2.3)		1(occ)	hypercementosis
WB	2	2	max molar 2	R	4				
WB	2	3	max molar 1	R	4				
WB	2	4	max premolar 2	R	4				
WB	2	5	max premolar 1	R	4				
WB	2	6	max canine	R	4		buccal		
WB	2	7	max incisor 2	R	4		buccal		
WB	2	8	max incisor 1	R	4				
WB	2	9	max incisor 1	L	4				
WB	2	10	max incisor 2	L	4				
WB	2	11	max canine	L	2	3			hypercementosis
WB	2	12	max premolar 1	L	4				
WB	2	13	max premolar 2	L	2	3			
WB	2	14	max molar 1	L	2	16(4.4.4.4)		1(occ)	hypercementosis
WB	2	15	max molar 2	L	4				
WB	2	16	max molar 3	L	2	8(2.2.2.2)			hypercementosis
WB	7	1	max molar 3	R	2	4(1.1.1.1)		1(occ)	
WB	7	2	max molar 2	R	2	14(3.4.3.4)			
WB	7	3	max molar 1	R	2	19(5.6.4.4)			
WB	7	4	max premolar 2	R	5				
WB	7	5	max premolar 1	R	2	5			
WB	7	6	max canine	R	5				
WB	7	7	max incisor 2	R	5				
WB	7	8	max incisor 1	R	5				
WB	7	9	max incisor 1	L	5				
WB	7	10	max incisor 2	L	7				
WB	7	11	max canine	L	2	4			

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
WB	7	12	max premolar 1	L	2	4			
WB	7	13	max premolar 2	L	2	3			
WB	7	14	max molar 1	L	2	18(5.5.4.4)			
WB	7	15	max molar 2	L	2	15(3.4.4.4)			
WB	7	16	max molar 3	L	5				
WB	4	1	max molar 3	R	5				
WB	4	2	max molar 2	R	2	6(3.0.3.0)		1(lg.ling)	Periodontitis
WB	4	3	max molar 1	R	2	10(5.0.5.0)		1(lg.ling)	Periodontitis
WB	4	4	max premolar 2	R	2	4			periodontitis
WB	4	5	max premolar 1	R	5				
WB	4	6	max canine	R	5				
WB	4	7	max incisor 2	R	5				
WB	4	8	max incisor 1	R	5				
WB	loose	15	p max molar 2	L	1	4(1.1.1.1)			fused roots
WB	loose	14/15	p max molar 1or2	L	1	11(4.2.3.2)		1(occ)	
WB	loose	60	d max molar 2	L	1				
WB	loose	?	p max premolar	R?	1				unerupted
WB	loose	4/5	p max premolar	R	1	5			
WB	loose	14	p max molar 1	L	1	17(5.4.4.4)			
WB	loose	15	p max molar 2	L	1	4(2.0.1.1)			
WB	loose		fragment-root?	?					

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
WBS	10	56	max incisor 1	L	5				
WBS	10	57	max incisor 2	L	5				
WBS	10	58	max canine	L	5				
WBS	10	59	max molar 1	L	2				
WBS	10	60	max molar 2	L	2				
WBS	10	14	p max molar 1	L	8				
WBS	10	51	max molar 2	R	5				
WBS	10	52	max molar 1	R	5				
WBS	10	53	max canine	R	5				
WBS	10	54	max incisor 2	R	5				
WBS	10	55	max incisor 1	R	5				
WBS	10	5	p max premolar 1	R	8				
WBS		65	mand incisor 1	L	5-partial				
WBS		66	mand incisor 1	R	5				
WBS		67	mand incisor 2	R	5				
WBS		68	mand canine	R	5				
WBS		69	mand molar 1	R	5				
WBS		70	mand molar 2	R	5-partial				
WBS		25	p mand incisor 1	R	8				
WBS		27	p mand canine	R	8				
WBS		28	p mand premolar1	R	8				
WBS	loose	5	p max molar 1	R	1-unerupted				crown complete 3yo
WBS	loose	51	d max molar 2	R	1				
WBS	loose		d max molar 2?	R	1				Carabelli’s cusp
WBS	loose		d mand molar 1		1				
WBS	loose	52	d max molar 1	R	1				

Appendix B: Complete Dental Inventory

Location	Individual	Place	Tooth	Side	Category	Wear	Abscess	Caries	Notes
WBS	loose	64	d mand incisor 2	L	1				
WBS	loose	8	p max incisor 1	R	1-unerupted				
WBS	loose	30	p mand molar 1	R	1-unerupted				crown complete 3-4yo

APPENDIX C:

INDIVIDUAL PROFILES

Individual 1
Skeletal Inventory

Location	Bone	Side	Segment	Completeness	Count
WB	humerus	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	ulna	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WBS	os coxa	L	auricular surface	3	1
WBS	os coxa	L	pubis-ischium-acetabulum	1/1/1	1
WBS	os coxa	R	ilium/ischium/pubis/	1/1/3/1/1	1
			acetabulum/auricular		
BB	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	tibia	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	tibia	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	fibula	L	m1/3-d1/3-de	1/1/1	1
WB	fibula	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	sacrum			2	1
cranium WB	frontal			1	2
	parietal	L		1	1
	parietal	R		1	2
	occipital			2	2
	maxilla	L		3	1
	maxilla	R		3	1
	temporal	L		3	1
BB	temporal	L	squama/petrous/mastoid	1/1/1	1
	sphenoid	L		3	
BB	nasal	R&L		1/1	1
BB	temporal	R	petrous/mastoid/EAM	2/1/1	1
	occipital	R			
WB	maxilla/zygomatic/	L		1/1/2	1
WB	palatine	L			
WBS	occipital	R	occipital condyle	3	1
BB	mandible			1	2
WBS	scapula	L	all	1	4
WBS	scapula	R	all	1	1
WBS	zygomatic	R	lateral & inferior orbit	1	1
WB	maxilla	R		3	1

Individual 1
Dental Inventory

Position	Tooth	Category	Wear	Abscess	Caries
6	R max canine	4		buccal	
7	R max incisor 2	4			
8	R max incisor 1	4			
9	L max incisor 1	4			
10	L max incisor 2	4			
11	L max canine	4		buccal	
12	L max premolar 1	4		buccal	
13	L max premolar 2	4			
14	L max molar 1	7	36(9.9.9.9)		
15	L max molar 2	4			
16	L max molar 3	4			
17	L mand molar 3	4			
18	L mand molar 2	4			
19	L mand molar 1	4			
20	L mand premolar 2	4			
21	L mand premolar 1	4			
22	L mand canine	4			
23	L mand incisor 2	4			
24	L mand incisor 1	4			
25	R mand incisor 1	4			
26	R mand incisor 2	4			
27	R mand canine	4			
28	R mand premolar 1	4			
29	R mand premolar 2	4			
30	R mand molar 1	4			
31	R mand molar 2	4			
32	R mand molar 3	4			

Individual 1
Sexing Criteria

Pelvis	**L**		R
Ventral Arc (1-3)	1		
Subpubic Cocavity (1-3)	1		
Ischiopubic Ramus Ridge (1-3)	2		
Greater Sciatic Notch (1-5)			3
Preauricular Sulcus (0-4)			3
Estimated Sex, Pelvis (0-5)	**2, Female**		
Skull	**L**	**M**	**R**
Nuchal Crest (1-5)		1	
Mastoid Process (1-5)	3		1
Supraorbital Margin (1-5)	2		2
Glabella (1-5)		2	
Mental Eminence (1-5)			
Estimated Sex, Skull (0-5)	**2, Female**		
Humeral Head Diameter	F	F	
Radial Head Diameter	F	F	
Femoral Head Diameter	F	F	

Individual 1
Aging Criteria

Os coxa			
R	Auricular Surface	phase 3	30-34
L	Auricular Surface	phase 3	30-34
	Pubic Symphysis		
	Todd	phase 3-4	22-26
	Suchey Brooks	phase 2	19-40

Cranial Suture Closure	
External Cranial Vault	**Score**
1. Midlambdoid	0
2. Lambda	0
3. Obelion	0
4. Anterior Sagittal	0
5. Bregma	0
6. Midcoronal	0
7. Pterion	0
8. Sphenofrontal	0
9. Inferior Sphenotemporal	0
10. Superior Sphenotemporal	0
Palate	
11. Incisive	3
12. Anterior Median Palatine	U
13. Posterior Median Palatine	U
14. Transverse Palatine	0
Internal Cranial Vault	
15. Sagittal	0
16. Left Lambdoid	0
17. Left Coronal	0
S1 = 0; <49	
S2 = 0; <50	

Element	**Fusion**	**Age**
Humerus pe	F	14-22
Humerus de	C	
Radius pe	F	14-19
Radius de	F	17-22
Ulna pe	C	
Ulna de	F	15-20
Femur pe	C	
Femur de	C	
Femur gt	C	
Tibia pe	F	15-22
Tibia de	C	
Fibula pe	F	14-21
Fibula de	F	14-20
Scapula med border	F	17-22
Os coxa aic	C	
Os coxa isch tub	F	17-25

Individual 2
Skeletal Inventory

Location	Bone	Side	Segment	Completeness	Count
BB	os coxa	L	ilium/ischium/acetabu-	1/1/1/1	2
			lum/auricular surface		
WBS	os coxa	L	pubis	2	1
BB	os coxa	R	ilium-acetabulum-	1/1/1	2
			auricular surface		
BB	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	2
BB	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	tibia	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	3
BB	tibia	R	pe-p1/3-m1/3-d1/3-de	2/3/1/1/2	3
BB	fibula	L	m1/3-d1/3-de	2/1/1	1
BB	sacrum		all	1	1
BB	humerus	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	ulna	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	complete skull				1
BB	mandible		all	1	1
WBS	atlas		all	1	1

Individual 2
Dental Inventory

Position	Tooth	Category	Wear	Abscess	Caries	Notes
1	R max molar 3	2	9(2.2.2.3)		1 occ	hypercementosis
2	R max molar 2	4				
3	R max molar 1	4				
4	R max premolar 2	4				
5	R max premolar 1	4				
6	R max canine	4		buccal		
7	R max incisor 2	4		buccal		
8	R max incisor 1	4				
9	L max incisor 1	4				
10	L max incisor 2	4				
11	L max canine	2	3			hypercementosis
12	L max premolar 1	4				
13	L max premolar 2	2	3			
14	L max molar 1	2	16(4.4.4.4)		1 occ	hypercementosis
15	L max molar 2	4				
16	L max molar 3	2	8(2.2.2.2)			hypercementosis
17	L mand molar 3	4				
18	L mand molar 2	4				
19	L mand molar 1	4				
20	L mand premolar 2	4				
21	L mand premolar 1	2	6			
22	L mand canine	2	5			
23	L mand incisor 2	5				
24	L mand incisor 1	2	7			
25	R mand incisor 1	5				
26	R mand incisor 2	5				
27	R mand canine	5				
28	R mand premolar 1	4				
29	R mand premolar 2	4				
30	R mand molar 1	4				
31	R mand molar 2	4				
32	R mand molar 3	4				

Individual 2
Sexing Criteria

Pelvis	**L**		**R**
Ventral Arc (1-3)	1		
Subpubic Concavity (1-3)	2		
Ischiopubic Ramus Ridge (1-3)	1		
Greater Sciatic Notch (1-5)	2		1
Preauricular Sulcus (0-4)	4		0
Estimated Sex, Pelvis (0-5)	**2, Female**		
Skull	**L**	**M**	**R**
Nuchal Crest (1-5)		1	
Mastoid Process (1-5)	2		
Supraorbital Margin (1-5)	2		
Glabella (1-5)		1	
Mental Eminence (1-5)		3	
Estimated Sex, Skull (0-5)	**2, Female**		
Humeral Head Diameter			F
Radial Head Diameter	F		F
Femoral Head Diameter	?		?

Individual 2
Aging Criteria

Os coxa			
R	Auricular Surface	phase 8	60+
L	Auricular Surface	phase 8	60+
	Pubic Symphysis		
	Todd	phase 9/10	45-50+
	Suchey Brooks	phase 6	42+

Cranial Suture Closure	
External Cranial Vault	**Score**
1. Midlambdoid	0
2. Lambda	0
3. Obelion	3
4. Anterior Sagittal	2
5. Bregma	3
6. Midcoronal	0
7. Pterion	0
8. Sphenofrontal	0
9. Inferior Sphenotemporal	0
10. Superior Sphenotemporal	0
Palate	
11. Incisive	3
12. Anterior Median Palatine	0
13. Posterior Median Palatine	1
14. Transverse Palatine	0
Internal Cranial Vault	
15. Sagittal	U
16. Left Lambdoid	U
17. Left Coronal	U
S1 = 8; 27-44	
S2 = 0; <44	

Element	**Fusion**	**Age**
Humerus pe	C	14+
Humerus de	C	
Radius pe	C	14+
Radius de	C	17+
Ulna pe	C	
Ulna de	C	15+
Femur pe	C	
Femur de	C	
Femur gt	C	
Tibia pe	C	15+
Tibia de	C	
Fibula pe	U	14+
Fibula de	U	14+
Scapula med border	U	17+
Os coxa aic	C	
Os coxa isch tub	C	17+

Individual 3
Skeletal Inventory

Location	Bone	Side	Segment	Completeness	Count
BB	os coxa	L	ilium/ischium/pubis/ace-	2/1/1/1/1	4
			tabulum/auricular surface		
BB	os coxa	R	ilium-acetabulum	3/2	1
WB	os coxa	R	ilium/ischium/pubis/	2/1/1/2/1	4
			acetabulum/auricular		
BB	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	femur	R	pe-p1/3-m1/3-d1/3	1/1/1/2	1
WBS	femur fragments	R	d1/3	3	6
WBS	sacrum			1	1
BB	tibia	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/1	1
WB	fibula	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/1	1
WB	humerus	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	ulna	L	pe-p1/3-m1/3-d1/3	1/1/1/2	1
WB	ulna	R	pe-p1/3-m1/3-d1/3	1/1/1/1	1
WB	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	skull		all but zygoma, maxilla,	1	1
			partial nasal	3	
BB	mandible		left side/mental protub.	1/1	1
WBS	mandible	R		1	1
WBS	maxilla/zygomatic	R		2/2	1
WBS	ulna	L	d1/3-de	1/1	1

Individual 3
Dental Inventory

Position	Tooth	Cat	Wear	Abscess	Caries	Notes
17	L mand molar 3	4				
18	L mand molar 2	4				
19	L mand molar 1	4				
20	L mand premolar 2	4				
21	L mand premolar 1	4				
22	L mand canine	7	8			no crown
23	L mand incisor 2	4				
24	L mand incisor 1	4				
25	R mand incisor 1	4				
26	R mand incisor 2	7	8			no crown
27	R mand canine	7	8			no crown
28	R mand premolar 1	4				
29	R mand premolar 2	4				
30	R mand molar 1	4				
31	R mand molar 2	4				
32	R mand molar 3	4				

Individual 3
Sexing Criteria

Pelvis	**L**		**R**
Ventral Arc (1-3)	3		3
Subpubic Concavity (1-3)	3		3
Ischiopubic Ramus Ridge (1-3)	3		3
Greater Sciatic Notch (1-5)	3		4
Preauricular Sulcus (0-4)	4		4
Estimated Sex, Pelvis (0-5)	**3, Male**		
Skull	**L**	**M**	**R**
Nuchal Crest (1-5)		4	
Mastoid Process (1-5)	4		
Supraorbital Margin (1-5)	4		
Glabella (1-5)		4	
Mental Eminence (1-5)		4	
Estimated Sex, Skull (0-5)	**4, Male**		
Humeral Head Diameter	F		?
Radial Head Diameter	F?		
Femoral Head Diameter	?		?

Individual 3
Aging Criteria

Os Coxa

Method	**Left**	**Right**
Auricular Surface	35-39	45-59
Todd Pubic Symphysis	50+	50+
Suchey-Brooks Pubic Symphysis	34+	34+

Cranial Suture Closure	
External Cranial Vault	**Score**
1. Midlambdoid	2
2. Lambda	1
3. Obelion	2
4. Anterior Sagittal	2
5. Bregma	0
6. Midcoronal	2
7. Pterion	3
8. Sphenofrontal	3
9. Inferior Sphenotemporal	0
10. Superior Sphenotemporal	3
Palate	
11. Incisive	-
12. Anterior Median Palatine	-
13. Posterior Median Palatine	-
14. Transverse Palatine	-
Internal Cranial Vault	
15. Sagittal	3
16. Left Lambdoid	3
17. Left Coronal	3
Vault = S4; 30+	
Lateral-Anterior = S7; 47+	

Element	**Fusion**	**Age**
Humerus pe	C	14+
Humerus de	C	
Radius pe	C	14+
Radius de	C	17+
Ulna pe	C	
Ulna de	C	15+
Femur pe	C	
Femur de	C	
Femur gt	C	
Tibia pe	C	15+
Tibia de	C	
Fibula pe	-	14+
Fibula de	-	14+
Scapula med border	-	
Os coxa aic	C	17+
Os coxa isch tub	-	

Individual 4
Skeletal Inventory

Location	Bone	Side	Segment	Comp	Count
WB	os coxa	L	ilium/ischium/acetabu-	1/1/1/1/1/1	1
			lum/pubis/auricular		
			surface/acetabulum		
BB	os coxa	R	ilium-ischium-pubis-	1/1/1/1/1	1
			acetabulum-auricular		
			surface		
BB	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	tibia	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	tibia	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	fibula	L	pe-p1/3-m1/3-d1/3	1/1/1/2	1
BB	fibula	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	sacrum			1	1
BB	humerus	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	2
BB	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	ulna	L	pe-p1/3-m1/3-d1/3	1/1/1/1	1
WB	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	skull				2
BB	mandible		all	1	1
WBS	ulna	L	d1/3-de	3/1	1
WB	zygomatic/maxilla	L	infr for, fr process, inf orb	2/2	1
			margin		

Individual 4
Dental Inventory

Position	Tooth	Cat	Wear	Abscess	Caries	Notes
1	R max molar 3	5				
2	R max molar 2	2	6(3.0.3.0)		1ling-6	Periodontal
3	R max molar 1	2	10(5.0.5.0)		1ling-6	Periodontal
4	R max premolar 2	2	4			periodontal
5	R max premolar 1	5				
6	R max canine	5				
7	R max incisor 2	5				
8	R max incisor 1	5				
17	L mand molar 3	2	4(1.1.1.1)		1 lab	
18	L mand molar 2	7				
19	L mand molar 1	7		buccal		
20	L mand premolar 2	5				
21	L mand premolar 1	2			1ipd	
22	L mand canine	7				hypoplasias
23	L mand incisor 2	7				
24	L mand incisor 1	5				
25	R mand incisor 1	5				
26	R mand incisor 2	5				
27	R mand canine	2	5			hypoplasias
28	R mand premolar 1	7				
29	R mand premolar 2	2	5			
30	R mand molar 1	2	28(9.5.9.5)		1occ/bu	
31	R mand molar 2	2	7(-.3.-.4)		1large	
32	R mand molar 3	2	12(3.3.3.3)		1occ/1bu	

Individual 4
Sexing Criteria

Pelvis	**L**		**R**
Ventral Arc (1-3)	3		3
Subpubic Concavity (1-3)	3		3
Ischiopubic Ramus Ridge (1-3)	3		3
Greater Sciatic Notch (1-5)	5		4
Preauricular Sulcus (0-4)	0		0
Estimated Sex, Pelvis (0-5)	**3, Male**		
Skull	**L**	**M**	**R**
Nuchal Crest (1-5)		3	
Mastoid Process (1-5)	4		
Supraorbital Margin (1-5)	4		
Glabella (1-5)		5	
Mental Eminence (1-5)		5	
Estimated Sex, Skull (0-5)	**4, Male**		
Humeral Head Diameter	?		?
Radial Head Diameter	F		F
Femoral Head Diameter	M		M

Individual 4
Aging Criteria

Method	**Left**	**Right**
Auricular Surface	Abnormal	20-29
Todd Pubic Symphysis	18-21	20-24
Suchey-Brooks Pubic Symphysis	≤23	≤23

Cranial Suture Closure	
External Cranial Vault	**Score**
1. Midlambdoid	0
2. Lambda	0
3. Obelion	1
4. Anterior Sagittal	1
5. Bregma	0
6. Midcoronal	1
7. Pterion	0
8. Sphenofrontal	0
9. Inferior Sphenotemporal	0
10. Superior Sphenotemporal	0
Palate	
11. Incisive	3
12. Anterior Median Palatine	0
13. Posterior Median Palatine	-
14. Transverse Palatine	0
Internal Cranial Vault	
15. Sagittal	2
16. Left Lambdoid	2
17. Left Coronal	2
Vault = S2; 22-45	
Lateral-Anterior = S1; 20-43	

Element	**Fusion**	**Age**
Humerus pe	F	14-23
Humerus de	C	
Radius pe	F	14-19
Radius de	F	17-22
Ulna pe	C	
Ulna de	F	15-23
Femur pe	F	15-19
Femur de	C	
Femur gt	C	
Tibia pe	F	15-22
Tibia de	C	
Fibula pe	F	14-21
Fibula de	C	
Scapula med border		
Os coxa aic	C	17+
Os coxa isch tub	F	17-25

Individual 5
Skeletal Inventory

Location	Bone	Side	Segment	Comp	Count
BB	os coxa	L	ilium/ischium/pubis/ace-	2/1/1/1/2	2
			tabulum/auricular surface		
WB	os coxa	R	ilium/ischium/pubis/ace-	1/1/1/1/1	1
			tabulum/auricular		
WB	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	tibia	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	tibia	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	fibula	R	pe-p1/3-m1/3	1/1/1	1
WBS	sacrum			1	1
WBS	humerus	L	p1/3-m1/3-d1/3-de	2/1/1/1	6
WBS	humerus	L	pe-p1/3	1/3	1
BB	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WBS	ulna	L	p1/3-m1/3-d1/3-de	2/2/1/1	3
WB	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	radius	L	m1/3-d1/3-de	3/1/1	3
WBS	radius	L	pe-p1/3	1/2	1
WB	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	parietal	R	all	1	1
	temporal	R	squamous/petrous	3/3	
	frontal	R	superior orbital margin	2	
	sphenoid	R	greater wing	3	
BB	occipital			2	1
	temporal	R	mastoid	1	
WBS	temporal/sphenoid	R		2/3	1
WBS	zygomatic/maxilla	R		1/3	1
WBS	temporal/occ/sph	L		2/2/3	1
WB	frontal/LR nasal/	L	sup.orb.margin &squama	2/2/3	1
	LR maxilla				
WBS	os coxa frag	L	post sup iliac spine & part	3	1
			of inf aur sur		

Individual 5
Sexing Criteria

Pelvis	**L**		**R**
Ventral Arc (1-3)	1		3
Subpubic Concavity (1-3)	3		3
Ischiopubic Ramus Ridge (1-3)	1		3
Greater Sciatic Notch (1-5)	-		5
Preauricular Sulcus (0-4)	-		4
Estimated Sex, Pelvis	**Male?**		
Skull	**L**	**M**	**R**
Nuchal Crest (1-5)		3	
Mastoid Process (1-5)			4
Supraorbital Margin (1-5)			5
Glabella (1-5)			
Mental Eminence (1-5)			
Estimated Sex, Skull	**Male**		
Humeral Head Diameter	?		?
Radial Head Diameter	F?		F
Femoral Head Diameter	?		?

Individual 5
Aging Criteria

Method	**Left**	**Right**
Auricular Surface	NA	50-59
Todd Pubic Symphysis	35-39	40-45
Suchey-Brooks Pubic Symphysis	21-57	23-66

Individual 5
Aging Criteria

Cranial Suture Closure	
External Cranial Vault	**Score**
1. Midlambdoid	0
2. Lambda	0
3. Obelion	1
4. Anterior Sagittal	1
5. Bregma	0
6. Midcoronal	1
7. Pterion	3
8. Sphenofrontal	3
9. Inferior Sphenotemporal	1
10. Superior Sphenotemporal	0
Palate	
11. Incisive	-
12. Anterior Median Palatine	-
13. Posterior Median Palatine	-
14. Transverse Palatine	-
Internal Cranial Vault	
15. Sagittal	2
16. Left Lambdoid	0
17. Left Coronal	3
Vault = 6; 18-45	
Lateral-Anterior = 8; 32-65	

Element	**Fusion**	**Age**
Humerus pe	C	
Humerus de	C	
Radius pe	C	
Radius de	C	
Ulna pe	C	
Ulna de	C	
Femur pe	C	
Femur de	C	
Femur gt	C	
Tibia pe	C	
Tibia de	C	
Fibula pe	C	
Fibula de	-	
Scapula med border	-	
Os coxa aic	C	
Os coxa isch tub	C	

Individual 6
Skeletal Inventory

Location	Bone	Side	Segment	Comp	Count
WB	humerus	L	m1/3-d1/3-de	1/1/1	1
BB	humerus	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/2	1
WB	radius	L	pe-p1/3-m1/3	1/1/3	1
WB	os coxa	L	ilium/ischium/acetabu-	2/2/1/3	1
			lum/auricular surface		
WB	os coxa	R	ilium/acetabulum/	2/1/3	1
			auricular surface		
BB	femur	L	pe-p1/3-m1/3-d1/3-de	2/1/1/1/2	1
BB	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/2	1
BB	tibia	L	p1/3-m1/3-d1/3-de	1/1/1/1	1
WB	tibia	R	pe-p1/3-m1/3-d1/3-de	3/1/1/1/1	1
WB	rib (3-12)(6 ribs)	L	shaft	2	6
WB	rib (3-12)	R	shaft	2	1
WB	cervical (3-7)		body/neural arch	1/1	1

Sexing Criteria

Pelvis	**L**		**R**
Ventral Arc (1-3)	-		-
Subpubic Concavity (1-3)	-		-
Ischiopubic Ramus Ridge (1-3)	-		-
Greater Sciatic Notch (1-5)	1		1
Preauricular Sulcus (0-4)	-		-
Estimated Sex, Pelvis	**Female**		
Skull	**L**	**M**	**R**
Nuchal Crest (1-5)		-	
Mastoid Process (1-5)	-		-
Supraorbital Margin (1-5)	-		-
Glabella (1-5)		-	
Mental Eminence (1-5)		-	
Estimated Sex, Skull	**-**		
Humeral Head Diameter	-		-
Radial Head Diameter	F		-
Femoral Head Diameter	-		F

Aging Criteria

Element	Fusion	Age
Humerus pe	F	14-23
Humerus de	C	
Femur pe	F	15-20
Femur de	F	14-21
Femur gt	C	17+
Tibia de	C	14+

Individual 7
Skeletal Inventory

Location	Bone	Side	Segment	Comp	Count
WB	scapula	L	glenoid/all	1/2	2
BB	scapula	R	all	1	1
WB	clavicle	L	all	1	1
WB	clavicle	R	all	1	1
WB	sternum		body	1	1
WB	humerus	L	pe	1	1
BB	humerus	L	p1/3-m1/3-d1/3-de	1/1/1/2	1
BB	humerus	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	3
BB	ulna	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
WB	ulna	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	radius	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	radius	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	1
BB	os coxa	L	all	1	1
BB	os coxa	R	ilium-ischium-pubis-	1/1/1/1/2	1
			acetabulum-auricular		
			surface		
WB	sacrum			2	1
BB	femur	L	pe-p1/3-m1/3-d1/3-de	1/1/1/1/1	2
BB	femur	R	pe-p1/3-m1/3-d1/3-de	1/1/1/1/2	1
BB	tibia	R	pe-p1/3-m1/3-d1/3-de	2/1/1/1/1	1
WB	atlas		body/neural arch	1/1	1
WB	axis		body/neural arch	1/1	1
WB	C3		body/neural arch	1/1	1
WB	C4		body/neural arch	1/1	1
WB	C5		body/neural arch	1/1	1
WB	C6		body/neural arch	1/1	1
WB	C7		body/neural arch	1/1	1
WB	T1		body/neural arch	1/1	1
WB	T2		body/neural arch	1/1	1
WB	T4		body/neural arch	1/1	1
WB	T5		body/neural arch	1/1	1
WB	T6		body/neural arch	1/1	1
WB	T7		body/neural arch	1/1	1
WB	T8		body/neural arch	1/1	1
WB	T9		body/neural arch	1/1	1
WB	T10		body/neural arch	1/1	1
WB	T11		body/neural arch	1/1	1
WB	T12		body/neural arch	1/1	1
WB	L1		body/neural arch	1/1	1
WB	L2		body/neural arch	1/1	1
WB	L3		body/neural arch	1/1	1
WB	L4		body/neural arch	1/1	1
WB	L5		body/neural arch	1/1	1
WB	rib 1	L	all	1	1

BB	rib 2	L	all	1	1
BB	rib (3-12)	L	head-tubercle-shaft	1	2
WB	rib (3-10)(7ribs)	L	all	1	8
WB	rib 11	L	all	1	1
WB	rib 12	L	all	1	1
WB	rib 1	R	head-tubercle-shaft	1	1
WB	rib 2	R	head-tubercle-shaft	1	1
BB	rib (3-12)	R	head-tubercle-shaft	1	1
WB	rib 4-9 (6ribs)	R	head-tubercle-shaft	1	6
WB	rib 10	R	head-tubercle-shaft	1	1
WB	rib 11	R	head-tubercle-shaft	1	1
WB	rib 12	R	head-tubercle-shaft	1	1
WB	complete skull			1	1
BB	mandible		all	1	1

Individual 7
Dental Inventory

Position	Tooth	Cat	Wear	Abscess	Caries	Notes
1	R max molar 3	2	4(1.1.1.1)		1 occ	
2	R max molar 2	2	14(3.4.3.4)			
3	R max molar 1	2	19(5.6.4.4)			
4	R max premolar 2	5				
5	R max premolar 1	2	5			
6	R max canine	5				
7	R max incisor 2	5				
8	R max incisor 1	5				
9	L max incisor 1	5				
10	L max incisor 2	7				
11	L max canine	2	4			
12	L max premolar 1	2	4			
13	L max premolar 2	2	3			
14	L max molar 1	2	18(5.5.4.4)			
15	L max molar 2	2	15(3.4.4.4)			
16	L max molar 3	5				
17	L mand molar 3	2	13(3.4.3.3)			
18	L mand molar 2	4				
19	L mand molar 1	2	17(4.4.4.5)		1oc/bu	
20	L mand premolar 2	5				
21	L mand premolar 1	2	4			
22	L mand canine	7				
23	L mand incisor 2	7				
24	L mand incisor 1	5				
25	R mand incisor 1	2	5			
26	R mand incisor 2	2	5			
27	R mand canine	5				
28	R mand premolar 1	2	4			hypoplasias
29	R mand premolar 2	2	4			
30	R mand molar 1	2	12(3.1.5.3)		1 buc	
31	R mand molar 2	2	14(4.3.4.3)		1 buc	
32	R mand molar 3	2	19(5.4.5.5)		1oc/1bu	

Individual 7
Sexing Criteria

Pelvis	**L**		**R**
Ventral Arc (1-3)	3		3
Subpubic Concavity (1-3)	3		3
Ischiopubic Ramus Ridge (1-3)	3		3
Greater Sciatic Notch (1-5)	5		5
Preauricular Sulcus (0-4)	-		-
Estimated Sex, Pelvis	**Male**		
Skull	**L**	**M**	**R**
Nuchal Crest (1-5)		3	
Mastoid Process (1-5)	2		2
Supraorbital Margin (1-5)	2		-
Glabella (1-5)		2	
Mental Eminence (1-5)		5	
Estimated Sex, Skull	**?**		
Humeral Head Diameter	M		M
Radial Head Diameter	F		M?
Femoral Head Diameter	M		M

Individual 7
Aging Criteria

Method	Left	Right
Auricular Surface	NA	-
Todd Pubic Symphysis	30-35	-
Suchey-Brooks Pubic Symphysis	21-46	-

Cranial Suture Closure	
External Cranial Vault	**Score**
1. Midlambdoid	0
2. Lambda	0
3. Obelion	0
4. Anterior Sagittal	0
5. Bregma	0
6. Midcoronal	0
7. Pterion	0
8. Sphenofrontal	0
9. Inferior Sphenotemporal	0
10. Superior Sphenotemporal	0
Palate	
11. Incisive	-
12. Anterior Median Palatine	-
13. Posterior Median Palatine	-
14. Transverse Palatine	0
Internal Cranial Vault	
15. Sagittal	-
16. Left Lambdoid	-
17. Left Coronal	-
Vault = 0; <49	
Lateral-Anterior = 0; <50	

Element	Fusion	Age
Humerus pe	C	
Humerus de	C	
Radius pe	C	
Radius de	F	17-22
Ulna pe	C	
Ulna de	F	15-23
Femur pe	C	
Femur de	C	
Femur gt	C	
Tibia pe	-	
Tibia de	C	
Fibula pe	-	
Fibula de	-	
Scapula med border	C	
Os coxa aic	-	
Os coxa isch tub	-	

APPENDIX D:

OSTEOMETRIC DATA

Infracranial Metrics for Unassigned Adult Materials (mm)

Clavicle	**L**	**L**	**L**	**L**	**R**	**R**	**R**	
Location	**BB**	**WB**	**WB**	**WBS**	**WB**	**WB**	**WBS**	
max length	157	145	134	124	143	146	161	
AP diam at midshaft	13	11	11	10	11	12	13	
SI diam at midshaft	10	12	9	8	8	10	9	
Scapula	**L**	**L**	**L**	**L**	**R**	**R**	**R**	**R**
Location	**BB**	**WBS**	**WBS**	**WBS**	**BB**	**BB**	**BB**	**WBS**
Height	-	-	112*	-	148	-	158	118
Breadth	110	104	90*	107	106	103	96	88
Calcaneus	**L**	**L**			**R**	**R**	**R**	
Location	**WBS**	**WBS**			**WBS**	**WBS**	**WBS**	
max length	83	68			79	79	73	
middle breadth	45	39*			43	45	43	

Infracranial Metrics for Subadult Materials (mm)

Femur	**L**	**R**	**R**	**Fibula**	**R**		
Location	**BB**	**BB**	**BB**	**Location**	**WB**		
max length	185	242	186	max length	199		
max width at distal end	42	45	-	max diam at midshaft	8		
max diam at midshaft	12.5	14	13				
Tibia	**L**	**R**		**Ilium**	**L**	**L**	**R**
Location	**BB**	**WB**		**Location**	**WBS**	**WBS**	**WB**
max length	208	207		width	62	73	61
max diam at midshaft	15.5	16		length	66	84	-
Scapula	**L**	**L**		**Humerus**	**R**	**R**	
Location	**WB**	**WBS**		**Location**	**WBS**	**WBS**	
length	55*	56		length	107	140	
width	50	42		diameter	10	29	
length of spine	54*	48		width	25	12	
Clavicle	**L**	**R**		**Ulna**	**R**		
Location	**WB**	**WBS**		**Location**	**WBS**		
length	59*	93		length	115		
diameter	6	6		diameter	7		

Subadult Mandible	**BB**
25. chin height	-
26. body height at mental foramen	21*
27. body thickness at mental for	11.5
28. bigonial diameter	-
29. bicondylar breadth	-
30. minimum ramus breadth	-
31. maximum ramus breadth	-
32. maximum ramus height	34
33. mandibular length	-
34. mandibular angle	125
width of arc	30

*Measurement estimated due to damage.

APPENDIX E:

ASSOCIATED ARTIFACTS

Artifacts found in White Barrel Sack

Fiber Cordage found in Black Barrel

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