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# THE STRUCTURAL VIOLENCE OF MAYA SACRIFICE: A CASE STUDY OF RITUALIZED HUMAN SACRIFICE AT MIDNIGHT TERROR CAVE, BELIZE 

C. L. Kieffer Nail<br>University of New Mexico

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# C. L. Kieffer Nail (a.k.a Crystal Leanne Kieffer) 

Candidate

Anthropology
Department

This dissertation is approved, and it is acceptable in quality and form for publication: Approved by the Dissertation Committee:

Dr. Lawrence G. Straus, Co-Chairperson

Dr. Loa Traxler, Co-Chairperson

Dr. Wirt H. Wills

Dr. Marisol Cortes-Rincon

# THE STRUCTURAL VIOLENCE OF MAYA SACRIFICE: <br> A CASE STUDY OF RITUALIZED HUMAN SACRIFICE AT MIDNIGHT TERROR CAVE, BELIZE 

by<br>\section*{C. L. KIEFFER}

B.S., Anthropology, University of California, Riverside, 2004
M.A., Anthropology, California State University, Los Angeles, 2007
M.A., Museum Studies, University of New Mexico, Albuquerque, 2017

## DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy
Anthropology

The University of New Mexico
Albuquerque, New Mexico

May, 2018

## DEDICATION

This dissertation is dedicated to Dorothy Anne Parker, Jean Claude Morand, Nicholas Arburn, and Kyle Barthel.

May you continue to live on in our memories.

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For various reasons, working on the MTC Project almost broke me as an archaeologist and I seriously considered changing the topic of my dissertation to the evolving religiosity of the Mennonites in the Springfield, Belize community that captured my hearts. However there were a number of people on the project who kept me from abandoning research at MTC. The words of wisdom from our dedicated project cavers Don Arburn, Allan Cob, and Linda Palit inspired me before we started the MTC project and helped me remember what was and was not important. Humility is hard to teach, but you got the point across Allan - Thank You! I will always respect your advice and y'all will always be caver family to me. I thank you for making me a better caver which has in turn made me a better cave archaeologist. Special thanks also to the assistant project director of the project, Dr. Ann Scott. Thanks for helping me turn a paper I wrote in an archaeological theory class I took at the University of New Mexico in the Fall of 2008 into something a little more substantial. You contributed a breath of knowledge regarding Maya ethnography and ritual practices and restructure the order of the paper to make it what it is today - "The Mesoamerican Cave Paradigm."

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by<br>\section*{C. L. KIEFFER NAIL}<br>B.S., Anthropology, University of California, Riverside, 2004<br>M.A., Anthropology, California State University, Los Angeles, 2007<br>M.A., Museum Studies, University of New Mexico, Albuquerque, 2017<br>Ph.D., Anthropology, University of New Mexico, 2018


#### Abstract

The site of Midnight Terror Cave is located in the karstic Roaring Creek Valley near the village of Springfield in the Cayo District of Belize. The site was discovered in 2006 and fieldwork was conducted by the Western Belize Regional Cave Survey Project and California State University, Los Angeles, between 2008 and 2010. This dissertation focuses on the osteological analysis of the bones of 118 individuals recovered and recorded at the site. The osteological, contextual, and demographic evidence is framed within ritual and costly signaling theory of structural violence and viewed with the ethnohistoric and ethnographic literature of the ancient and modern Maya in mind. Analyses of the data indicate that the site's remains constitute the largest assemblage of probably sacrificed individuals in the Southern Maya Lowlands, and that these sacrifices may have coincided with the Terminal Classic droughts. Demographic analysis indicates that the mortuary assemblage is significantly different from what would be expected for a "normal" cemetery assemblage of a horticultural society. The large quantities of older children and young adults apparently sacrificed in this cave suggest that these may have been petitions to the Maya rain deity. Isotopic data and paleopathology evidence suggest


that geographical outsiders and possible social outcasts were at least sometimes chosen for sacrifice.

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## CHAPTER 1 INTRODUCTION

"Thus, the study of violence in archaeological contexts must necessarily go beyond the proximate causes of individual cases of traumatic injury. To do so requires the use of a theoretical framework responsive to the historical and contextual factors that create and maintain violence." (Martin 1997:71)

Violence is part of human nature, especially when triggered by certain life threatening stressors. From the distant past to today, violence has a sense of structure which is created by cultural adaptations through the way society is structured to how religion is practiced. It is this structure that allows for violence to be culturally sanctioned and pervasive for an extended period of time. In order to change these conditions in which violence is socially acceptable, we must first understand how these conditions arise, how they are maintained, and how they are ultimately overturned. By understanding the full cycle of how humans use violence in a culturally adaptive manner, we may be able to learn how to avoid certain types of warfare and genocide today.

This dissertation uses the site of Midnight Terror Cave, Belize to focus on how politically supported ritual violence conducted by the ancient Maya may relate to periods of environmental change. How this structuralized violence pervasively persisted within their culture for an extended period of time will be discussed. Additionally, how these political and environmental conditions may have contributed to the political instability of the local region. By correlating these events with the Terminal Classic, a period of climatic instability in the region, we will broaden our understand of the factors that drive humans to commit such acts of violence against others.

The fields of Maya cave archaeology and bioarchaeology have been revolutionized greatly in the past three decades. During this time, our understanding of Maya ritual has deepened and evolved, especially as it relates to the utilization of caves and other karst features. Similarly, the field of bioarchaeology has emerged and slowly refined its methodological and interpretive frameworks that are now considered standard practice. This dissertation contextualizes and analyzes data and suggests interpretations of a large number of human remains from the site of Midnight Terror Cave (MTC), Belize. The goal of the historical and theoretical chapters in this dissertation provide a background to the topic of Maya cave sacrifice. This information also provides the methodological and theoretical frameworks that have only recently become widely accepted by other specialists in the field of Maya cave archaeology (Kieffer and Scott 2012).

The integral aspects of the theoretical framework utilized in Maya cave archaeology today is outlined in the "The Mesoamerican Cave Paradigm," which is included in this dissertation as Chapter 2. It was first published in Heart of Earth: Studies in Maya Ritual Cave Use (Brady 2012), a publication of the Association for Mexican Cave Studies, and is included with permission of the publisher. This chapter provides the historical background necessary to understand the paradigmatic approach utilized by Maya archaeologists specializing in caves. In the simplest terms, "The Mesoamerican Cave Paradigm" outlines why these spaces are viewed as sacred and ritual-related, based upon ethnographic analogy and the material culture left behind by the ancient Maya in these caves. Chapter 3 builds upon the shifts in paradigmatic views held by some Mayanists by showing how the topic of sacrifice has evolved in relation to Maya caves.

Additionally, the chapter outlines some of the changes in bioarchaeological approaches used in the Maya region and how they contributed to changes in interpretations of human remains recovered from the archaeological record.

The theoretical approaches that allow us to understand the act of sacrifice in Maya caves are discussed and elaborated upon in Chapter 4. This chapter sets up the major theoretical tenets of why specific classes of people were chosen for sacrifice according to Girard (1979). While the site of MTC cannot account for every element of society that was likely to be chosen for sacrifice, there is some evidence that supports the idea that physically disabled and non-local individuals were targets for sacrifice. Each of these topics is highlighted by case studies in Chapters 5 and 6 . While these chapters primarily focus on the evidence for the sacrifice of physically disabled people as well as of geographical outsiders; MTC has circumstantial evidence to support the idea that orphans may have also been chosen for sacrifice.

Chapters 5 focuses on the isotope analysis conducted on skeletal remains from the site of MTC. After creating a database of known isotope values and site-dependent variables known to influence oxygen isotope values, step-wise regression determined distance from the sea to be the leading factor influencing oxygen isotope values in the Central Maya Lowlands. Chapter 5 provides the data that suggests many of the individuals interred at MTC were probably not originally from the immediate area of the cave and thus were possibly geographical outsiders to the community.

This notion that the ancient Maya at MTC sacrificed "the other" (an individual from outside the group or community) is further examined in Chapter 6.This chapter focuses on two probable cases of Klippel-Feil disease noted at the site of MTC. While the
skeletal abnormalities of this genetic abnormality are not always by themselves debilitating, the associated abnormalities can be excruciatingly painful, physically limiting, and present a physical appearance that is abnormal. In addition to the probable physical limitations these two individuals had, it is these associated abnormalities that I argue may have contributed to these individuals being chosen for sacrifice.

The final data-based chapter (Chapter 7) focuses on the demographic age distribution of individuals recovered from the site of MTC. Chapter 7 critically evaluates the similarities and statistically significant differences of rectangular prorated demographic data from MTC and 49 other sites through the creation of Siler Models and multiple different statistical tests (z-score, paired t-tests, and Monte Carlo simulation). Comparative sites in this analysis include Chichén Itzá (a known Maya site where sacrifice has been shown to have occurred), multiple sites where mortuary assemblages were accumulated due to warfare and violence, and "normal" mortuary assemblages found in Maya cemeteries.

## Methods

Archaeological survey of MTC was conducted during three, month-long field seasons in 2008-2010 by California State University, Los Angeles (CSULA) directed by Dr. James Brady. The field seasons focused on precision mapping and surface collection of artifacts and skeletal material. A few detailed area maps were produced, none of which were available for inclusion in this dissertation. No complete resurveyed map was ever completed as part of the CSULA field work. Thus the only available map of the site is the incomplete map produced by Nancy Pistole for the Institute of Archaeology shortly after the cave was discovered (See Appendix A).

During the CSULA field work, descriptive notes were taken on every deposit including nearby cave morphology, skeletal material that could not be removed due to calcium carbonate concentrations, positioning of skeletal material, condition of skeletal material, and whether individuals were in primary or secondary placements (See Appendix A for details). Upon removal from context, bones were wrapped in aluminum foil and placed in plastic boxes for transport to the laboratory. In the field laboratory south of Belmopan, the bones were washed, dried and labeled by archival ink with Operation (cave chamber), Lot (room or bone concentration), and Sublot numbers. This unique bone catalog number allowed for photos, qualitative and quantitative descriptions of the bone to be referenced in future research. Osteological analysis of MTC skeletal material collected during the last three field seasons was completed during the winter of 2012 at CSULA following shipment of the collection stateside in early 2011.

## Ceramics and Cultural Material

When this dissertation was completed, no final report had been filed with the Belize Institute of Archaeology regarding the analysis of the site's ceramics or other cultural material. Preliminary description of ceramic deposits and cultural behaviors associated with ceramics at the site have been discussed by Giron (2009). The most complete analysis performed to date on the ceramic assemblage was performed by Ann Scott and James Brady. The synthesis of this analysis was presented at a conference but never published (Scott 2011). The only published article on ceramics from the site of MTC is a theoretical discussion of the high-density ceramic clusters in Operation IV (Giron-Ábrego and Brady 2014). Preliminary summary of items of personal adornment
(Cordova 2011), tools (Saldana 2011), and spatial distribution of artifacts (Saldana 2012) recovered from the site were presented at conferences, however, these data have not yet been published. Most of the artifacts recovered from the site were not exported for further analysis or testing and are currently housed at the Archaeological Institute in Belmopan, Belize.

## Large-Scale Modifications

What makes the site of MTC very unusual in the Southern Maya Lowlands is the extent to which the interior of the cave has been modified. These modifications include a complex trail system, artificial terraces, the leveling and construction of what could be called a plaza, as well as deliberate breaking and modification of cave formations. The number of conference papers that have discussed this topic are many (Brady 2009a; Chavez 2009; Cobb and Brady 2009; Saldana and Kieffer 2009; Cobb and Brady 2011; Brady 2011; Brady and Kieffer 2011). However, the only publication that has discussed the large-scale modifications to the cave is a previously co-authored article by Brady and Kieffer (2012). Brady and Kieffer (2012:249-251) state that the degree to which the site was used and altered over a long period of time provide evidence towards the idea that it was a public space with a ritual circuit, and thus viewed as a sacred space for the ancient Maya.

## Osteological Analysis

This dissertation presents the most complete analysis to date of the skeletal inventory with calculation of minimum number of individuals for material recovered
from the site and analyzed in situ. A number of conference papers and a few peerreviewed publications have been produced on various aspects of the skeletal assemblage that are not incorporated into this dissertation. These works go into greater topical coverage of dental modification observed at the site (Kieffer 2010, Verdugo 2015), strontium isotope analysis (Lorenz 2016), DNA analysis of individuals (Verdugo et al. 2016, Verdugo et al. 2016), and more focused osteological analysis and a different calculation of minimum number of individuals (due to inaccurate methodology) on juveniles and sub-adult remains recovered from the site (Prout 2015, 2016ab).

Due to the commingled nature of the human remains recovered from MTC, each bone was analyzed, photographed, catalogued, and pertinent measurements or morphological descriptions recorded using standard bioarchaeological and forensic anthropological techniques by the author (See Appendix B for details). The techniques provided data with which to create biological profiles related to sex, age, and status. The data collected allow for calculation of minimum number of individuals, numbers of males and females, ages, incidence of pathological conditions, and other indications of social and health status such as caries (Cucina and Tiesler 2003:1), dental modifications (Romero 1958; Smith 1972; Becker 1973; Tiesler 1999; Williams and White 2006), and cranial modifications (Tiesler 1999). Osteological analysis yielded the demographic data necessary for understanding who was chosen for sacrifice and allowed for reduced possibility of duplicate sampling of individuals for dating and isotope analyses.

The minimum number of individuals (MNI) was calculated based upon standard bioarchaeological methods, which rely on knowing the quantity and size of the same sided elements. Whenever possible, age and sex differences that could be noted based on
size and morphology of individual bones were used to aid in determining the number of people within a deposit. Because many age estimation techniques are based on European skeleton assemblages, care was taken to note any possible overlap of age ranges within a deposit from numerous skeletal elements. Minimum number of individuals was calculated numerous times in an effort to reconcile the possibility of skeletal material being moved from one deposit to another or even completely removed from the cave due to looting, prehistoric reuse, or natural processes. First MNI was calculated at the sublot level, then at the lot level, next at the operation level, and finally at the level of the entire cave site. These calculations were done due to the known movement of skeletal material by fluvial and cultural means throughout the cave. Making these calculations and comparing elements present, completeness of individuals, and MNI with adjacent or nearby deposits made it possible to determine if movement of skeletal elements occurred. When these calculations were compared to field notes that recorded unrecoverable material, it became possible to understand which areas of the cave had skeletal material removed from via secondary use or looting.

Overall, the site of MTC has yielded an exceptional skeletal assemblage. To date, it contains the greatest number of individuals ever recovered from a cave either in Belize or the whole Southern Maya Lowlands. While not all of these individuals have visible signs of violence on their remains, evidence from those that do when combined with the contextual evidence at the site indicate that many/most of these individuals probably suffered violent deaths.

The artifacts and skeletal collection recovered from MTC will be useful for piecing together many aspects of ancient Maya life for generations to come. More
specifically, this site has a plethora of data that will aid in understanding more about rituals performed in Maya caves. This type of research in Maya ritual would have been impossible decades ago, due in part to the slow moving paradigmatic shift in the way researchers working in caves now approach cave utilization.

# CHAPTER 2 THE MESOAMERICAN PARADIGM: ITS HISTORICAL DEVELOPMENT 

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## Introduction

Although there is a long history of cave investigation in Mesoamerica dating back to the 1840s, a dramatic revival of cave studies began in the 1980s leading to the emergence of a self-conscious sub-discipline of Mesoamerican cave archaeology in 1997 (Scott 2007). The approach developed by the new field has been influential especially in the advancement of a Southwestern cave archaeology that has borrowed heavily from Mesoamerican models. In the session, "Sipapus, Sinkholes, and Shrines: New Approaches to the Study of Ritual Cave Use in Southwestern Archaeology," at the $72^{\text {nd }}$ Annual Meeting of the Society for American Archaeology, the organizer, Scott Nicolay (2007), referred to the approach as the Mesoamerican Cave Paradigm. Nicolay coined the term from his experience working on Jaime Awe's (1994; 2005) Western Belize Regional Cave Project to refer to the ideas he encountered there and incorporated into his
own work in the Southwest. Mesoamericanists, for the most part, have not used this designation although Brady (2007) acknowledges it in his paper, "The Mesoamerican Paradigm in the Southwest," given in Nicolay's session. The use of the label by Southwesternists raises an interesting question, however, as to whether a cave paradigm, recognized or not, actually exists in Mesoamerica. This paper will examine whether a paradigm exists and, if it does, will attempt to define and critically evaluate it.

## What is a Paradigm?

The uncertainty over whether a Mesoamerican Cave Paradigm exists is, to a great extent, due to the misuse of the term paradigm. Archaeologists have often used the terms paradigm, theory, and theoretical framework interchangeably. Some archaeologists classify processual, postprocessual, and other such "schools of thought" as paradigms. They are not. These are logical theoretical frameworks, which are "constructed by using an established, coherent explanation of certain phenomena and relationships" and act as structures that guide research (Eisenhart 1991: 205).

Kuhn (1962: 23) defines a paradigm as "an accepted model or pattern." This definition, however, is too lacking in specificity to be useful. Kuhn (1996: 175) later revised his definition to include "an entire constellation of beliefs, values and techniques, and so on, shared by the members of a given community." These beliefs become so instilled in a group that the way they view the world is different than those who do not share the same paradigm. Burrell and Morgan (1979: 24) make this same point in stating that "be[ing] located in a particular paradigm is to view the world in a particular way." Martin (1971: 5-6) holds that a new paradigmatic ideology significantly alters the discipline, desired
goals, concept of culture, and methods utilized. "The new paradigm does not resolve any problems. Its value rests in the fact that it revolutionizes our methods of thinking and permits us to view our inquires in a different way and with greater scope" (Martin 1971: 6). It is based on these definitions and expectations that existence of a Mesoamerican Cave Paradigm will be judged.

## History of Mesoamerican Cave Archaeology

As noted earlier, there is a long history of cave investigation in Mesoamerica. The study of these features, however, was not pursued with equal intensity in all parts of the culture area. Because the entire Maya lowlands is karstic in nature, the majority of the early reports are from this region and the Maya area has remained at the forefront of the theoretical developments in cave studies. To determine if a Mesoamerican Cave Paradigm exists, it is helpful to examine the historical development of cave scholarship. This allows periods of methodological change and theoretical innovation to be highlighted. A review of that literature clearly shows that the developments during the last two decades of the twentieth century marked a significant break from work that had gone before it.

The period from 1840 - 1914 has been designated the Early Period (Brady 1989; Brady and Prufer 2005a) and was initiated by the writings of John Lloyd Stephens (1841, 1843) and illustrations by Fredrick Catherwood of their explorations in the 1840s that popularized Maya archaeology. In their travels, visits to a number of caves are described, highlighted by Catherwood's painting of the ladder in Bolonchen Cave. This period is noteworthy for the publication of four studies: Henry Mercer's The Hill-Caves
of Yucatan (1896), Edward Thompson's Cave of Loltun (1897), George Gordon's Caverns of Copan (1898), and Eduard Seler's report on Quen Santo (1901) that rank among the best work carried out in the Maya area at this time. The period also stands out for its missed opportunities. Edward Thompson's dredging of the Cenote of Sacrifice was widely known within the field but the cenote was not recognized as a cave feature. More importantly, his manuscript on the High Priest's Grave was filed away unpublished for decades (Thompson 1938). If Seler had known that a major pyramid at Chichen Itza had been built over a cave it might have influenced his interpretation of the cavearchitecture relationships that he noted at Quen Santo. Theoretically there was little challenge to the European view of caves as habitation sites. Henry Mercer (1895: 397) states the position explicitly,

Just as the Drift Hunter, the oldest proved inhabitant of Europe, was found to have left traces of his presence in caves, just as the prehistoric European epochs of human culture, bronze under iron, then polished and then chipped stone, were found to be represented in caves by the super-position of films of this rubbish resting one above the other, so here in America we may hope to find similar evidence, if it exists. If the Indian had a predecessor, we may expect to reveal proof of his presence in some cavern not difficult to discover.

Although a number of significant cave studies provided a foundation of data on cave use in the Maya area, no attempt was made to synthesize this material and there was no active discussion about the function of caves. It is clear, therefore, that nothing approaching a paradigm existed at this point.

The Middle Period (1914-1950), witnesses a near complete cessation in cave investigations (Brady and Prufer 2005b:1). In the Maya area most of this period falls into
what Norman Hammond (1982:20) calls the "Period of Institutional Domination," [1924 - 1970] when large projects sponsored by institutions such as the Carnegie Institution of Washington, the Peabody Museum of Harvard University and the University Museum at the University of Pennsylvania drove advances in the field. The British Museum's Pusilha Project was the only major institutional investigation at this time that included substantial cave work (Joyce et al. 1928, Joyce 1929, Gruning 1930). The absence of cave investigations in the research agendas of institutional projects meant that caves disappear from the discussion of Mesoamerican archaeology so that there is nothing that could be called a paradigm at the end of this period.

During the Post-War Period (1950-1980), field studies of caves began to reemerge. The Carnegie Institution's last project at Mayapan produced a significant number of cave studies (Smith 1953, 1954; Strómsvik 1956). E. Wyllys Andrews IV documented the Gruta de Chac (Andrews 1965a) and the important cave of Balankanche (Andrews 1961, 1970, 1971), significant because the religious function of the site was well accepted by the field. David Pendergast (1962, 1964, 1966, 1969, 1970, 1971, 1974) contributed a model of first rate reporting in a series of monographs based on salvage operations. Doris Heyden's $(1973,1975,1981)$ interpretation of the cave beneath the Pyramid of the Sun at Teotihuacan greatly influenced the views of the subsequent historical periods especially in terms of understanding and seeing constructed sacred landscapes.

The most important contribution of the period was the first synthesis and interpretation of the cave data in Sir J. Eric Thompson's The Role of Caves in Maya Culture (1959). A revised and expanded version appeared as the introduction to the
reprint edition of Mercer's The Hill-Caves of Yucatan in 1975. Thompson's syntheses are significant in that he explicitly discounts habitation saying, "Most caves in Central America are too damp to be suitable for long residence" (Thompson 1959:129) and all of his principal uses of caves were for ritual. Unfortunately, the first article was published in an obscure German journal and so was not widely circulated and the second was published the year he died and so, once again, had little immediate impact on the field (Brady 2005a:f-6). Archaeology's view at the end of this period is neatly summed up in Norman Hammond's (1981:177) statement, "Whether residence in caves was permanent, periodic or sporadic, regular or only for ritual and refuge, we do not yet know..." Clearly, nothing approaching a cave paradigm had appeared at the end of the Post-War Period. The Post-War Period ended with the deaths of a number of the prominent figures who had worked in caves (Scott 2004). A.H. Anderson died prior to publishing all of his cave findings in 1967 (McNatt 1996), E. Wyllys Andrews IV died of a heart attack in 1971 at age 54 (Wauchope 1972), and Sir J. Eric Thompson died in 1975 at age 76 (Hammond 1977). Dennis Puleston, who had only days before presented his first statement on Maya cave utilization (MacLeod and Puleston 1979), was struck by lightning on the top of the Castillo pyramid at Chichen Itza in 1978 and died at age 38 (Harrison and Messenger 1980). These deaths at the end of the Post War Period contributed to the introduction of a fundamentally different approach when a new generation of archaeologists entered the field with virtually no prominent, authorities active from the previous period.

Over the last two decades, the division of the historical periods has evolved as the passage of time has provided a changing perspective on the development of cave studies. In the first historical overview of Mesoamerican cave studies written in the 1980s, Brady
(1989) referred to the period from 1950-1980 as the Recent Period. In 1997, he proposed dividing the Recent Period into a Post-War Period (1950-1980) and a Recent Period (1980-present) during which he saw a subfield of Maya cave archaeology emerging (Brady 1997a). Ten years later Ann Scott (2007) further refined the history by renaming the period from 1980-1997 the Foundation Period, with the amended Recent Period (1997-present) beginning with the 1997 Society for American Archaeology meeting in Nashville.

The Foundation Period (1980-1997) marked the appearance of the first specialized archaeology focused on caves. Scott (2007) states that this was "when the underlying assumptions of the field were defined, a methodology was established, and a theoretical position took shape." The new approach grew out of James Brady’s 45 publications between 1985 and 1997, which established basic methodological and interpretative approaches that cave archaeology followed into the Recent Period (Scott 2004). Scott's characterization of the Foundation Period makes this span the obvious place to look for a cave paradigm. Scott (2007) has also argued that the session, "New Perspectives in Mesoamerican Cave Archaeology," at the Society for American Archaeology meeting in Nashville marked the end of the Foundation Period, the beginning of the Recent Period (1997-present), and the emergence of a "self conscious" sub-discipline of Mesoamerican cave archaeology.

## Is There a Mesoamerican Cave Paradigm?

In examining the history of Mesoamerican cave archaeology, we have concluded that a paradigm does in fact exist. Since the term was first formally used by

Southwesternists, Mesoamerican cave archaeologists are largely unaware of the designation, so no attempt has been made by practitioners to define the paradigm or to discuss what elements make up its key constitutes. Our task, therefore, is to define the Mesoamerican Cave Paradigm.

In attempting this definition, we have followed Clifford Geertz's ideas about paradigm definitions when he says,

Let us, therefore, reduce our paradigm to a definition, for, although it is notorious that definitions establish nothing, in themselves they do, if they are carefully enough constructed, provide a useful orientation, or reorientation, of thought, such that an extended unpacking of them can be an effective way of developing and controlling a novel line of inquiry (Geertz 1973: 90).

Following Geertz, our review of the literature suggests that the Mesoamerican Cave Paradigm is constituted around four basic propositions:

1. Caves were used primarily for ritual.
2. Caves must be understood from an indigenous perspective.
3. Caves played a significant role in Pre-Columbian society.
4. Cave Archaeology can address wider theoretical issues.

## Caves as Ritual Features

The first element in the paradigm is that Mesoamerican caves are features used primarily, if not exclusively, for ritual. This point is built on Thompson's $(1959,1975)$ syntheses that outlined a number of functions of Maya caves and argued that all the major uses are religious. Habitation, even for temporary refuge in times of unrest, is dismissed
by Thompson (1959: 129) who notes, "but one may doubt that this kind of occupation was sufficiently prolonged to have had much effect on their contents; most caves in Central America are too damp to be suitable for long residence." His point is well taken. Thermohydrographs placed in Naj Tunich recorded a very stable environment with a relative humidity slightly over 90\% at all times (James Brady, personal communication, August 2005) and two TipTemp Dataloggers placed in Midnight Terror Cave near the surface site of Tipan Chen Uitz, Belize recorded an average temperature of $22.5^{\circ} \mathrm{C}$ $\left(72.5^{\circ} \mathrm{F}\right)$ and an average relative humidity of $99.62 \%$ and $99.99 \%$ during 2008-2009 (Humberto Nation, personal communication, 2011). Similarly, Yok Balum Cave near the site of Uxbenka, Belize recorded an average temperature of $22.92^{\circ} \mathrm{C}\left(73^{\circ} \mathrm{F}\right)$ and an average relative humidity of $100 \%$ with an ONSET HOBO U23 Pro v2 Temperature/Relative Humidity Data Logger (Keith Prufer, personal communication, 2011). This point has been too often overlooked by archaeologists who, prior to the Foundation Period, rarely spent more than a day or two in a cave. With the extended periods now spent investigating individual caves, most cave archaeologists have anecdotal stories of finding gloves or other equipment left in a cave that were covered with mold. While controlled experiments on preservation have not been conducted in caves, information is available for the subterranean environment of chultuns that have almost identical temperature and relative humidity as Midnight Terror Cave and Yok Balum Cave (Puleston 1971:329). Dennis Puleston's attempt to store a variety of crops in chultuns showed that little of the food was edible at the end of his 11-week experiment. He concludes that chultunes "could not be used for the storage of maize, beans or squash. Even the root crops did not do very well" (Puleston 1971:330). It is
important to recognize that one of the primary determinants of fungal growth in grain is moisture content, which is determined by relative humidity (Christensen and Kaufman 1969:25). We mention this because much of the Naj Tunich tunnel system is covered with a thick layer of dust that gives it the appearance of a "dry cave" so archaeologists need to exercise caution when characterizing a cave as dry.

Andrews (1965b:291), while accepting the possibility of cave habitation, states, "Inland, particularly on the flat northern plain, caves and cenotes, especially water caves, is a likely place to search for ancient man, but excavation and exploration of scores of caverns since the turn of the century have produced not a single indication of really early habitation." If the Maya were not using caves for habitation early on, then it is unlikely that they were used for habitation during the Classic Period when we find the heaviest utilization.

Although Hammond's statement quoted above indicates that the larger field of Maya archaeology had not accepted Thompson's position, those actually working in caves during the Foundation Period had accepted and were utilizing Thompson's (1975) second synthesis as the point of departure in their research (Brady 2005a:f-7). This is illustrated in an extended critique of Thompson in which the critique does not reject Thompson so much as demonstrates how his major points are being rethought and reprioritized in the emerging paradigm (Brady 1989:32-37). The religious function of caves was further strengthened by the first direct critique of the idea of cave habitation in the Maya area (Brady 1989:2-6). The application of the ritual model of cave use through the 1980s and 1990s largely defined who was working within the paradigm and separated them from those outside of it.

The difference in position between those working within the cave paradigm and those working outside of it is illustrated in Paul Healy's review of two volumes of collected articles on Mesoamerican cave archaeology (Brady and Prufer 2005a; Prufer and Brady 2005a). Healy not only notes that all of the authors are working within the same model but also explicitly sets himself outside of the paradigm in stating: None of the authors in either volume discuss any alternative (nonritual) uses of caves in antiquity, despite the fact that these sites regularly contain evidence for habitation (e.g., grinding stones, food residues, utilitarian ceramics, signs of fires), and may have provided temporary, or emergency, shelter in times of inter-center warfare (Healy and Prikker 1989). The authors of these volumes have a strong adherence to the belief that the caves of Mesoamerica in late Pre-Columbian times were all ritualized, sacred (not mundane) sites. Others would be less sanguine (Healy 2007:271).

For those working within the paradigm, Healy's comments simply reflect all the problems encountered in the pre-paradigmatic approach in which archaeologists applied interpretive models developed at surface sites and in domestic contexts with little appreciation for the radically different nature of the cave context. Why, for instance, are signs of fire an indication of a habitational function? At the most obvious level, charcoal in caves is deposited by the use of torches regardless of the type of activity being carried out. More to the point, however, fire is an integral part of Maya ritual (Scott 2009). This is reflected in the fact that the K'iche' Maya refer to rituals as "burnings" (Cook 1986:139) and to the altar where rituals are performed as a "burning place" (quemador) (Bunzel 1952:431). Food offerings also play a prominent role in Maya ritual (Scott 2009) so the discovery of food residues is exactly what one would expect in ritual
contexts (Morehart and Butler 2010). Recent work has also shown that faunal material is ritually deposited in caves as well (Brown 2004, 2005; Brown and Emery 2008; Halperin et al. 2003).

Manos and metates are commonly encountered in caves (Brady 1989:303-306) but those working within the paradigm see no reason to assume that these are associated exclusively with domestic activities. Andrea Stone (1995) proposes that they were used in the production of the ritual dough and breads known ethnohistorically (Durán 1971) and ethnographically (Gomez N. 1974; Love and Peraza Castillo 1984) to have been utilized in ritual. Nor is this the only possible ritual use. Polly Peterson (2006:85-86) extracted fossil pollen from manos and metates recovered from caves in the Sibun Valley which indicated that chili peppers and other items were being ground. Furthermore, Peterson found that metates were re-used as burning surfaces and materials for wall construction inside the dark zone of caves.

Finally, assertions of habitation based on the presence of "domestic" or "utilitarian" ceramics has been heavily criticized with good reason (Brady et al. 1992; Brady and Peterson 2008). These terms generally refer to nothing beyond the fact that the ceramic is unslipped or monochrome slipped so their actual function is not in fact known. It has been shown that the unslipped and monochrome slipped ceramic at Naj Tunich frequently show signs of fire blackening on the vessel interior related to the burning of copal incense, most likely during rituals (Brady 1989:212-213).

The forgoing discussion focuses on specific issues because they were raised by Healy as evidence for habitation. On a higher level, however, the discussion illustrates Kuhn's point that competing paradigms are incommensurable or irreconcilable because
they lack mutually accepted standards of verification. The older approach accepts the existence of utilitarian artifacts whose function is inherent in the object and the presence of such artifacts is then used to determine the function of a site or activity area. The cave paradigm rejects the notion of artifacts having inherent function. Hayden and Cannon (1984:96) note that in living societies "artifacts rarely function in the utilitarian, social, or ideological domain to the exclusion of the others" so function is contingent on context. Therefore, critiques that point to a particular type of artifact or deposit as being proof of habitation simply fall short of the complex argument required by the cave paradigm to demonstrate such a function. There is an epistemological difference at the most fundamental level that impacts not simply the meaning of a particular unit (artifacts) but also how that meaning can be employed in constructing acceptable explanations.

Since the issue of cave habitation has been raised, perhaps it needs to be considered. We would point out that no one asserting cave habitation has considered the larger theoretical implications of such a practice. Who were the people living in caves? Proponents of the habitation model have not discussed the social status of those living in caves. Were they landless peasants? Considering the large quantities of valuables (jade, pyrite, polychrome vessels, finely worked lanceolate blades and hachas of fine-grained stone) recovered from the caves at Dos Pilas (Brady 2005b), this seems unlikely. Could they have been elites? This appears equally unlikely given the large number of palaces at Dos Pilas.

Furthermore, all the archaeological cave surveys that have been conducted have located many more caves than could be studied. If, as the model proposes, every cave containing charcoal or grinding stones is considered habitational, then a sizeable class of
cave dwellers would have existed. What were the social relationships between cave dwellers and surface dwellers? How did a habitational function articulate with a ritual function? One of the reasons that cave habitation remains a viable proposition among critics, in our opinion, is precisely because archaeologists have not seriously considered the implications of habitation.

## Caves in Indigenous Ideology

A second distinctive element of the Mesoamerican Cave Paradigm is its extensive and unapologetic use of ethnographic and ethnohistoric analogy to create emic models of the meaning and, to a lesser extent, the function of caves (Brady and Prufer 2005c). At the lowest level, ethnographic analogy has been used to redefine the very scope of the field in adopting an emic definition of "cave." It appears that early in the Foundation Period, the concept of "cave" was left largely undefined. Bonor Villarejo (1989b:19) simply calls them subterranean spaces while Brady and Veni (1992:149) point out the geological definition of caves as "Humanly accessible natural cavities in the earth." An explicitly emic definition of caves is proposed in Brady's (1989:1) dissertation but this element only appears to be adopted at the end of the Foundation Period when it appears in a more widely distributed work. For the field:

Cave is being used here in the sense of the Maya word č'en which means a hole or a cavity that penetrates the earth. As such it includes caves, grottoes, cenotes, sinkholes, many springs, places where rivers emerge from or disappear into the earth, crevices, and any number of other holes (Laughlin 1975:132). At times rockshelters will be treated as a $c^{\prime}$ 'en and be used ritually while other times not. While this definition is not nicely
bounded, it reflects both the nature of human categories and the ambiguity often encountered in the field (Brady 1997b:603).

The use of an emic definition of caves appears to have been generally accepted in cave archaeology and has been explicitly acknowledged (Rissolo 2003:20-21; Ishihara 2007:27-28) and elaborated on (Scott and Maxwell 2008; Chavez and Landeros 2009) in subsequent work. The issue appears to have been settled by David Stuart's decipherment of the "ch 'een," (cave) glyph in ancient Maya inscriptions (Vogt and Stuart 2005, see also Helmke 2009: 536-600).

On a higher level, the Mesoamerican Cave Paradigm has created a model of the meaning of caves in indigenous cosmology and how this meaning was related to cave's function in the society. It is interesting that Thompson $(1959,1975)$ does not discuss the meaning of caves to either the ancient or modern Maya and does not address the social significance of caves in ancient society. Heyden $(1973,1975,1981)$ attempts to do this in her analysis of the cave beneath the Pyramid of the Sun at Teotihuacan but her discussion is focused specifically on one particular cave so she does not produce a generally applicable regional or cultural model. Responding to the lack of a conceptual framework for interpreting Maya caves, Barbara MacLeod and Dennis Puleston (1979) proposed that caves were associated with the underworld, a view constructed from the Popol Vuh as well as from Lacandon ethnography. In the Popol Vuh, the underworld is portrayed as a place full of dangers and presided over by the malevolent underworld deities. The attribution received wide acceptance and was applied with little question for the next 20 years (Bassie-Sweet 1991; Brady and Stone 1986).

The first critique of the underworld model came at the 1997 SAA meetings in Nashville that marked the beginning of Recent Period (Brady 1997a). Reservations about the idea came from ethnographies where many of the properties, such as rain, attributed by MacLeod and Puleston to the underworld were associated with Earth in indigenous thought. The modeling of actual cave use after a mythical event in a place that was not explicitly identified as a cave was also heavily criticized. Scott (2009) notes that during invocations, Kaqchikel ajq'ijob frequently use the paired couplet, "ruk'u'x Kaj, ruk'u'x Ulew" ("heart of sky, heart of earth") while references to underworld are notable by their absence. The underworld model was replaced among cave archaeologists by the association of caves with the concept of a sacred, animate Earth, an idea more solidly grounded in ethnographic evidence in terms of the modern Maya beliefs (Brady and Prufer 2005c; Scott 2009; Vogt and Stuart 2005).

The association of caves with the sacred Earth has led to the development of additional connections that provide a multifaceted model of areas where caves might be expected to have been important. At the highest level, caves are associated with the actual creation of the universe since celestial bodies such as the sun and the moon emerged and rise from and set into caves (Brady and Prufer 2005c:371; Duby and Bloom 1969:292; Garza 2009:49; Villa Rojas 1945:156). Likewise, human creation is also associated with caves. Many Maya today still believe that their community's founding couple (Jich Mi and Jich Mam in Jakalteko myth) originated in the cave or still live in one. This thereby establishes the cave as a symbol of group identity (Brady and Delgado 2009; Casaverde 1974; LaFarge 1947; Vogt and Stuart 2005:164). These myths and continued ancestor veneration at caves often forms the basis for a group's claim to rights
and access to land (Garza 2009:53). The idea of caves being a source of fertility is emphasized with the belief that clouds and rain are believed to originate from caves (Vogt 1969:387; Vogt and Stuart 2005:177). Both ethnographic and ethnohistoric accounts document the importance of rain rituals and agricultural rituals performed in caves. Recent ethnographic research has even shown that caves are seen as living and breathing entities (Garza 2003). While others have noted that caves are associated with the place of creation (Heyden 1987a), the Mesoamerican Cave Paradigm has recognized this as a singularly important fact. Although the significance of the act of creation has been recognized in other fields dealing with religion (Eliade 1959:80-81), it has largely been unappreciated in Maya archaeology.

## Caves Played a Significant Role in Pre-Columbian Society

J. Eric Thompson was well known for integrating ethnographic and ethnohistoric data into his discussion of the ancient Maya and Doris Heyden relied heavily on both as well. Therefore, it was not the lack of an indigenous view per se that was the critical element missing in the formulation of the social significance of caves. Instead, it appears that it was Thompson's inability to grasp the social significance of caves and Heyden's failure to generalize her findings beyond the one cave at Teotihuacan that prevented them from fully accepting the importance of caves in the indigenous view, a perspective eventually developed by Brady (1997b). Brady explicitly notes that the issue of social importance is at the heart of the new paradigm:

At its very simplest, it [the Mesoamerican Cave Paradigm] maintains that caves and earth openings were so fundamental to the religious concerns of indigenous
populations that their presence in the landscape structured human activity, including settlement, around them... While the implications of this statement could keep us here for hours, it is precisely this insight that has driven Maya cave archaeology for the last two decades (Brady 2007).

The pre-paradigmatic view of caves as unimportant has its historical roots in several sources. First, because of the view of caves as habitation sites, they could have been theoretically important only if they had yielded evidence of Pleistocene occupation. When Mercer and others failed to find deposits predating the Preclassic, interest waned. Cave habitation in this view could be little more than a minor component of the larger settlement system, probably housing the lowest strata of Mesoamerican society. At a time when excavation focused almost exclusively on elite centers, there was little interest in studying such commoners.

Second, while surface archaeology focused on the largest centers with their monumental pyramids and elite palaces, the caves that were explored tended to be modest both in size and artifact assemblages. This skewed the appreciation of the relative importance of the surface and subterranean contexts. Interestingly, three important caves, Loltun, the High Priest's Grave at Chichen Itza and Quen Santo Cave 3, were investigated during the Early Period and they play a prominent role in J. Eric Thompson's syntheses. It is interesting to speculate how Thompson's work might have been impacted if more great caves had been known. Along the same line, if Edward Thompson's (1938) report on the High Priest's Grave had been published promptly, it might have changed Seler's interpretation of Quen Santo (Seler 1901; Brady 2009b).

Once the conviction that caves were not significant was established, it became self reinforcing. The Carnegie Institution of Washington visited a great cave in Alta Verapaz, Guatemala, Seamay Cave, which has a long stairway and retaining walls (Gurnee 1965; Gurney et al. 1968), but failed to publish any mention of it. As a result no great caves are reported until after World War II to challenge the view of caves as being unimportant. The discovery of Balankanche in 1959 did impact the field because the material was spectacular and the ceremonial function of the cave was never seriously questioned. Even more important was the discovery of the cave beneath the Pyramid of the Sun at Teotihuacan in part because Heyden's $(1973,1975,1981)$ interpretation did argue for the high social significance of the cave.

The role of these great discoveries is best exemplified by Naj Tunich (Stuart 1981), which was reported at the beginning of the Foundation Period. To this day, the site contains the greatest amount of architectural modification, the first masonry tombs ever documented in a Maya cave and the largest corpus of hieroglyphic inscriptions known from a cave (Brady and Stone 1986; Stone 1995). The first publication on Naj Tunich stressed the extraordinary nature of the site. Based on the labor and resources needed for construction and the belief that the inscriptions were painted by a scribal elite, Brady and Stone (1986) propose direct elite involvement with, and utilization of, the site. This was a novel idea at the time. Some archaeologists, while accepting the ritual use of caves, saw that utilization being restricted to peasants, much as it is today. That view marginalized caves as features outside of elite concerns and the "great tradition" in Maya history. It was the investigation of Naj Tunich that led directly to the formulation of
caves being important and this element of the paradigm appears to have been the first to be adopted.

The other archaeological data that contributed to the realization that caves were features of central social importance in Mesoamerica was the appropriation of resources for construction of pyramids and temples over caves. This is interesting because it is precisely the material that both Thompson and Heyden had earlier discussed. J. Eric Thompson was aware of this because he had come upon Edward Thompson's manuscript on the "High Priest's Grave" at Chichen Itza and had edited it for publication (Thompson 1938). In his first synthesis of the cave data, J. Eric Thompson (1959: 128) says, "Mention should be made of caverns beneath buildings, notably the High Priest's Grave at Chichen Itza, but discussion of them would vastly extend our subject." Thompson appears to suggest that there were quite a number of examples but never interprets these and by the time of his second synthesis has concluded that they are not important (Brady 2005a:f11-12). In her first two articles on the cave beneath the Pyramid of the Sun at Teotihuacan, Heyden $(1973,1975)$ was unaware of Thompson's discovery at Chichen Itza. When she does learn of it, she clearly misses the point in stating, "This of course, presupposes a cave per structure, which is doubtful" (Heyden 1981: 14).

Brady combined the High Priest's Grave at Chichen Itza and the cave beneath the Pyramid of the Sun at Teotihuacan with additional examples from both Central Mexico and the Maya to propose that caves were regularly used to validate settlement space in Mesoamerica (Brady 1989:64-71). This idea was then tested in the field on the Petexbatun Regional Archaeological Project and documentation of a close relationship between caves and architecture was first presented at the International Congress of

Americanists, a document widely circulated among cave archaeologists during the Foundation Period (Brady 1991). Elaborated discussions of these correlations were then published at the beginning of the Recent Period (Brady 1997b; Brady and Ashmore 1999; Brady et al. 1997).

## Cave Archaeology Can Address Wider Theoretical Issues

For her paper on the development of cave archaeology from the end of the Post War Period, Scott (2004) interviewed a number of senior scholars, one of whom noted, "[Caves] seemed to call for very large investments of effort, planning, etc. for relatively small scientific returns. It seems to me to be a rather limited field and one which produces information and interpretation which are difficult to integrate with the mainstream data produced by site and regional projects." This quote touches on a central problem of pre-paradigmatic cave studies that is related to Hammond's (1981:177) observation, quoted earlier, that archaeology at the end of the Post War Period did not know how caves had been used. At the heart of the issue were the lack of any theoretical approach and the dearth of even basic research questions (Brady 1989:6-9).

Brady attributes this to the absence of individuals specializing in caves, which seriously impacted cave scholarship. He notes that:
although a large corpus of published cave material exists, there is little dialog with these data. As a consequence, later works do not build on the foundation laid by earlier studies and so reports rarely rise above the level of elementary data presentation. ... Lacking such fundamental building blocks, it is not surprising that archaeologists have struggled with larger questions of interpretation (Brady 1996:ii).

Cave archaeologists working during the Foundation Period responded to this need with the production of works that were clearly synthetic in nature and provided the building blocks for interpretation (Bonor Villarejo 1989b; Brady 1989; Stone 1995). The problem of relating cave data to surface archaeology was resolved to a great extent by the advent of cave surveys conducted in conjunction with large surface projects. Hammond (1982:177) had stated that "caves must clearly be considered part of the same settlement system as open residential and ceremonial sites that their users also frequented" but no attempt had been made to that point to systematically document them. The first systematic archaeological cave survey was Juan Luis Bonor Villarejo's underfunded study conducted in conjunction with the Oxkintok Project (Bonor Villarejo1987a, 1987b, 1988, 1989a). Bonor Villarejo (1989a:303) documented 40 caves in the area, which clearly pointed to a richer, more varied, and more complex pattern of utilization than had been heretofore considered.

The cave survey in its current form can be traced back to the Petexbatun Regional Cave Project in the early 1990s (Brady 1997b; Brady et al. 1997). The project was also influential because it used an explicit landscape approach. The Petexbatun Project's methodological approach was employed in later cave investigations. These included cave surveys associated with the Yalahau Project (Rissolo 2003), the Maya Mountains Archaeological Project (Prufer 2002), the Xibun Archaeological Research Project (Peterson 2006), and the Cancuen Project (Spenard 2006; Woodfill 2010). Even projects focused on single cave features (Moyes 2006; Ishihara 2007) utilized the landscape approach leading Smith and Schreiber (2006:19) to observe that:

For the Classic Maya, studies of sacred landscapes are dominated by research on caves. Caves were important cosmological features in all Mesoamerican societies, and the karst landforms of much of the Maya area are riddled with caves containing offerings, burials, and other material remains of ritual activity (Bassie-Sweet 1996; Brady 1997; Brady and Prufer 1999; Dixon et al. 1998; Stone 1995). In contrast to the empirically grounded cave research, other work on Classic Maya sacred landscapes is highly speculative in nature (e.g., Koontz et al. 2001; Stone 1992, 2002).

Another factor in cave archaeology's drive to address larger issues has been the changing appreciation of the importance of religion in complex society. Prufer and Brady (2005b) have noted how religion was largely marginalized by early processual archaeology in which important religious functions in the political or economic spheres where simply treated as aspects of the political or economic systems (e.g. Price 1974). The landscape approach focused attention on the political appropriation of sacred landscape and, more specifically, of sacred landmarks (Brady 1997b, Brady et al. 1997; Ishihara 2007, Mirro 2007; Peterson 2006; Prufer 2002; Rissolo 2003). Moyes (2006) in her detailed study of Chechem Ha relates alternating periods of use and abandonment to political issues and sees the Terminal Classic use being related to drought (Moyes et al. 2009). A number of authors have also used cave data to address wider local and regional economic issues (Brady 2005b; Morehart and Butler 2010; Spenard 2006; Woodfill 2010).

Buttressing the idea that caves were fundamentally important, recent archaeological and epigraphic data suggest that caves were desecrated after military defeats (Brady and Colas 2005; Helmke and Brady 2009). Helmke (2009: 76-193)
scoured the epigraphic corpus for references to caves and their usage to outline the emic importance of caves in the Classic period (A.D. 376-849). In so doing he found that the surprising majority of caves are involved in martial actions, whereas texts citing caves as places witnessed (as part of pilgrimages), or as the loci royal inhumations, calendrical rituals and accession rites are noticeably rare (Helmke 2009; Helmke and Brady 2009). At present we have to offer the caveat that the texts do not provide as comprehensive and unbiased a record as that afforded by the material culture recovered by archaeologist. Furthermore the texts may not record all of the different uses to which caves were put, but what the texts do demonstrate is that caves did play a significant role in antiquity and that these hosted a series of significant activities that might not have been reconstructible by archaeological methods alone.

## Discussion and Conclusions

Applying Kuhn's (1962: 23; 1996:175) definitions, it appears that the Mesoamerican Cave Paradigm does fulfill the criteria for being considered a paradigm in the sense an "accepted model" or "constellation of beliefs, values and techniques shared by the members of a given community." Having accepted its existence, we have sought to define the paradigm around four propositions (1. caves were used primarily for ritual; 2. they must be understood from an indigenous perspective; 3 . they played a significant role in Pre-Columbian society, and 4. caves allow archaeologists to address wider theoretical issues) to provide, in Geertz's (1973: 90) terms, "an effective way of developing and controlling a novel line of inquiry" about caves.

Our discussion of the four propositions shows that all four were established during the Foundation Period, with the first and the third growing out of Brady's investigations of Naj Tunich in 1981 and 1982 at the beginning of the era. Aspects of the second proposition were also in place during the Foundation Period, although the replacement of the underworld cave model with that of the animate earth model appears only at the beginning of the Recent Period. Finally, the fourth proposition is established during the Foundation Period with the completion of the Oxkintok and Dos Pilas cave surveys and the beginning of ones on the Yalahau and Maya Mountains Projects.

As noted at the beginning of the paper, the Mesoamerican Cave Paradigm was recognized by a Southwesternist, rather than by Mesoamericanists who actually developed and used it. In fact, there has not been, until this paper, a discussion in print of the paradigm or what constitutes it. Scott (2007) in analyzing the importance of the cave session at the 1997 SAA meetings in Nashville for the emergence of a self conscious field notes that it engendered an almost unbroken string of annual SAA sessions. These sessions, and the social gatherings that followed them, served the important function of enculturating members into the evolving paradigm. It is hoped that this explicit formulation of the propositions constituting the paradigm will lead to further discussion and refinement of the concepts.

## CHAPTER 3 THEORETICAL AND METHODOLOGICAL DEVELOPMENTS IN THE STUDY OF MAYA CAVES AND SACRIFICE

While there have been numerous chronologies of Maya cave archaeology presented in dissertations on the topic (i.e. Brady 1989, Prufer 2002, Moyes 2006, Scott 2009, Spenard 2014), this chapter presents the first chronology that attempts to focus on the evolution of mortuary interpretations. Much like the evolution of the Mesoamerican Cave Paradigm (Kieffer and Scott 2012) and the growing acceptance of cave utilization primarily for ritual, the interpretation of mortuary use within caves and other karst structures has evolved over time. The purpose of this historical review is to demonstrate the paradigmatic and methodological shifts that have occurred in bioarchaeology and implementation thereof in Maya cave archeology and sacrifice studies. As this review will indicate, it is only within the last decade that the topic of sacrifice has been more thoroughly studied within the realm of Maya caves.

Most chronologies of Maya cave archaeology rely heavily upon the temporal scheme first proposed by Brady (1989), which separated research periods on the basis of lulls in the Maya cave literature. Brady's chronology divides the exploration and archaeological history of Mesoamerican cave research into the Early Period (1840-1914), Middle Period (1914-1950), and Recent Period (1950-Present). Brady (1997a) later revised this chronology to subdivide the original Recent Period into two periods: The Post-War Period (1950-1980) and the Recent Period (1980-Present).

Since the development of Brady's original chronology, methodological and theoretical developments have led some researchers to make slight modifications to his chronology. The most significant is Scott's (2012) addition of a Foundation Period
(1980-1997) and changing the commencement of the Recent Period to 1997. The impetus for this revision centered on the 1997 Society for American Archaeology (SAA) annual meeting in Nashville. Prior to this time, Brady dominated Maya cave archaeology with his ideas, but his ideas were not well disseminated or adopted among Maya archaeologists. This event also marked the first of what would become an annual SAA Maya cave session and commemorated the first time in the subdiscipline that the field became "self-conscious" and agreed upon the theoretical and (to a certain extent) some initial methodological approaches (Brady and Prufer 2005b; Brady 1997).

The following chronology more closely follows Scott's revised history of Maya cave studies, with some alterations. Unlike previous ones, this chronology will define periods based upon advancements in the methods, interpretations, and/or the theoretical framing of the discipline. More importantly, this chronology will specifically focus on bioarchaeological developments in research in Maya caves. This includes the topic of sacrifice and how methods, theories, and classifications have changed with regard to the interpretation of skeletal material in Maya caves.

## The Early Period (Pre-1840)

## Ethnohistory

The Early Period was one of the more influential periods in understanding ancient Maya sacrifice and to a certain extent ritual cave utilization. Although this period is not known for any archaeological work or cave exploration, it was during this time that ethnohistoric accounts, primarily in the Yucatán Peninsula, described acts of human sacrifice. While some of these accounts were not available until the late twentieth
century, it is important to note that accounts of ritual and human sacrifice occurred during this early period and were transcribed by Spanish missionaries and priests. It is important to note that these accounts were written by individuals who wanted to convert the Maya, and may have exaggerated the frequency and nature of ritual events such as sacrifice. Nonetheless, the archaeology of subsequent periods would confirm aspects of Maya ritual life, including sacrifice and cave utilization.

Ethnohistorical accounts of Maya ritual practices indicate that human sacrifice was a common element in religion. The Relación de la Ciudad de Valladolid (1900:23) mentions that sacrifices occurred in cenotes (sinkholes). This practice was seen in various areas of the Yucatán and across many centuries. In the $16^{\text {th }}$ century, Bishop Diego de Landa (Tozzer 1941:43-44, 116-117, 180-183) described victims as primarily being war captives and young children who were sacrificed via heart extraction, thrown into the Cenote of Sacrifice at Chichén Itzá, cast down from a great height, or shot with multiple arrows. Other manners of sacrifice depicted by Landa included decapitation, skin flaying, drowning, hanging, and disembowelment, to mention only a few. It was these original accounts that were then repeated in various forms and even extrapolated upon by authors such as Diego López de Cogolludo (2010 [1688]), Orlando W. Roberts (1827:xxi), and Henri Beuchat (1818:488-489) among others. The works of López de Cogolludo (2010 [1688]) and Beuchat (1818) cited Landa while Roberts (1827) did not.

Don Juan Galindo (1833:62) is noted for recording possible evidence of sacrifice in the Highlands of Guatemala, however his account is not definitive because he used the terms sacrifice and execution interchangeably. Sánchez de Aguilar's (1937 [1613]:140) account mentions the of murals at Uxmal and Chichén Itzá which he describes as
depicting the sacrifices and dances that he actually saw. Pedro Sánchez de Aguilar (1937 [1613]) also noted the post-sacrificial disposal of human remains in caves and cenotes in the $17^{\text {th }}$ century. This ethnohistoric analogy by Aguilar justifies the use of prehistoric Maya iconography as probably depicting actual ritual events, rather than sensationalizing mythical events. Similarly, in the mid $17^{\text {th }}$ century Don Diego Quijada (Scholes and Adams 1938:78-81, 88-89, 95, 104, 116-119) recounted multiple examples of child sacrifice with the ultimate disposal of the bodies occurring in cenotes. Human sacrifice in cenotes also occurred at Chichén Itzá:

From these facts alone one deduction is possible, namely that sacrifices in the cenote did occur, and that such sacrifices were of young girls who were hurled by the priest into the chasm, possibly after defilement by the high priests in the small building at the pool's edge, thus symbolizing the simultaneous surrender of virginity and life to the Rain Deity. (Arnold and Frost 1909:92).

A similar account of sacrifice occurring in a cave was recorded near Mixco Viejo by Fuentes y Guzman (1932:36), with the sacrifice young children to the rain deities at the cave site of Mother of the Water.

Seventeenth century accounts from Mexico recognized the importance of caves as places of worship. Despite the Spaniards efforts, the practice of sacrificing to "idols" continued in caves during the historical period:

Y parece razon muy convincente, el que no erigieron este adoratorio alla en su antigua gentilidad quando reynaban sus emperadores y reyes idòlatras, porque entònces no tenian para que buscar retiros ocultos, ni cuevas excusadas para el impio exercicio de sus abominables idolatrias, pues podian libremente adorar en las plazas, donde por la mayor parte tenian para ello adoratorios, y en otros lugares publicos y patentes, como consta de las historias y tradiciones. Luego á esta cuevas irian á adorar y á sacrificar á sus idolos quando los españoles, y en particular los
ministros del evangelio les tendrian entredicho el ir á sus antiguos cues y los castigarian si en ellos los veian, porque presumirian que iban á idolatrar en ellos: pues estando estas grutas emboscadas entre tanta arboleda, y en una quebrada impertransible, les pareció que allí estaban seguros de que los viesen y hallasen los españoles, y asi escogieron este parage para continuar, sin ser vistos ni descubiertos, su detestable exercicio. (Sardó 1810:90-91)

Here, Fr. Joaquín Sardó wrongly deduced that these places were utilized in secret so that they could continue ritual practices that were persecuted. The use of caves for ritual was not exclusively done in secret, nor did the use of caves occur as a result of persecution of the Maya by the Spaniards. Ritual petitions in caves were in fact practices that predated the arrival of the Spaniards, as the archaeological data would later demonstrate.

## Ethnohistoric Accounts of Sacrifice and Burial

The introduction of Catholicism into the Yucatán Peninsula did change some of the practices of human sacrifice performed by the Maya. Within twenty years after the Spanish conquest, the use of crucifixion was sometimes incorporated into human sacrifice (Scholes and Roy 1968:346). Diego Quijada also recorded human sacrifice occurring at night in churches, in milpas, and at the feet of crosses at the entrance of towns. More importantly, many of these cases indicate that caves and cenotes were locations of sacrifice (Scholes and Roy 1968).

In addition to where sacrifice was performed, the early Spaniards even recorded reasons why sacrifice was practiced. Diego Quijada recounted that typically children were sacrificed via heart extraction and offered in order to end drought (Scholes and Roy
1968), or to remedy damage after a hurricane (De Anda et al. 2004: 378). Based upon oral testimony, Diego Quijada documented sacrifice performed by leaders in Hocaba, Huhi, and Xocchel. A young boy was thrown into the Sacred Cenote so that he could speak to the gods (Scholes and Adams 1968:156). The ethnohistoric documentation that records indigenous motivation allows archaeologists to understand the emic perspective on sacrifice in the Maya religious system during the colonial era. Similar desires to communicate with the gods were used to explain why the sacrifices of supposed virgins were made at Chichén Itzá were noted by López Medel (Tozzer 1957:193).

Towards the end of the Early Period, we also see the translation of early ethnohistoric accounts that document the use of caves for ancestor veneration. One example was recorded by Bishop Núñez de la Vega in 1698, who states that bones set in caves were venerated (as though they were Catholic saints) with the offering of copal and flowers (Köhler 1997). Similarly, in the Oaxaca region cave were reserved for elite burial or places of ancestor veneration in addition to being a place for rain shrines (Burgoa 1934 [1670]). This practice of ancestor veneration continued into historic times according to Sanmiguel (1994:165), who documents veneration occurring in a cave in the late $18^{\text {th }}$ century. While Brady (personal communication 2014) argues that the practice of ancestor veneration in caves is restricted to the Western Highlands, work being conducted in caves other than Midnight Terror Cave throughout the site of Tipan Chen Uitz, Belize indicate ancestor veneration also occurred in the Southern Lowlands (Wrobel et al. 2011, 2012).

The application of ethnohistoric analogy to the archaeological record becomes useful due to the ancient Maya performing human sacrifice and burial in caves. This analogy suggests there is a good possibility that human skeletal remains discovered in
caves and cenotes could represent sacrificial victims. However, the application of an ethnohistoric analogy would not be employed until the Expansion Period (1986-1997).

## The Exploration Period (1840-1920)

## Archaeology

The Exploration Period of cave archaeology did not have clearly formulated research questions, rather excavations were focused on discovery. This kind of exploration is exemplified by the writings of John Lloyd Stephens $(1841,1843)$ and illustrations by Fredrick Catherwood during their work in the 1840s that popularized Maya archaeology. In their travels, visits to a number of caves are described and highlighted by Catherwood's painting of the ladder in the Gruta de Chacs and their documentation at Bolomchen Cave. Henry Mercer $(1895,1896)$ continued this tradition of exploration during this period with his survey of 29 caves throughout the Yucatán, but he did not grasp the full significance of Maya caves, due to his bias towards habitationfocused cave utilization (Brady 1989:11).

The work of Edward Thompson in 1896 at the site of Chichén Itzá reported the presence of burials in a cavern under monumental architecture (Thompson 1938, 1965 [1932]:259-267). This became the first of many more caves directly associated with monumental architecture, including those at the sites of Tulum (Lothrop 1924), Cozumel (Mason 1927; Sanders 1955), Pusilha (Joyce 1929; Joyce et al. 1928), Polol (Lundell 1934), Dos Pilas (Brady et al. 1997), Maax Na (King et al. 2012), and Midnight Terror Cave. This association highlights the importance of caves in ancient Maya culture. Thompson's other contribution to the field of cave archaeology at this time was the
dredging at the Cenote of Sacrifice between 1904 and 1907, which finds would ultimately confirm the accounts of human sacrifice that Landa had noted centuries earlier.

Major publications that came out in this period included: Mercer's The Hill-Caves of Yucatan (1896), Edward Thompson's Cave of Loltun (1897), George Gordon's Caverns of Copan (1898), and Eduard Seler's report on Quen Santo (1901). In addition to this, numerous short descriptions of caves as well as descriptions of artifacts recovered from caves were produced at this time (Lefroy 1884; Gann 1894-1895, 1896-1897;

Baville 1897; Maler 1901, 1903; Starr 1908; Seler 1904; Casares 1907; Blackiston 1910;
Cole 1910). Even with this quantity of published literature, the field was theoretically divided. Many of the high-profile archaeologists had very little insights into how the caves were used. In fact, most seem to have held a European view of caves as habitation sites. Henry Mercer (1896:9) exemplifies this view with his interpretations of material discovered in caves:

They had built fires and cooked in the flames the flesh of animals, having eaten which, they threw the bones about the cave floor; and there these bones, often split to get the marrow, sometimes carved, or ornamented, or rubbed into points, have remained to this day, together with charcoal and ashed, and tools of stone and metal, to prove the underground feast.

Mercer (1895: 397) goes on to state this position explicitly,
Just as the Drift Hunter, the oldest proved inhabitant of Europe, was found to have traces of his presence in caves, just as the prehistoric European epochs of human culture, bronze under iron, then polished and then chipped stone, were found to be represented in caves by the super-position of films of this rubbish resting one above the other, so here in America we may hope to find similar evidence, if it exists. If the Indian had a predecessor, we may expect to reveal proof of his presence in some cavern not difficult to discover.

Such classification of material discovered in caves as "rubbish" clearly indicates the lack of understanding that these items may have been ritually deposited or offered as materials of sacrifice.

## Ethnography

Interestingly, it is also during this period that some amateur and professional ethnographic work provided passing mentions of the sacredness of caves according to local inhabitants. B. M. Norman (2009 [1842]:13) made one of the earliest arguments against the idea of caves as loci of habitation in his statement,
[T]here is another class, who have faith in man wherever he exists, and who rely upon permanence of the laws of Nature; who do not imagine that a man is necessarily a cannibal or a troglodyte because born in a different degree of latitude, nor that water will refuse to run downhill at a foreigner's request."

Norman (2009 [1842]:99) even documented that cenotes were "held in superstitious reverence by the Indians" and that they were "the places where most of their religious legends had their origin." Francisco Belmar (1901:5) made brief mention of a sacred cave on an island near the shore of San Dionicio in Oaxaca that no outsiders had managed to see. This sacredness of caves prompted local Maya guides on Gann's project to refuse to enter into Loltun cave due to the pixan or spirits of ancient inhabitants (Gann 1926:93). Archaeologists at this time were either unaware of this ethnographic literature that clearly indicated caves have a ritual/spiritual nature, or they were not making the connection that this ritual/spiritual nature occurred in the past as well.

## Sacrifice and Human Remains

It is also at this time we begin to see a downplaying in the role of human sacrifice in the ethnographic accounts. Part of this may be due to the spread of Christianity in the New World and a reduction in the practice of traditional Maya rituals. Gann (1918:54) most notably commented on this when he stated:

Human sacrifice among the Maya was probably a somewhat rare event, taking place on extraordinary special occasions, as in times of public calamity - for example, during the prevalence of famine, war, or pestilence - when it was felt that a special propitiatory offering to the god was called for. This practice was a confined one, or at most to a very small number of victims, never reaching the proportions which it did among the Aztec, by whom it was probably introduced into Yucatan.

In terms of the documentation of skeletal remains during this period, what little evidence that is available is descriptive, with only minimal analysis. Some descriptive reports lack specific and necessary details such as the positioning or contextual data surrounding the skeletal remains. In the southern Yucatán area, Gann relied heavily on ethnohistoric data to justify his interpretation of sacrifice, without noting any other means of death or evidence to support the interpretation:

Nothing found in the mounds provides definitely the practice of human sacrifice in this area... Near the headwaters of the Rio Hondo a mound was opened, which contained, in a stone-walled chamber, a number of human skulls unaccompanied by other bones. It is possible that these may have been the remains of sacrificial victims, as it is customary to remove the head of the victim after death, which became the perquisite of the priests. (Gann 1918:54)

Examples of the more detail-oriented descriptions were produced by Seler (1901) at the cave sites of Quen Santo, Guatemala. Similarly, Gordon (1898) interpreted cremated
skeletal remains and meter-deep deposit of skeletal remains in a cave in Honduras within a ritual framework. This analysis and interpretation of the skeletal material to be burial in nature set a standard that allowed for the classification of further remains discovered in caves to be classified as burials without any need for further questioning or analysis.

## The Classification Period (1920-1969)

The Classification Period is defined by the trend in bioarchaeology at this time to classify burials. However, the early half of this period is known for a marked slow-down in cave investigations (Brady and Prufer 2005b:1). The period in American archaeology classified as the Institutional Period covers most of what Norman Hammond (1982) calls the "Period of Institutional Domination." Although Hammond's Period of Institutional Domination runs from 1924 to1970, most of the projects relating to cave archaeology in Central America were carried out towards the earlier part of that period and thus this chronology does not mirror his dates exactly. It was during this period that large projects sponsored by institutions such as the Carnegie Institution of Washington, the Peabody Museum of Harvard University, the British Museum, and the University Museum at the University of Pennsylvania drove advances in the field.

## Archaeology

The British Museum's project at Pusilha was the only major institutional investigation at this time that included substantial cave work (Joyce et al. 1928; Joyce 1929; Gruning 1930). However, the Field Museum's previous sponsorship of E. H. Thompson's excavation of the High Priest's Grave at Chichén Itzá conducted in 1896
was finally published at this time (Thompson 1938; Brady 1988:12), along with J. Eric Thompson's Index of Maya Sites in British Honduras (1939). The New York Times even funded an expedition by Gregory Mason (1940), which included many cave sites in Belize. In addition to these larger-scale projects, numerous other reports at this time included some brief descriptions of caves (see Brady 1989:18-19). Ultimately Gann $(1924,1926,1927)$ produced the greatest quantity of literature on caves in this period. However, his research has been critiqued on the basis that he did not produce site maps, did not systematically collect, or grasp the ritual importance of caves (Brady 1989:17). Despite the architectural association with a cave discovered at this time, archaeologists failed to recognize caves as important features. This resulted in caves being omitted from the research agendas of institutional projects. The Carnegie Institution's last project at Mayapan was one of the few that produced a significant number of cave studies (Smith 1953, 1954; Strómsvik 1956). These descriptive reports, while occasionally lacking indepth interpretations, were rich in data. It is this data that became the basis for many of the ideas originally formulated during this period.

Towards the latter half of this period, many changes occur. One of the first was the establishment of the Belizean (then British Honduras) Department of Archaeology (DOA) in 1955, and the naming of A.H. Anderson as Archaeological Commissioner (Graham et al. 1980:153; McNatt 1996:82). Shortly thereafter, during the 1960s and 1970s, a great number of salvage investigations were conducted in caves (Brady 1989). Leading the way in these salvage efforts was David Pendergast (1962, 1964, 1966, 1969, 1970, 1971, 1974), who produced a series of first-rate field reports. The other significant cave work at this time was conducted by E. Wyllys Andrews IV when he documented the
cave of Balankanche (1961, 1965, 1970, 1971), which was significant because the religious function of the site was well accepted by the field.

## Ethnohistory and Ethnography

Many contributions to the ethnographic and ethnohistorical documentation of sacrifice were made during the Classification Period. It was during this period that Scholes and Adams (1938) documented their accounts and Alfred Tozzer's (1941) translated the ethnohistorical accounts of ritual practices of the Maya from the $16^{\text {th }}$ century from Bishop de Landa. Similar translations of original ethnohistoric documents were done by and at this time. This period also marked the reprint of Francisco de Burgoa's (1934[1670]) $17^{\text {th }}$ century accounts of cave shrines at Mixteca Alta in Oaxaca, Mexico, as well as those of Pedro Sánchez de Aguilar (1937 [1613]) in the Yucatán. These contributed to the understanding of the importance of religion and ritual to the Maya, including how and why human sacrifice occurred. In many of these accounts or translation of accounts, caves and cenotes appeared to be a common location where human sacrifice occurred. The revelation of these facts shed more light on the probability that caves were not typical burial sites.

Continuing the tradition of ethnographic work later in the Institutional Period was the ethnographer Robert Redfield. His work noted the sacredness of cenotes and their connection with rain deities.

Of all natural features, that attended the most important considerations is the cenote... In the prayers uttered by the shaman-priest in the agricultural ceremonies all the cenotes in the region in which the native moves and makes his milpas are mentioned by name; thus the priest calls, one by one, upon the chaacs associated with the cenotes. For the chaacs have within
their power the granting or the withholding of the rain upon which the maize and, therefore, the life of the people depends. Of all the gods of nature, the chaacs come first in importance. (Redfield 1941:117)

Redfield's (1941:118-119, 239; Redfield and Villa Rojas 1934:139,164-165) documentation of the importance of cenotes as places where winds originate (including disease causing ones), sacred water is obtained, and around which people situate themselves on the landscape was of great importance. Redfield's (1941:231) work even recorded the ancient beliefs that were beginning to fade away:

No one in Ditas among those who discussed the matter with the writer could give the meaning of the figurative expressions used in the prayers of the shaman-priest. The "doorway in the clouds" (holhuntazmuyal), through which chaacs are supposed to emerge, could not be identified.

It is only in retrospective of modern knowledge and continued ethnography in the highlands that this expression "doorway in clouds" regains meaning, because clouds appear to emerge out of caves (Vogt 1969) due to barometric pressure change. Thus caves are the doorways, the places where chaacs emerge.

With the boom in ethnographic literature came more sensationalized depictions of the ancient and modern Maya from untrained ethnographers and amateurs. Sensationalist accounts of cannibalism began to appear at this time, though with inadequate evidence to support the interpretation.

Perhaps the most curious and significant find of all was the right half of a human lower jaw-bone. This was discovered amongst a quantity of fish bones, and the fragments of a clay saucer, near the center of one of the kitchen middens, and was contained in a little nest, surrounded by conch
shells, which had been thrown in on top of the human fragment and fish-bones. I'm afraid we must accept this fragment of human jaw as strong presumptive evidence of cannibalism, for several burial mounds were excavated, in which the bones were undisturbed, the skeletons lying upon their backs, with their few poor possessions scattered around them, and food offerings in pottery receptacles provided for their journey to the next world, indicating the usual method of burial amongst these people. (Gann 1926:60)

Some of this sensationalism even impacted the archaeological interpretations of the time, as the work of Gann $(1927: 197,199)$
demonstrates:

No other bones were present, except that in one case the atlas, axis, and first cervical vertebra had been removed in severing the head, and in the second case the first two vertebra only. The skulls were those of young adults, probably males, in which the sutures had not yet ossified and dentition was not complete... I fear we cannot get away from the fact that these skulls indicate a very strong probability of the existence of human sacrifice amongst the Maya from the very earliest times. It has always been supposed that this infamous practice, with that of ceremonial cannibalism, was introduced by the Toltecs at the time of conquest of Chichen-Itza, towards the end of the twelfth century A.D., and that both were unknown to the Maya of either the Old or New Empires, who, up to that period, sacrificed fruit, flowers, and incense alone, to their gods. But these heads, all of healthy young male adults, who had just arrived at the age of puberty, must, I think, be accepted as strong presumptive proof of the existence of human sacrifice at Uaxactun in the first century A.D., and not only of human sacrifice, but of ceremonial cannibalism, for how otherwise would the bodies of the victims have been disposed.

The idea of cave habitation slowly began to wane during this period. Joyce
(1929:443) himself commented on the possible ritual function of caves due to the burials found within them. Although some untrained ethnographers did not aid in this transition, as is apparent in the work of Gann (1926:100-101):

I am convinced that it is in the remoter fastness of the cave, as yet entirely unexplored, that many discoveries may be made, not improbably of a pre-Maya race, or possibly even of palaeolithic man, such as have been made in France, Spain, and Palestine, for it traces exist anywhere else on the American Continent, surely such a vast natural cavern as this would be the place to look for them, admirably adapted as it is either as a mausoleum or dwelling place.

## T. A. Willard (1926:32-33), another amateur who sensationalized his accounts, similarly

 suggested that the caves had been used for habitation in the Yucatán:Wherever there are caves there is the likelihood of uncovering vestiges of aboriginal life, for primitive men everywhere used caverns, either as temporary shelters or permanent abodes. Beneath the cave floor may be the evidence of many generations of men the relics buried in layers one upon another as the discard and broken implements of one generation were trampled underfoot and submerged under the charred embers and rubbish of the succeeding one.

Thompson (1927:5-6) began the ideological shift from cave habitation to a predominantly ritual utilization model, when he stated in The Civilization of the Mayas, that the entrances of caves were probably used for habitation and that the layers of refuse encountered in caves were from the original inhabitants. Yet he stressed that caves were not places of habitation:

The American Indian, it appears, was never greatly addicted to caves or rock shelters, the habitation of which in the Old World, owing to their scarcity, was often continuous, but preferred open land on which to camp... Although caves occupied from very early times have been encountered in this country, no such occupation have been reported from

Central America, where in any case humidity would have destroyed most of the refuse. (Thompson 1927:7)

In this same volume, Thompson (1927:40-41) even indicates that "nothing will induce them to go into cave." This dual classification of cave utilization was later omitted from the fifth edition of his work (Thompson 1954). The omission in the next edition and lack of continued research on the topic of habitation left cave use open to debate for decades to come. The existence of such a debate slowed any progress towards understanding the ritual utilization of caves.

Towards the latter half of the Classification Period, there began to be ethnographic work in caves that focused on core ideas of fertility and rain. Much of this work highlighted some of the now well-accepted ideas related to rain petitions in caves. Evon Vogt (1961, 1964, 1969, 1977, 1981) and Carlos Navarrete (1966, 1971, 1974) were making similar contributions to ethnographic research in the Maya Highlands and in Mexico respectively, by documenting Maya beliefs regarding caves. In the Highlands, Vogt (1969:457, 1976:17) documented the long-standing and continuous practice of ritual crop offerings being conducted to insure future rains and crop fertility. Thompson (1959, 1970, 1975) discussed the importance of Maya cave sites for ritual activity especially ceremonies relating to rain petitions based upon his ethnographic work. During this period throughout Guatemala, caves in the highlands were even described as common locations where ancestors are worshipped. Examples of this are documented among the Qéqchi' (Gurnee et al. 1968), the K'iche' and Kaqchikel (Miles 1965), and throughout the Maya highlands (Carlson 1981; La Farge 1947:127-128; Nash 1970:19, 45; Villa Rojas 1969:223; Vogt 1969:298-301).

## Sacrifice and Human Remains

At this time, researchers began to make generalized statements about skeletal material in caves, rockshelters, and other underground cavities. In Thompson's (1897:20) discussion of chultunes in Labná, Mexico, he indicated he was completely baffled by the use of chultunes as tombs because he assumed they were solely used for reservoirs. It would not be until many decades later that many of these man-made cave-like features in the Southern Lowlands would be reinterpreted in a ritual light. In terms of osteological analysis during this time period, collections continued to receive minimal analysis, if they were analyzed at all. Willard (1926:114-115) made general notes on age and sex of the young female skeletons that Thompson pulled out of the Sacred Cenote at Chichén Itzá by dredging, but did not quantify how many. Also at this time, the High Priest's Grave at Chichén Itzá was documented by Gann (1924) and Thompson (1938) in a similar manner. In the case of skeletal material from Rio Frio Cave A, ash from possible funerary urns was thrown out without any analysis (Mason 1928). These examples indicate the flaws of many of the osteological syntheses published at this time that relied heavily upon the descriptive work of previous archaeological research.

This period also marks the first time classification systems were proposed for skeletal material in the Maya area. Oliver Ricketson (1925:394) was the first to discuss cave interment as a type within a larger classification system. This classification system was ultimately incomplete due to paucity of finds and unevenness in reporting. However, he concluded that caves were not usual burial places. Although Ricketson did not elaborate on what he meant by "not usual" places, some of the cave burials documented
during this time did suggest a sense of eliteness to those interred in caves. Ricketson over-utilizes the definition of "burial" to describe any mortuary context, since he relies on the burial types set forth by Saville (1899:350), which includes the burial of decapitated heads. Similarly Ricketson mentions that some bodies in mound 36 at Copan appeared to have been hurled in, while others were buried, but he does not even insinuate sacrifice as a possibility (Ricketson 1925:392). Butler (1934) also reviewed the skeletal cave literature and concluded that the behavior responsible for the deposition of human remains in caves was possibly related to some pre-Columbian cave cult.

Towards the latter half of this time period, the osteological evidence from caves and surface sites reflects significant methodological and ideological shifts. Greater care was taken during this period to note contextual information critical for interpreting deposits of human remains. This movement towards more detailed analysis allowed Frans Blom (1954) to document examples of cremation, secondary burial and ossuaries in numerous Chiapas caves. Some continued to suggest that such cave burials were an elite privilege (Dahlgren de Jordan 1966, Moser 1975). Coe (1959) even interpreted a child painted in red pigment to have been a sacrificial victim at Piedras Negras.

It was this detailed reporting which allowed for mortuary classifications to became more specific. For instance, Smith (1950) stated that burials can be simple, in caves, chultuns, cists, graves, or chambers. While this list is limited, it addressed the discussion of classifications. Similarly, J. Eric Thompson (1959:127; 1975:xxxiii) allowed for the continued development of mortuary classifications when he stated that one of the major functions of caves was as repositories of human skeletal material. However, he did not give any explanation for how the individuals came to be deposited,
other than the possibility that the bones had accumulated from participants who died while conducting rituals in the cave and that the cave received interments as centers of ancestor cults. Alberto Ruz (1968) noted secondary burials in cave sites in Guatemala and Yucatán. This classification of secondary burials opened our understanding of Maya mortuary ritual up to more possibilities other than just standard burial. Alberto Ruz (1968) continued research along this line and was one of the first to synthesize mortuary patterns and contextual data for Maya mortuary practices. Prior to this classification of mortuary patterns, researchers such as Borhegyi (1965:22-23) noted that "a curious new custom is represented by headless burials as well as caches of severed heads" during the Classic period, yet did not come to the conclusion of what would easily be described as warfare and/or sacrifice. However Ruz's system was flawed, as he (1968:165) simplified the description of skeletal material discovered in caves, and his classification of burial type was restricted based temporally (by Postclassic) and in terms of spatial distribution due to sample size.

Although the ethnographic data by this time indicated that sacrifice was a ritual that occurred in cave contexts, there were no skeletal collections that clearly indicated sacrifice. Even on the surface, "nothing found in the mounds proves definitely the practice of human sacrifice in this area, but that it existed is almost certain" (Gann 1918:57). Even at the end of this period, Shook (1954) documented at least 40 individuals he classified as sacrifice victims, but did not develop an argument justifying the interpretation. Without justifications, such classifications of sacrifice seem arbitrary. This may explain why the children discovered at the High Priest's Grave, which would be considered sacrifices by today's standards, were not classified as sacrificial victims.

Sacrifice as a means for eventual interment in caves was not seriously considered at this time.

## Developmental Period (1970-1985)

## Archaeology

The most important contributions of the period were some of the seminal works by J. Eric Thompson. His work, Maya History and Religion (1970), impacted the ways in which Maya religion and cave use was viewed. The other publication was the widespread dissemination of the first synthesis and interpretation of the cave data in J. Eric Thompson's "The Role of Caves in Maya Culture" (1959), which unfortunately was published in an obscure German journal. A revised and expanded version appeared as the introduction to the reprint edition of Mercer's The Hill-Caves of Yucatan in 1975, but Thompson died that year, thus the article never received the attention it deserved (Brady and Prufer 2005b:2). In these syntheses of Maya utilization of caves, Thompson used archaeology, ethnography, and ethnohistory to document eight uses of caves including: source of drinking water; source of virgin water; ritual rites; burial, ossuaries, cremation; art galleries; places to discard ritual items; refuse; and other uses (Thompson 1959). This practice of summarizing existing ethnographic and archaeological data was a common theme through this period. More importantly, these literature reviews were used by many archaeologists at this time to back up their arguments that caves were sacred places where rituals occurred. Later, Barbara MacLeod and Dennis Puleston's article, "Pathways into Darkness" (1979), proposed the first direct analogy between the physical caves
archaeologists were exploring and the ideological representation of Xibalbá, the Maya underworld.

In addition to recognizing ritual as a key component of cave utilization, data began to emerge during this time period that would eventually allow for the shift away from the dogmatic belief that caves were used for habitation. The ethnographic work of Andrews (1965ab) showed that the water rich cenotes and caves of the northern plains in the Yucatán have no signs of habitation. Thompson (1959:129) similarly pointed out that the conditions were less than ideal for habitation when he wrote, "But one may doubt that this kind of occupation was sufficiently prolonged to have had much effect on their contents; most caves in Central America are too damp to be suitable for long residence." The experimental archaeology of Puleston (1971) to try to use chultuns as underground food storage containers also provided fuel for the argument against habitation. In this study, Puleston noted that the humidity and temperature hastened the decomposition of organic material.

The Developmental Period is marked by deaths of a number of the most important figures working in caves. This caused a momentary halt to work in the subfield due to a void, which lead to a delayed acceptance of caves as ritual sites (Kieffer and Scott 2012, Scott 2012). The lingering idea that caves had been used primarily for habitation is neatly synthesized for this period by Norman Hammond's (1981:177) statement, "Whether residence in caves was permanent, periodic or sporadic, regular or only for ritual and refuge, we do not yet know..."

The importance of caves in the sacred landscape started to be noticed beyond the Maya area, and into the wider Mesoamerican region at this time. The most notable
research on this topic outside the Maya area was done by Doris Heyden (1973, 1975, 1981) at the caves under Pyramid of the Sun at Teotihuacan. In addition, Heyden explored the theoretical possibility that caves were places where rites of passage occurred (Heyden 1976) and that they may have had an association with fertility (Heyden 1987a, 1987b, 1991). Heyden's interpretation of the cave beneath the pyramid of the Sun at Teotihuacan influenced views of the subsequent periods especially in terms of understanding and seeing constructed sacred landscapes.

Pohls' theoretical contribution to the field linked the cuch ceremony, which involved animal sacrifice, to Maya caves (Pohl 1981, Pohl and Pohl 1983). They ultimately concluded that caves are "the most sacred precincts of the Maya" (Pohl and Pohl 1983:28). Mary Pohl briefly continued her research with faunal remains in caves and cenotes (Pohl 1983), before eventually leaving the realm of cave archaeology to pursue research on Maya subsistence.

## Sacrifice and Human Remains

Recognition of sacrifice as a possible means of death was rapidly evolving as an idea at this time. However, those discussing sacrifice were working at surface sites. Marcus' (1974) work at Dos Pilas and Tamarindito, Guatemala, documented images in Maya architecture of bound captives being killed. These images, along with those documented by Baudez and Mathews (1979), have been used to support interpretations of sacrifice based upon body positioning that implies bound hands and feet. Based upon the imagery of sacrifice, the idea that sacrifice was a public ritual also began to formulate (Baudez and Mathews 1979).

David Pendergast (1971:16-18) interpreted remains of a three to five year old child in Eduardo Quiroz Cave as a victim of sacrifice. This interpretation was based upon the child's two perimortem, unhealed holes in the skull. Although Pendergast (1971:18) was the first to propose that an individual found in a cave was the victim of sacrifice, he stipulated the need for obvious indications of a violent death to make such an interpretation. This dictum mandating the presence of trauma is probably what caused Pendergast et al. $(1968: 638,643)$ to conclude that skull fragments associated with a tooth cache at Yakalche, Belize were merely there "by chance" until ultimately interpreting the entire deposit as a secondary offering after the people had been initially sacrificed elsewhere.

The formulation of Pendergast's "necessary trauma rule" was problematic and probably impacted subsequent researchers' interpretations. While the presence of certain types of trauma paints a clear picture of a sacrificial deposit, the absence of evidence is not evidence of absence. There are various forms of sacrifice, including decapitation, disemboweling and drowning, that are depicted in the ancient codices (Vail and Hernandez 2007). Sacrifices performed in these manners are not likely to impact bone, and thus would not be classified as sacrifice under Pendergast's stipulation. This is in line with assumptions generally employed in bioarchaeology that, lacking evidence to the contrary, an individual is assumed to have died of natural causes. This assumption requires a normal burial context, because bioarchaeologists recognize that factors such as mass graves and even body positioning may indicate that death was not due to natural causes.

The inclusion of more data and knowledge of other patterns in Maya mortuary practices, including sacrifice, began to widen during this period. For the first time, we saw archaeologists trying to create a list of attributes that could be used to determine sacrificial contexts. William R. Fowler Jr. (1984) created a list of attributes that he associated with sacrifice, based on analysis of skeletal remains at Chalchuapa, El Salvador. This list included ritual preparation of bodies, absence of grave goods, relatively "homogeneous pattern for body and limbs positions," and data on age and sex (Fowler 1984: 612-614). Here Fowler clearly indicates which factors contributed to his interpretation of the remains, and he establishes a framework or reference for future researchers. However, he never elaborates on what he means by age and sex data. It was based upon these afore mentioned characteristics that William R. Fowler Jr. (1984) was able to document sacrifice at the site of Chalchuapa, El Salvador. In addition to a majority of the extended burials having touching right and left carpals and right and left tarsals, which indicates bound hands and feet, 19 of the 22 extended burials discovered at this site were in the prone position.

Sacrifice briefly dominated the literature during this time in terms of osteological data. However, cases of different mortuary patterns were still being recorded, which indicates methods were in place to distinguish differences in mortuary classifications. This includes secondary burials in the form of funerary bundles at the Gruta de Xcan in the Yucatán documented by Márquez de González et al. (1982). Many elite burials were recorded, including the one Haviland (1971) documented an elite tomb at Altar de Sacrificios, Guatemala. Hammond et al. (1975) also recorded an elite burial at the site of

Lubaantún, Belize, with numerous accompanying individuals whom the authors argued might not all have been sacrificial victims.

## Ethnography

Ethnographic research at this time also recorded the first emic perspective of how the Maya defined caves. These definitions had a significant impact on sacred landscape studies because they determined that the modern Maya believe that almost any hole in the ground is considered sacred (Laughlin 1975: 132; Vogt 1969:375). This emic perspective would later allow archaeologists to interpret constructed holes as representative of caves, hence the classification of ritualized cached contexts (Kunen et al. 2002; McAnany et al. 1999:131).

During this period of research, the use of graphic descriptions for ethnographically documented ritual acts of sacrifice (limited to animals and material items) were recorded, but with less frequency. Thompson (1970: 181) documented the customary practice of smearing "hearts and blood of the victims on the face of the idol which received the sacrifice." He even hypothesized that this was done as a means to feed the deity. Similarly, Uke (1970) records in great detail the first ever documented brujo ritual sacrifice of material objects performed in a cave in order to cut an individual's life short. Barrera (1970) also recorded the sacrifice of "virgin birds," as well as the role of small children in sacrifice rituals. In this case, the children imitated the sounds of frogs and toads, during cave rituals. These instances demonstrate the continued importance of children and water in cave related rituals.

## The Expansion Period (1986-1997)

The Expansion Period is distinct in being the phase during which Maya cave archaeology teetered on the brink of disappearance. This wavering of the discipline was due primarily to a lack of senior scholars in the field during this time (Scott 2012:12). What kept the field from vanishing at this time was Brady's research at Naj Tunich, Guatemala, and his decision to become the first Mayanist to specialize in cave research. With no senior scholar in the subfield to support him, his idea of caves as important sacred places was not well received, in part because the idea of cave habitation was still so deeply entrenched, despite advances in the previous period. Toward the end of the period, caves came to be more (albeit grudgingly) accepted as ritual sites, due primarily to Brady's 45 publications between 1985 and 1997. These publications established basic methodological and interpretative approaches that cave archaeology followed during the next period (Kieffer and Scott 2012; Scott 2004).

## Archaeology

The beginning of this period is demarcated by Brady's research with Andrea Stone (1986) at Naj Tunich, that established elite utilization of caves. Brady's (1989) dissertation followed up on this idea, establishing distinct areas within the cave: light, twilight, and dark zones and detailed the importance of these areas. Brady (1989:2-6) also made the first argument against cave habitation, which he supported with material evidence from Naj Tunich, Guatemala. The strongest evidence supporting his argument was that many broken ceramics had burning on the interior, rather than the exterior which would be expected if the vessels were used for cooking. This pattern of burning on the
interior has been proposed to be from the burning of incense and other organic offerings. The ceramics from Naj Tunich were demonstrated to have been used in this manner to burn copal. This was discovered when oven-drying of the sherds produced the smell of copal (James E. Brady, personal communication, 2006). The only other cave related research that was being conducted at the beginning of the Expansion Period was by Juan Luis Bonor Villarejo. Bonor Villarejo's (1989b) major contribution at this time was an attempt to compile an inventory of all known Maya caves.

Other than the multitude of cave archaeology publications, this period also marks the beginning of regular dissemination of field research by cave researchers. The first conference session devoted to Mesoamerican ritual cave use occurred at the 1994 Annual Meeting of the American Anthropological Association. Two years later, Jaime Awe established the Western Belize Regional Cave Project, which has drawn many students into the field and produced several dissertations, publications, and numerous Society for American Archaeology presentations well into the Reemergence Period.

## Ethnography

Starting during this time period was the beginning of a boom in the Maya field of ethnography that continued into the Reemergence Period. Vogt's work in the Highlands of Guatemala had begun prior to this period, but it was his analysis of the sacred landscape that was most influential at this time period (Vogt 1981). His work not only changed the way archaeologists thought, but also probably encouraged many ethnographers to follow in his footsteps. At this time ethnographers such as Graham (1997), Kearney (1996), Knab (1995), Köhler (1995), Manca (1995), Monaghan (1995),

Sandstrom (1991, 2005), and Wilson (1995) were publishing their accounts and syntheses of existing literature. These works highlighted the sacredness of caves and their role in ritual and/or ideology for indigenous Maya peoples. With the large number of ethnographers referencing the ritual significance of caves, it became impossible to conclude that ritual did not occur in caves. In addition to documenting the sacredness of caves, rain-petition ceremonies, that included pilgrimages to caves and mountains for water and fertility, also included child sacrifice on occasions (Kubler 1985).

## Epigraphy and Iconography

This period witnessed the formulation of epigraphic and iconographic evidence from Maya architecture that graphically depicted sacrifice. Schele and Miller (1986, Schele 1984) observed that most monumental architecture depicts bound captives and that glyphs of war were commonly followed by sacrifice. Similarly Marcus and Flannery (1996:104) recorded a monument at San Jose Mogote in Oaxaca that depicted sacrifice, potentially from heart extraction. Commentary from Diane Chase (1991:89) stressed that blood sacrifice was one of the most important aspects of Maya religion according to their own art. While researchers such as Freidel (1986:104) could see sacrifice embodied in other commonly repeated motifes such as the Quadripartite Badge symbolize "the principle of rebirth through death... an image of the driving motivation behind war, capture and sacrifice."

## Sacrifice and Human Remains

During this phase, sacrifice was more frequently proposed as an interpretation for companion burials. One such example is the young boys who were placed beside the ruler of Copan, son of Smoke Imix (Bower 1990:56). However, not all researchers supported this idea. Hammond et al. (1991), for instance, made arguments for domestic utilization of tombs at Cuello over long periods of time-based on weak statistical evidence that suggested that an accumulation of 28 burials over 250 years (one death every 8.9 years) was typical for a single family lineage.

It was also during this period that the infamous skull pit at Colha was discovered (Massey 1989). This selective placement of skulls from adult and children displays evidence of trauma (cut marks indicative of decapitation and defleshing) and burning prior to burial. Numerous interpretations were originally proposed for the deposit (Massey 1989:44-45), including sacrifice (Mock 1998:115). However, warfare eventually became an accepted interpretation, due to destruction noted at the site and the multiple commingled deposits of human remains (Barrett and Scherer 2005:114). This supporting site data contributed to the interpretation that the individuals may have been part of an overthrown ruling elite (Hester 1985; Duncan 2014:266). The inclusion of contextual data into the initial interpretation of human sacrifice at the site may have contributed to the reformulation of what sacrificial deposits should look like.

Welsh (1988:144) narrowly defined evidence for sacrifice by shifting the focusing "primarily, though not exclusively," on skeletal mutilation. This requirement for cut marks as evidence would cause disagreement among bioarchaeologists working in the field in later periods and even be used to argue against sacrifice when cut marks were
present (Minajares 2003:47). Without this mandate for trauma to be present for sacrifice to have occurred, the classification of sacrifice with minimal dispute among bioarchaeologists who could rely of other data, such as body positioning. Colby (1989) used this prone body position to interpret sacrifice of eight prone individuals at the site of Sin Cabezas, Guatemala. Bound victims of sacrifice were also observed at Rio Azul (Adams 1986, 1990).

In terms of human skeletal material discovered in caves, Brady (1989:343-344) referenced many examples and provided the first theoretical discussion of sacrifice as an interpretation. In his work at Naj Tunich, he was able to demonstrate another case of sacrifice from a cave based on a child's skeleton with unhealed holes in the skull (Brady 1989:351). His interpretation of sacrifice was supported by the fact that the individual was discovered in a watery context. Dorie Reents-Budet and Barbara MacLeod (1986:8788) similarly suggested that infants placed in rimstone dams at Petroglyph Cave, Belize, were sacrificial victims based upon the watery context in which they were discovered.

The use of caves for other mortuary purposes was also raised at this time. During this period, Brady also documented, but did not explicitly state, the fact that one cave could have multiple mortuary functions. This is demonstrated by the discovery of the first cave tomb structure in the Maya area at the site of Naj Tunich, Guatemala (Brady 1989:348).

Even with all this abundant evidence of sacrifice, archaeologists and epigraphers were still arguing over the topic. Numerous individuals had actively critiqued other archaeologists for exaggerating the frequency and graphic nature of blood sacrifices and violence conducted by the ancient Maya (Schele and Miller 1986; Schele and Freidel

1990; Demarest 1993; Webster 1977). Even when material evidence did not support any particular argument, sacrifice was argued against. An interpretation made by Diane Chase (1991:93) at this time demonstrates this when she noted that "burials also sometimes contain knives or points... but these suggest blood from war rather than from individual sacrifice."

## The Emergence Period (1997-Present)

This period covers the same years as the Recent Period as defined by Scott (2004, 2007, 2012). The naming, reclassification, and discussion of defining moments of this time period have been discussed numerous times over the years by Brady (1989, 1987), Brady and Prufer (2005), and Scott (2012). For the purpose of this chronology, the name was changed in order to prevent the eventual necessity of renaming the period, because eventually it will no longer be "recent." For instance if new methods or theoretical approaches are implemented, then a new chronological period designation would have to be made. There is also the possibility that no change will occur for quite some time and a period that spans fifty or more years will ironically be called the Recent Period. The new title was chosen based upon the growth within the field and the growing acceptance that caves are not primarily places of habitation and that mortuary practices that take place in caves are highly variable.

## Archaeology

The importance of cosmology (Brady 1997b), and the idea of caves being living, fertile entities for the Maya, rather than inanimate places (Brady 1988) was also established at this time. These significant contributions allowed for a move away from
the idea that caves are not places of habitation, but rather sacred places (Brady and Prufer 2005b). Another significant event during the Emergency Period was Brady's cave survey conducted as part of the larger Petexbatun Regional Archaeological Project (Brady et al. 1997). This marked one of the first field projects that had a separate specialized cave crew working in conjunction with surface archaeologists.

Due to the plethora of data uncovered during this period, the habitation model of cave utilization was no longer being used by archaeologists who regularly work in caves in Central America. Slowly, scholars who work above ground cited the importance of caves in ritual. Takeshi Inomata (2006a:810) noted that "theatrical performances in Classic Maya society most likely took place in various spatial contexts, including small residential complexes and sacred locations outside of centers such as caves." However, some individuals have continued to make an argument that caves are used as habitation. Healy's (2007:271) critique of Brady and Prufer (2005, Prufer and Brady 2005a) exemplifies this when he pointed out that caves "regularly contain evidence for habitation (e.g., grinding stones, food residues, utilitarian ceramics, signs of fires)." This argument has lost favor due to existing ethnographic literature and continued research.

While food and organic material are unarguably commonly found in caves (Moreheart and Butler 2010), they are also common components of rituals (Scott 2009). Therefore, it is the context of the food that rules out long-term storage, which would indicate habitation. For instance, small amounts found in metates and small ceramics with burning on the interior are not suggestive of storage or cooking, rather it is typically suggestive of ritual. The discovery of grindstones in these contexts is not an indication of habitation, since they can be used in the ritual as a receptacle for burning items (Peterson
2006), as well as a place to prepare the items prior to offering (Stone 1995, Duran 1971, Gomez 1974). The argument that fire was a sign of habitation has also been dealt with by summarizing ethnographic literature which indicates that fire was and continues to be an important part of ritual (Bunzel 1952, Cook 1986, Scott 2009).

In addition to Healy's argument of habitation, the argument has typically been made that caves are dumps. Brady (1997b) addresses this point when he noted that in the cave sites of Dos Pilas refuse piles were in fact constructed from a termination ritual and the caves had a large quantity of polychrome ceramics. Such valuables are typically fragmentary, suggesting that the items were sacrificed or "killed" as offerings. During this time period, other cave archaeologists used environmental conditions to rule out long-term habitation in Central American caves. The high humidity, wet, cramped conditions, and limited fresh air frequently encountered in caves utilized by the Maya are not conducive to habitation (Brady 2004).

## Epigraphy and Iconography

It is during this time period that we see a slight increase in the study of epigraphic and iconographic depictions of sacrifice. Brown and Garber (2003:93) noted that the ancient Maya "epigraphic and iconographic evidence suggests that captive sacrifice is a ritualized institution associated with warfare and is deeply rooted within Maya mythology." Brown (2005:131) also highlighted the overwhelming evidence via iconography, epigraphy and ethnographic sources that indicated the appeasement of supernatural guardian animals with sacrifice. Webster (2001:449) comments that texts dating to as early as the Formative period demonstrate the practice of sacrifice.

In the Maya codices, there are multiple references to imprisonment, death, and sacrifice. Vail and Hernández (2007:157) note that only the Madrid Codex (66a) illustrates sacrifice in association with a cave or cenote. Further exploration of the Madrid Codex (22a) proved to have another example of cave sacrifice. In it, a young individual painted blue has been stabbed in the eye. This individual is against a black circular background, reminiscent of a cave (Kieffer 2011). This depiction of a cave setting is supported by the eye motif surrounding the individual, which is typically associated with bats (Brady and Coltman 2011). This motif is reminiscent of the glyphs that Karl Taube (1989) has classified as tamales, which are an item synonymous with life. Such layering of meaning in imagery is supported by the ethnographic and ethnohistoric data that suggests human sacrifice was done in order to promote life and fertility. While, the ethnohistory and iconography generally focus on the act of sacrifice and not necessarily on the location in which the bodies are disposed of, which is that of archaeological interest. This fact was exemplified by a study conducted on images of sacrifice in the Maya Vase Database. Of 93 vessels that depicted human sacrifice, 44 vases did not indicate where the ritual had taken place; however the second-most commonly depicted location ( $\mathrm{n}=27$ ) were caves (Kieffer 2013).

Some individuals chose to interpret this influx of iconographic data supporting sacrifice to insinuate that the Maya themselves were sensationalizing or exaggerating sacrifice. "The utter paucity of mass deposits of human remains in the Maya Lowlands is somewhat surprising, considering the prominence given to warfare and sacrifice in the epigraphic record" (Barrett and Scherer 2005:111). This statement was incorrect even at the time they published it. The facts that they also used the term "murdered" rather than
"sacrificed" and argued for political motives for the Colha skull pit, suggest an inherent bias against sacrifice. This bias still exists to among some bioarchaeologists.

## Ethnography

Ethnographic research has continued into this time period; however this period includes a specific increase in research relating to ritual, material sacrifice, and caves. Leading this group of ethnographers was Linda Brown who worked primarily in the highlands of Guatemala. Brown's (2002) work was critical in pointing out the distinction between hearths used for cooking and those used for warmth typical for habitation. Her work also stressed the importance of looking at contextual data, because material sacrifices often consisted of objects that could be used in other everyday ways and thus might accidently get classified as discard or trash in a ritual context (Brown 2004). The topics covered in ethnographic research at this time also include the sacredness of mountains as the source of water and fertility (Winter et al. 2007), mountaintop shrines (Brown 2002, 2004), and the importance of caves in mountains (Christenson 2008).

## Sacrifice and Human Remains

During this time, archaeologists began to realize that they had to look beyond the osteological data and rely also on contextual data, cultural material (or the lack thereof) in association with the remains, and analogies based on the ethnohistorical accounts. The focus on including contextual data at this time in bioarchaeological methods allowed for more in-depth studying of sacrificial deposits on surface sites. Such contextual data
include the location and position of the body, other artifacts or individuals present, and information from the rest of the site.

Thanks to the earlier interpretations by Colby (1989) and Adams $(1986,1990)$ more instances of sacrifice began to be interpreted at this time due to more detailed documentation of body position. Body position can give insight into a culture's mortuary practices and potentially the level of respect bestowed upon individuals from the community that deposited them in the cave. A supine position, face up on the back with legs extended flat, is cross-culturally and temporally considered to be a respectful and purposeful position for burying an individual (Komar and Buikstra 2008). Individuals in a supine, face down, position are disposed in a disrespectful manner. Such disrespect may indicate a potential sacrificial victim (Owen 2005: 331).

With the abundant examples of sacrifice, attempts were once again made to try to create more formulaic standards of analysis in order to make interpretations easier and less debatable. But in doing so, the variation within sacrifice rituals and the deposits they leave behind has become apparent. Berryman (2007) expanded on the characteristics of sacrificial deposits based upon the same data from Chalchuapa. Although she was hesitant to create a "formula," she did indicate the importance of public placement, lack of investment in burial/preparation, selection for a particular group in a population, lack of offerings, and dismemberment or decapitation with cut marks in defining sacrificial deposits. Documented sacrifices discovered at this time at Teotihuacan include public display of victims at Pyramid of the Moon (White et al. 2007), and both local and foreign sacrificial victims at the Feathered Serpent Pyramid (White et al. 2002) and Pyramid of the Moon (White et al. 2007). However, ornate decorative items discovered with some of
the individuals beg the question of the importance that a lack of offerings has in the declaration of sacrificial deposits.

Berryman (2007) highlights numerous cases of sacrifice throughout the Maya area in an attempt to construct a more detailed list of attributes to aid in interpreting sacrificial deposits. These references include the two pits with 14 probable young males at El Coyote, Honduras (Berryman 2007:393). Berryman's criteria for sacrifice were based off of her findings, and thus were circular logic. They were constructed based off of one site and used to proposed sacrifice for the same site. So, not surprisingly, the criteria do not function as well in other contexts. For instance, some sacrificial victims received body preparation in the form of pigment, which contradicts the notion that the victims received a lack of body preparation. Most importantly is the idea that cut marks have to exist, which has been demonstrated to be insubstantial, based on experimental archaeology of heart extractions (Tiesler and Cucina 2006). The idea that a single specific group was chosen for sacrifice is now speculative, due to isotope research at the Feather Serpent Pyramid suggesting the presence of both individuals from the area and people from different geographical areas (White et al. 2002). Similarly, the public location can be called into question due to the presence of sacrificial victims (burials 95-1, 37-7, 37-9, 34-10, and 95-1) near the Motmot (burial 37-8), Margarita (burial 93-2), and Hunal tombs at Copan (Price et al. 2010:17-19).

Tiesler $(2005,2007)$ has made the greatest contribution to the field of Maya sacrifice with her historical overview of the patterns of sacrifice among the Maya. In her criteria of sacrifice, she identifies characteristics that might be beneficial indicators that can be used to distinguish sacrifice from simple, natural burial. These characteristics
include: biological profile, form of death, post-depositional body treatment, primary deposition, post-depositional manipulation, and secondary deposit patterns (Tiesler 2007:22). Additionally, Tiesler (2005:259-260) recommends the applied taphonomic analysis of contexts and collective assemblages to aid in developing interpretations of deposits. Some of these criteria include presence of specific anatomical elements, definition of mortuary space, comparison with local and regional patterns, and chronological determination. Tiesler et al.'s (2010) comparative analysis of potential sacrificial victims and main burial deposits via bone representation index indicates that differential preservation and cultural processes do not act on these deposits similarly. This inconsistency has led Tiesler and Cucina (2006) to indicate deposition of the entire individual does not need to occur for sacrifice to have occurred. More importantly, Tiesler and Cucina (2006:505) used a unique experimental archaeological technique to demonstrate that sacrifice via heart removal could be done without leaving any cut marks on skeletal elements: "By itself, the proposed transdiaphragmatic approach does not require the involvement of any bony structures... consequentially, absence of evidence does not mean evidence of absence, as no traces on the bony surfaces should be expected in every instance of trunk opening."

These revised criteria and previously documented contexts allowed bioarchaeologists working in caves during this time to easily interpret cases of sacrifice based on contextual findings. Individuals at Actun Tunichil Muknal have been documented to have had their hands and feet in positions that would suggest they were bound, therefore this is something that can be looked for and confirmed in the archaeological record (Gibbs 2000:110, 113). Similarly, Mirro (2012) has made the
argument that the "spread wide eagle" body positioning of the skeleton commonly referred to as the "Crystal Maiden" in Actun Tunichil Muknal indicates a splayed-out post-sacrificial posture due to the lack of deliberately modest body positioning. This "spread wide eagle" body position has also been documented at Midnight Terror Cave in the case of an individual whose torso would have been partly submerged in a rim stone dam pool at the time of deposition (Kieffer 2011). Such positioning has been used to suggest that drowning may be an explanation for why individuals were deposited in watery features in caves (Kieffer 2011).

Similarly surface deposits were classified as evidence of sacrifice at this time using criteria put forth by bioarchaeologists. One such instance of this is the sacrificial classification made for the partial individuals, primarily children, in a vaulted tomb at Caledonia, Belize (Healy et al. 1998). The skulls of numerous individuals discovered in a Copan tomb were even interpreted as having been decapitated (Storey 2007:328). It is only with the work conducted by previous researchers that this idea of companion burials became widely accepted. This acceptance can clearly be seen when Rebecca Storey (2007:327) comments that:

Placing other individuals within a royal tomb was apparently common among the Late Classic Maya, but others this young are not mentioned. Ritual and appropriate human sacrifice in PreColumbian Mesoamerica called for the sacrifice of individuals of all ages and both sexes, so finding children/boys in this situation is not surprising.

However, even during this time period, many researchers still classified these type of contexts in different lights. For instance, McAnany et al. (1999:141) argued against sacrificial interpretations with an over-reliance of post-processual ideology:

While not negating the practice of ritual human sacrifice, a close reading of stratigraphic evidence coupled with observations on bone preservation and anatomical elements suggests an equally important role for ancestors in "completing" or "ensouling" a structure that may have been dedicated to the deceased, rather than the opposite case.

Similarly, Weiss-Krejci $(2003,2004)$ calls into question the idea of tomb re-use over time and lineage burials in tombs. However, her conclusions are based primarily on cross-cultural comparisons and lack of complete bodies.

It is during this time that the use of demographic data for assemblages is also used to interpret a sacrificial assemblage of individuals. Chamberlain (2006:64) and Weiss (1973) indicate that a J-shaped curve would be expected for a "normal" large mortuary assemblage. In this curve, there are high levels of mortality for newborns, which dramatically decreases after one year of age prior to slowly increasing with age at time of death. Data that reflect this J-shaped curve have been documented in mortuary assemblages interpreted as burials at Caves Branch Rock Shelter, Belize (Glassman and Bonor 2005), and Teotihuacan, Mexico (Storey 1992), for example. This curve differs from the demography of warfare, which shows a high number of deaths for young adult males (Chamberlain 2006). Assemblages in the Maya area that have been interpreted as resultant from sacrifice defy both of these patterns. Based upon work by De Anda Alanís (2007) on the demography of Cenote Saratoga at Chichén Itzá, which has ethnohistoric accounts of human sacrifice (Tozzer 1941:43-44, 116-117, 180-183), the demography of sacrifice should display a peak in the frequency of mortality for young adults and older children who are not otherwise at high risk of mortality.

Even with all this evidence, much like the topic of cave habitation, the topic of sacrifice is still debated. Cross-cultural contextual evidence regarding prone body position as an indication of violence and sacrifice (Pearson 1999) has been disregarded. For instance, prone body position in the Belize River Valley has been argued to be standard "burial" practice (Weiss-Krejci 2006), based on quantity alone, with no consideration of contextual data. This conclusion is contrary to other mortuary interpretations, given that face down body position has been used to infer sacrifice at other sites in the Maya area (Brady 1989:90, Berryman 2007, Lucero and Gibbs 2007, Fowler 1984). Prone is also noted as a body position associated with sacrifice in iconographic data (Miller and Samayoa 1998:65). Similarly, osteologists who only focus on the skeletal remains have made burial classifications based upon an absence of skeletal trauma, even when watery contexts at sites such as Dos Pilas clearly indicate sacrifice (Minjares 2003:v).

Scott and Brady (2005) discuss some of the problems regarding previous interpretations of human remains from cave contexts in the Southern Lowlands at this time. Their coverage of mortuary practices typical for the Southern Lowlands is extremely useful in reviewing many earlier reports that lack detailed descriptive analysis. They were the first to point out the shift in interpretations of human remains in caves, from predominately burial to predominately sacrifice. The only documented exceptions to this include elite burial at the sites of Naj Tunich (Brady 1989) and Quen Santo (Kieffer 2009), Chichén Itzá (Thompson 1938, Headrick 1991), and Balam Na (Garza et al. 2001). These unique cases of cave burial are considered distinct and separate from
other karst burials, due to the distinction cave archaeologists have made between caves and rockshelters.

The underlying difference is that elite burials in caves are located in the dark zone of the cave, while rockshelter burials lack a dark zone. These burials in rockshelters seem to be primarily utilized by the lower class. This conclusion is based on grave goods and a number of other considerations (e.g. diet, cranial modifications, dental modifications, health) (Saul et al. 2005:302). Rockshelter burials have been found at Mayahak Cab Pek, Mohibal Kanchi, and Saki Tzul (Saul et al. 2005), with the most extensive rockshelter cemetery noted at Caves Branch Rockshelter in the Belize River Valley (Bonor Villarejo 1995; Bonor Villarejo and Martínez Klemm 1995, Glassman and Bonor Villarejo 2005). It has been suggested that commoners may have been attempting to bury their loved ones at the portal of "the creation cave" (Glassman and Bonor Villarejo 2005:294). Such ideology mirrors the construction and utilization of temple tomb chambers which are symbolically caves within large constructed mountains. This is supported by the presence of speleothems brought in from elsewhere discovered in the tomb of Lim Ni Pulit and the slab of stone that covered Pacal's tomb at Palenque (Glassman and Bonor Villarejo 2005:294).

Scott and Brady (2005:278) also highlight the expanded understanding archaeologists have developed for cave utilization which focuses on rituals, including sacrifice. In Scott and Brady's (2005:277-278) discussion of cave sacrifice, they suggest the importance of watery deposits as indicators of sacrifice. It was first noted at the site of Naj Tunich that areas of "special elaboration" were associated with wet areas (Brady 1989:415). These elaborations include higher artifact densities associated with water,
architecture associated with pools, and the deliberate construction of a pool used for ritual petitions. In terms of human sacrifice as petitions for rain, Scott and Brady (2005:278) interpreted the human remains found at Cueva de Sangre as sacrificial, based on their association with water. This interpretation was supported by earlier ethnographic accounts that documented sacrifices being made to watery features (Fuentes y Guzman 1932, Sahagún 1969). Similar human remains or partial remains discovered in watery contexts include La Iluminada, Hun Nal Ye, Actun Tunichil Muknal, and Petroglyph Cave (Woodfill 2007: 546-547; Moyes and Gibbs 2000; Gibbs 1997, 1998, 2000; ReentsBudet and MacLeod 1986:87-88). These examples indicate that chances are good that human skeletal material found in wet environments are related to sacrifice.

## Summary

This historical overview of data, methods, and theory relating to caves and sacrifice is a critical component to understanding interpretation of sacrifice in the Maya area through time. The fields of cave archaeology and sacrifice have been revolutionized only within the past few decades. It is only with a more holistic approach to research over time that we are now able to address questions related to rituals in caves, especially those pertaining to human sacrifice. More importantly, it is only now that the topic of sacrifice can be discussed with a more focused idea of the aspects that should be evaluated in order to make a sound interpretation.

The documented bias against sacrifice held by anthropologists is not a locally restricted phenomenon to the Maya area. Miranda Aldhouse Green notes a similar behavior by researchers in Europe when she states, "we regard human sacrifice today with revulsion, but there is no reason to suppose it was considered repugnant by ancient

Europeans" (Green 1999:58). Anthropologists often seem to feel an overwhelming need to represent the ancient people we study in the best possible light, and in doing so we sometimes refuse to accept all of their past behaviors and beliefs, because we do not fully understand them. However if anthropologists can contextualize these acts of sacrifice, the acts no longer seem to be purely barbaric. On the contrary, contextualizing the act within each culture's belief system, allows us to understand it on a more vulnerable level that transcends all cultures and thus makes the practitioners more human. After all,

Sacrifice has played a central role in many past and present religious systems. Human sacrifice themselves - symbolically - by rejecting the world to become monks or nuns. In some systems, such as the ancient Anatolian cult of Atys, the Egyptian Osiris, and of course, Christianity, divine beings themselves become sacrificial victims in order to grant salvation, be delivered from sin, or generate fertility or prosperity for their devotees. In all cases, sacrifice is bound up with an association between death and regeneration. (Green 1999:65).

The sheer universality of sacrifice as a practice done for similar purposes is what makes it a humanistic act that should not be ignored, but studied for what it is - a ritual act.

The last two decades of Maya bioarchaeological research have produced a significant amount of ritual violence-related research, while previous researchers were unwilling even to discuss the topic of sacrifice (Buikstra 2007:294-295). It is only within the current period of Maya research that arguments against sacrifice have been called into question as a form of researcher bias. Arthur Demarest (2007:593-595) was the first to actively challenge archaeologists on their denial of historical reality and the universality of sacrifice. This denial is only possible with researchers' over-dependence on specific scientific evidence, which in some cases might not exist, and the overzealous desire to present the ancient Maya with respect and sensitivity. It is only with a more holistic
approach that involves various methods (i.e., ethnography, ethnohistory, demography, experimental archaeology, forensics), that we can finally begin to understand how sacrifice is manifested in the archaeological record. Sadly, it is only within the last decade that a more holistic approach to studying sacrifice and other mortuary contexts has been accepted by the field.

## CHAPTER 4 THEORETICAL DISCUSSION OF SACRIFICE

Like many topics within archaeology and anthropology, there are numerous theoretical approaches that can be used to study the topic of human sacrifice. This chapter does not aim to be an all-inclusive approach to the general topic of human sacrifice. Such a goal would be impossible to achieve due to the vastly differing and sometimes opposing beliefs and theoretical stances on why sacrifice even occurs. Rather, the goal of this chapter is to frame the discussion of human sacrifice as relevant to the particular case study of Midnight Terror Cave, Belize.

At the most fundamental level, theories pertaining to sacrifice allow anthropologists to answer some questions or propose hypotheses that can be tested from the material evidence. One of the most critical of these questions is why sacrifice is performed. Secondary is the more humanistic question concerning why a particular person is chosen for sacrifice. When trying to answer questions about sacrifice in the archaeological record, the material aspect of sacrifice actually proves to be one of the more difficult aspects. For instance, not all evidence of human sacrifice, especially that which is left in soft tissue, survives the diagenic and taphonomic processes that occur during the formation of the archaeological record. The materiality of sacrifice is not limited to the actual physical remains of the person or material object that was sacrificed. Other aspects of the cultural context that should be included in developing a sound interpretation of sacrifice within a culture include evidence from the ethnographic, ethnohistoric, iconographic, and mythological data, as discussed previously in the history section of this dissertation.

In an attempt to explore as many of the critical questions surrounding sacrifice as possible, multiple theoretical approaches will be considered. Three resounding questions that most researchers have when dealing with the topic of sacrifice are: Why is sacrifice performed? Who is chosen for sacrifice? and Why does sacrifice persist within a culture? No one theoretical approach to the topic of sacrifice is capable of addressing all three of these questions. However, exploring responses to these questions becomes possible when sacrifice theory, costly signaling theory, and the theory of structural violence are used in tandem. It is through this multifaceted approach that the answers suggested by one theoretical perspective can be tested and evaluated within another theoretical framework., thereby strengthening our overall understanding of sacrifice.

## History of Sacrifice Theory

In the simplest words, sacrifice is the offering or giving up of something of value. Typically it is done in the belief that it will lead to a more predictable outcome that may benefit an individual at a later time or over the long term. The first theory of sacrifice focused on the idea that the sacrifice was a gift given so that another gift would be given in return (Tylor 1871). Hubert and Mauss (1964 [1898]) were the first to examine sacrifice as a means which allows for communication between the sacred, ritual world of gods and the profane, mundane world of humans. Valeri (1985) later combined these theories to propose that the gift of sacrifice is a means of communication with deities. More importantly, Valeri (1985) explains how the imbalance of reciprocity and the imbalance between the gift and the expected outcomes are not as drastic as they initially seem because what man is asking for in return requires little effort from the deity.

Therefore, if the perceived value of the sacrifice by the sacrificer is large, the imbalance of the gift does not exist and the little effort the deity gives in return allows for the deity to maintain his superiority.

The most common themes of communication between humans and deities associated with sacrifice deal with petitions for reproduction and fertility; while the act itself maintains social order and is necessary to renew or maintain the life of gods (Bloch and Parry 1982; Merrifield 1987). Based upon ethnohistoric, ethnographic and archaeological evidence, the ancient Maya conform to this cross-cultural generalization for the existence and function of sacrifice (Brady 2005; Brady and Scott 1997; Gibbs 1997, 1998, 2000; Owen 2002, 2005; Vogt and Stuart 2005; Thompson 1959, 1970, 1975; Tozzer 1941; Vogt 1969). However, ethnographic and ethnohistoric accounts present significant variation in individual practice as well as change which can occur over time that prevents us from truly understanding the intent of the petitioner at the moment a sacrifice is made.

In addition to grappling with the difficulty of discerning the underlying intent of sacrifice, the topic can be difficult for anthropologists to tackle because it is inherently a multi-discipline research topic. It is a topic in which theoretical explanations and material evidence are intertwined. In some cases, specific material evidence of sacrifice from limited cultural perspectives has contributed to the establishing of theoretical models (Tylor 1871; Valeri 1985), and over time these theoretical models have then been used to explain other lines of material evidence. While this may create somewhat of a circular understanding of sacrifice, it is the way in which most ritual theory has developed over time.

Regarding who is sacrificed, some ritual theory indicates a preference for the victim to be foreign, but not too foreign (Girard 1979). Girard elaborates on this by explaining that those being sacrificed have to be known by the sacrificing group as people who do not belong or do not yet belong to the group. In the Maya area, this could possibly translate to people who "looked Maya", spoke a Mayan language (but possibly a different dialect), but might not have been born or resided in the polity that was performing the sacrifice. It could even mean that the individuals were from the polity performing the sacrifice, but were not socially accepted as full members of the group due to illness or age. Foreigners and those on the fringe of society have been suggested to include: "prisoners of war, slaves, small children, unmarried adolescents, and the handicapped" (Girard 1979:12). This theory fits the Maya case, since captives and children who may not have been initiated into the community or orphaned are commonly noted as sacrificial victims (Fuentes y Guzman 1932:36; Tozzer 1941:44n; Scholes and Adams 1968:156; Scholes and Roy 1968; Baudez and Mathews 1979; Marcus 1974; Schele and Miller 1986; Schele 1984; Brady et al. 1997:361; Healy et al. 1998; Lucero 1999; De Anda et al. 2004: 378; Berryman 2007:378).

By analyzing who was chosen for sacrifice and when, deeper theoretical issues pertaining to why human sacrifice occurred can potentially be addressed. The field of ritual theory is conflicted regarding the relative importance of some of the underlying psychological functions of sacrifice. While some theorists like Gluckman (1963), Turner (1966), Girard (1979) and Burket (1983) argue that sacrifice allows for channeling and repression of human behavior, thus keeping order in society; others such as Heesterman (1985), Valeri (1985) and Smith (1998) believe the act is pure and a necessary ritual for
society that acts to define the individual or group (Bell 1992:173-175). If human sacrifice is primarily performed during a specific period that is already witnessing much conflict (such as the time of climatic and political instability that was the Terminal Classic in the Maya Lowlands), then one would suspect the behavior to relate to anger and frustration over uncontrollable environmental factors. However, if an act was conducted repeatedly through time, unrelated to external forces, this would support the idea that sacrifice was used to define an individual or group or even control the group.

The ritual act of sacrifice and human sacrifice in general have been well documented throughout time and cross-culturally. Because so many cultures have been studied and contribute to our understanding of sacrifice, it is important to understand that not all aspects of ritual and sacrifice are applicable to every culture. This inability to simplify sacrifice theory has led some theorists to look beyond general models or laws to focus on why sacrifice occurs. Cross-culturally, periods of crisis are correlated with increased ritual activity (Beattie 1980), including pleas for divine intervention (Malinowski 1954; van Gennep 1960). However, some ritual theorists state that this sacred obligation becomes neglected during times of great peril (Girard 1979).

In recent years our theoretical frameworks for understanding sacrifice have included more evolutionary and functional views on sacrifice that respond to specific case studies. These frameworks include the idea of sacrifice as a form of costly signaling, as well as an act of structural violence within the society. While still grounded in traditional sacrifice theory (i.e. Gluckman 1963; Turner 1966; Girard 1979; Burket 1983; Bell 1992), I aim to pursue understanding the role that evolutionary and structural approaches have in explaining the purpose of sacrifice and why it occurred.

## Costly Signaling and Sacrifice

Costly signaling, commonly referred to as conspicuous consumption (Vleban 1899), is the act of displaying, wasting, or redistributing material wealth in an attempt to manipulate, impress others, or gain their support. Trigger (1990) pointed out that conspicuous consumption violated Zipf's (1949) principle of least effort, thereby giving archaeologists a means to study power and status via the material record left behind by costly signaling. The theoretical framework was then applied to a wide range of archaeological issues, including monumental architecture in the Maya area as a signaling mechanism for competitive strength (Neiman 1997).

There is some hesitation by archaeologists to utilize costly signaling theory due to the limitations of applying the theory to the archaeological record. This was demonstrated in the Codding and Jones (2007) versus Hildebrandt and McGuire (2002, 2003, McGuire and Hildebrandt 2005, McGuire et al. 2007) debate. This debate pointed out the fact that different lines of investigation, such as ethnographic analogy, used narrowly and selectively, can weaken the argument of costly signaling by analyzing specific data in isolation from the broader context. It is for this reason that McGuire et al. (2007:359) state, "It is not the bones themselves but their context that potentially provides insight into signaling behavior." For this reason, osteological analysis alone cannot be used to fully understand the act of human sacrifice - the context must also be considered. In the case of Midnight Terror Cave, this context is the liminal, sacred space of a cave (see Chapter 2).

The only proposed modification to costly signaling theory from the field of archaeology has come from Madsen et al.'s (1999) introduction of the bet-hedging and variance reduction model. This model is based on Dunnell's (1989) observation that cultural elaborations are often found in environmentally marginal areas, rather than ecologically diverse and rich ones. The bet-hedging model suggests that costly displays are a type of social investment which could be utilized at a later time. Therefore, the models do not necessarily contradict each other, as they both "attempt to comprehend the evolutionary basis for wasteful energy expenditure" (Aranyosi 1999:360).

This bet-hedging model within the theoretical framework of costly signaling can be transcribed to human sacrifice in the Maya area. It is hypothesized that sacrifice in caves is performed for the purpose of rain petitions (Ishihara 2007; Moyes et al. 2009), which would indicate the act is performed in an environmentally marginalized area or during periods of climatic fluctuations. This act could be viewed as a social investment if the leader and/or the group performing the sacrifice use the act of sacrifice as a way to establish their place in the cosmos and strengthen their ties to the gods. This investment into their status within the community could then be used later to gain other resources. Such arrangement might only continue to work if the group perceived the petition to be granted by the gods. This means that the bet-hedging model would eventually collapse if rain did not come following repeated sacrifices.

The use of costly signaling theory has been further developed in the field of behavioral ecology. Much of this literature revolves around biological explanations of costly mating signals (Zahavi and Zahavi 1997) and explanations of perceived altruistic behavior (Gurven et al. 2000, Lotem et al. 2002, Price 2003). An offshoot of this
behavioral ecology approach has applied the theoretical framework to explain ritual practices of sacrifice. The basis of this comes from the idea that rituals and taboos are forms of signaling that can create intragroup cooperation when they force participants to sacrifice material wealth (Sosis and Bressler 2003) to the extent that they then produce signals that are hard to fake (Zahavi and Zahavi 1997, Irons 2001).

The main contributors to this body of literature have very recently been applying this behavioral ecology-based theoretical framework to evaluate the interconnectedness of violent rituals and how they promote group cohesion (Sosis et al. 2012, Atran and Ginges 2012). Relying upon numerous case studies (Atran, 2002, Johnson 2008; Sosis and Alcorta 2008), Sosis et al. (2007:245) notes that "cooperation and intra-group trust achieved through costly ritual behavior enhances the ability of religious groups to organize for acts of terror and war." While all violence cannot be explained in an evolutionary paradigm (Abbink 2000), this seems like an appropriate explanation for one of the underlying reasons why human sacrifice persisted among the ancient Maya. This is especially likely given that the ancient Maya relied upon acts of terror and warfare to obtain at least some of their human sacrifices (Schele 1984; Freidel 1986:104; Schele and Miller 1986; Brown and Garber 2003; Vail and Hernández 2007).

Although Sosis and Bressler (2003) primarily focus on how an individual sacrificing his/her life can be a form of costly signaling; it is possible for the sacrifice of another individual to be a costly act as well. There are many ways an individual may contribute value to their society including: potential labor, potential of contributing to the society's advancement through thought, potential genetic contribution, etc. While we cannot predict the cultural and social value that the ancient Maya placed on specific
individuals, it is possible to hypothesize the variables that contributed to the cost of acquiring an individual for sacrifice and potential contributions an individual could have made to the society. For instance the cost of sacrificing a captive individual would include the time, energy, and lives lost in conducting raids or waging war in order to acquire the individual. In addition, any potential labor or other forms of social contribution that the captive could have performed would also be lost.

When an individual is sacrificed from within the group, the cost of acquiring the individual may not be as time and labor intensive as warfare - especially if the individual is very young and helpless. However, his/her potential labor, potential genetic contribution, cultural capital and social capital within the group would have to be calculated. It is important to note that in the case of an individual sacrificed from within the group, one with high cultural and social capital may not necessarily be a logical choice for sacrifice. His/her connectedness within the group could potentially cause upset and strife if he/she were to be killed. Sacrificing an individual with low cultural and social capital may be more ideal. This idea of sacrificing an individual with low cultural and social capital may explain why ritual theorist Girard (1979:12) proposes that "small children, unmarried adolescents, and the handicapped" are among some of the groups of people typically chosen for sacrifice.

## Structural Violence

The idea of structural violence was devised by Johan Galtung (1969). Structural violence is simply the injuries or deaths caused by society's political and economic institutions (Galtung 1993, Farmer et al. 2006). Researchers have elaborated on the idea of injuries to include more than physical harm, but to also include the diminishing of
lifestyle by means of threatening violence or impairment of access to fundamental human needs (Moor et al. 1994, Gault 1993). The many facets of causation for violence are why theoretical frameworks that incorporate historical and contextual factors are ideal for explaining the creation and maintenance of violence within a society (Martin 1997).

Although structural violence is technically a high-level theory, it can also be represented by a flow chart model that suggests why a particular form of violence continues to occur (Figure 4.1). This model of structural violence, as it applies to bioarchaeology, relies heavily upon social inequality in a society and how those in control are able to appropriate, influence, and control resources (Klaus 2012).

In this model, the differential access to resources causes detrimental effects on various levels of human health. Impacts to health via physiological disturbances can be minimally visible to an observer. Minimal impacts such as heightened and prolonged periods of mental stress due to insecurity and fear are at one end of the spectrum. The more apparent levels of physiological disturbance could include impacts on growth and development or even physical health of an individual if certain resources are severely limited. In the case of human sacrifice, the ultimate physiological disturbance is the cessation of life, caused by the culturally buffering system of a society's ideology which allows for the ritual act of human sacrifice to be performed.


Figure 4.1. Feedback loop representing how structural violence in a society relates to bioarchaeology (Klaus 2012).

The ideology among the ancient Maya that allowed for the reinforcement of the structural violence feedback loop in the practice of human sacrifice comes in the form of the politically sanctioned performances of ritual violence (Inomata 2006a; Vail and Hernandez 2007, Duncan 2011). These performances (or cultural buffering systems) including acts of raiding, warfare, and sacrifice were governed and controlled by the
ruling class. This created an environment in which resources could be acquired, but yet still controlled by the ruling elite.

The "vicious" part of this feedback loop model is that, while one polity may be able to obtain resources, it could impose differential access to resources to another polity, which might then be passed on to another polity. All the while, stress within the system due to limited environmental resources (as experienced during the Maya Late to Terminal Classic period due to climatic instability) could increase. An increased stress in the feedback loop system, due to decreasing resource availability, could eventually trigger a behavioral alteration. This may be an explanation for how the practice of ritualized human sacrifice originated. The act could have been used as a means to create differential access to resources such as labor or as a means to further increase social inequality.

Additionally, this behavioral variable in the feedback loop also allows for discontinuation of human sacrifice. One of the simplest means of reducing the stress within the system would be an influx of environmental resources. Such an influx could occur once an environment stabilized after a period of climactic instability. Another means of stress reduction within the feedback model would be through the destabilization of the social inequality and the restriction of resources that the elite impose upon other classes of society through ritualized and politicized performances.

These ritualized and politicized performances tie back into the theories of costly signaling. Under the structural violence model utilized by the Classic Maya kingship (Figure 4.1), costly signaling during the performances by an elite member of society would contribute to an increase in status through imposing costs, redistributing resources, and dispensing of benefits (Boone 2000). However, the value of the sacrifice and the
strain on the social system would vary dependent upon the social and cultural capital of those chosen for sacrifice and whether they were from within the polity or outsiders.

If sacrificed individuals come from within the group, this would indicate that the group maintained intragroup cooperation. This practice would inevitably survive for a time, since religious costly acts are more likely to survive than secular ones (Heinrich 2009). This system would be able to persist so long as free-riders do not take advantage of the system (Iannaccone 1992:275-276, Heinrich 2006). A free-rider in this sense would be an individual or family that does not contribute to the pool of possible sacrificial offerings. Therefore, for this system to remain balanced, all families (including the elite ruling family) would have to participate and provide one of their own eventually. For a system like this to last for an extended period of time, the society would need to possess an ideology that compelled individuals to participate or would have to be more egalitarian. Without one or both of these elements, people may be inclined to leave due to insecurities or eventual mistrust of the elite.

If the sacrificed individuals were outsiders, then the leader or ruler would be putting forth effort and resources in obtaining prisoners. So long as the ruler was successful in costly raids to obtain captives, the elite would signal their status as the sacrifice provider, possibly increase social inequality, and maintain group sodality. However, the act of raids and sacrifice would eventually lead to political instability on a wider geographical scale. Over the course of time, a successful polity would eventually overtake or diminish adjacent polities, thus creating a further traveling distance between resources. Eventually this distance could result in a situation where the cost of raiding did not benefit the expected outcome.

With drought putting pressure on resources for example, a large population would become a costly investment to maintain. The great length of a drought or period of climatic instability would inevitably result in a failure of the equilibrium in the costly signaling system. Since "religious beliefs can be directly falsified by experience, they tend not to stick around for the same reasons" (Heinrich 2009:254). This falsification likely would occur when ritual petitions failed to procure rain. With human sacrifice placing a high potential cost on a household, it seems reasonable to assume that people would lose faith in the system and walk away from the polity, thus causing disruption of trade and social networks and eventually contributing to decentralization of the polity.

The costly signaling and structural violence models for human sacrifice could be used to explain the persistence of either insiders or outsiders being chosen for sacrifice. However, sacrifice theory states that outsiders are preferred. While it is possible that the people utilizing Midnight Terror Cave may have eventually turned to sacrifice of those from within the community, it seems that this would dramatically increase the pressure within the feedback loop and bring the practice to a halt rather quickly. The next two chapters of this dissertation focus on the ancient Maya near the site of Midnight Terror Cave, Belize whose actions represented in the archaeological record demonstrate the expected behavior of sacrificing outsiders. In this particular case, the sacrifice of outsiders includes both probable social outcasts and individuals who would have been viewed as geographical outsiders.

## CHAPTER 5: THE USE OF OXYGEN ISOTOPE ANALYSIS TO HELP DETERMINE PLACES OF ORIGIN IN THE MAYA LOWLANDS: A CASE STUDY FOR ESTABLISHING LOCAL OR FOREIGNER STATUS OF POSSIBLY SACRIFICED INDIVIDUALS FROM MIDNIGHT TERROR CAVE, BELIZE.

## Introduction

In order to explore the larger social implications of the sacrifice of individuals found within Midnight Terror Cave, it is important to determine where these individuals originally came from. Determining place of origin for individuals in the archaeological record, however, is fraught with difficulties. Most of the stable isotope data used to address the issue of locality for individuals come with caveats that must be taken into account when making interpretations of the data. For instance, the oxygen isotope ratio can be impacted by numerous climatic and geographic variables, including local water signal, altitude (Gat 1971; Gonfiantini et al. 2001; Poage and Chamberlain 2001; Clark and Fritz 1997), latitude, humidity, and temperature (Price et al. 2014; Spence et al. 2004; White et al. 2000, 2004, 2007), elevation and distance inland (Dansgaard 1964; White et al. 2007), and seasonal variation in rainfall (Simpkins 1995), especially in the tropics (Rozanski et al. 1993; Lachniet and Patterson 2002, 2006). Additionally, anemia (Wright and Chew 1998) and cultural practices, including duration of breastfeeding (Jay 2009; Wright and Schwarcz 1998) and cooking, can affect the oxygen isotope signal (Daux et al. 2008). The wide array of factors that can impact oxygen isotopes as well as the minimal variability in certain parts of the Maya area (Scherer et al. 2015) discourages many bioarchaeologists from using this method as the primary indicator for
determination of place of origin. Thus, for the past decade, strontium and heavier isotopes, which are widely accepted as having a greater utility in determining an individual's place of origin, have been considered to be the better choices for determining place of origin.

The inherent problem with both strontium and oxygen isotope analyses is, however, determining what the local signal should be and whether it has been stable over time. Often this is based on the collection of modern local samples and comparison to presumed local individuals. Oxygen isotope analysis has one benefit over strontium: the relatively inexpensive cost of running samples. Processing cost ultimately becomes the limiting factor for many researchers who cannot conduct analyses on large quantities of samples, especially when numerous samples must be run to establish a local baseline. However, recent research by Laffoon et al. (2013) in the Caribbean region suggests that lighter elements such as carbon and oxygen still hold much promise in contributing to our understanding of migration and determining place of origin in some regions.

Rather than establishing the local oxygen isotope value for Midnight Terror Cave by running modern samples, this chapter aims to estimating what a local oxygen isotope signature should be by using step-wise regression on available published data from the area surrounding Midnight Terror Cave and its periphery. This method may reduce the need for running extensive background sampling to determine a local oxygen signal.

## Background

## Midnight Terror Cave

The site of Midnight Terror Cave (MTC) is located in the karstic Roaring Creek Valley near the village of Springfield in the Cayo District of Belize. The site was discovered in 2006 and received immediate attention from the Institute of Archaeology in Belize because of the many human skeletal remains found in various clusters deposited on the cave floor. The cave is composed of multiple levels of karstic chambers that cover an area more than 200 m by 50 m . Many of the easily accessible areas in the cave have undergone substantial artificial modification during the pre-Columbian era to create leveled plazas, trails, and terraced steps on the sloping floors of the cave (Brady and Kieffer 2012). Such modifications suggest that performance of public or semi-public rituals would have taken place within the cave. Ceramic analysis indicates the cave was utilized as early as the Middle and Late Preclassic period (1000 BC - AD 100), with increased utilization during the Early Classic (AD 250-600), before the peak of activity during the Late and Terminal Classic period (800-1000 AD) (Scott 2011). Two radiocarbon assays on human skeletal material at the site yielded dates $690 \pm 20$ years (UGAMS\#16770, MTC VI 23-140) and $670 \pm 20$ years (UGAMS \#16771, MTC VIII 13168) uncal BP, also corresponding to the Classic (Kieffer 2017:51).

Osteological analyses by the author of skeletal remains recovered from MTC (see Appendices A and B) indicate that at least 118 individuals were deposited, thus making this the largest prehistoric skeletal assemblage from a cave in the southern Maya lowlands. MTC yielded multiple lines of evidence that indicate it is a place where human sacrifice may have occurred. For instance, the demographic distribution from the site
does not display a typical J curve (Chamberlain 2006; Weiss 1973), which would have a large proportion of very young infants, but with dramatically fewer individuals two to three years of age. In this demographic distribution, numbers of people gradually increase with age, with a final spike in the numbers of older adults. A "J curve" is typical of normal mortuary patterns seen in cemeteries cross-culturally through time (Chamberlain 2006; Weiss 1973). In contrast, the MTC assemblage has an irregular age distribution, with an abnormally large proportion of young adults and children between five and nine years of age (Kieffer 2014, 2015). A similar demographic profile has been documented in the Sacred Cenote at Chichén Itzá (De Anda Alanís 2007), a site with ethnohistoric evidence that indicates in situ sacrifice (Tozzer 1941).

Additional evidence at MTC suggests that a number of the individuals were sacrificed, including 28 instances of perimortem trauma (including blunt force, sharp force, and/or scalping) on at least 16 individuals (Kieffer 2011, 2015a). The locations of cut marks on the ends of long bones, on a sternum, and on multiple crania are consistent with defleshing, skin flaying, and heart extraction (Tiesler 2007:24-26). Bones of individuals discovered at the site were typically found commingled on the ground surface within the cave without associated grave goods. Additionally, many of the individuals were either found in or adjacent to the cave's water features such as rimstone pools. Such water features have been argued through the use of ethnographic analogy by cave archaeologists to be places where human sacrifice occurred for the rain gods, perhaps by drowning (Kieffer 2011; Scott and Brady 2005:278). Such manner of human sacrifice is depicted by the ancient Maya in the Madrid Codex (Vail and Hernández 2007:150-151, M.32b).

In 2009, the core of the surface site Tipan Chen Uitz (TCU) was discovered by the Caves Branch Archaeological Survey reconnaissance team about 1000 m from MTC. Archaeological investigations at TCU indicate that the site dates from the Late to Terminal Classic period, based on architecture, ceramics, and a calendrical stela date of AD 711 (Wrobel et al. 2012:242). The site of TCU is surrounded by more than 20 caves, many of which contain abundant ceramics and skeletal remains. However, MTC has the largest skeletal collection of any of these caves and differed in its utilization from the rest of the caves and rock shelters in the area, which were used for normal (i.e., nonsacrificial) cemetery purposes (Glassman and Bonor 2005; Wrobel et. al 2014).

## Stable Isotope Analyses

Isotopic analysis conducted on tooth enamel carbonate, bone collagen and bone apatite can provide geographical and dietary signals that in turn can permit osteobiographical reconstruction of individuals' lives through various isotope elements. Oxygen isotopes, while not the preferred isotopic method for demonstrating migration and place of origin, have been successfully utilized in numerous cases. Examples of demonstrated migration include determining the place of origin for sacrificed soldiers and buried elites at Teotihuacan (Spence et al. 2004; White et al. 2002, 2007), differences between individuals from the Valley of Oaxaca and the Valley of Mexico (White et al. 1998), as well as for distinguishing differences between individuals from different regions within Peru (Knudson 2009). Oxygen isotope analysis also is commonly used to determine migration and place of origin for other species in the fields of biology and ecology (Chamberlain et al. 1996).

Oxygen isotope values can be used as an indicator of geographical origins via factors that affect the signal such as drinking water, altitude, latitude, and distance from the sea (Sharp 2007). Price et al. (2014) and Freiwald (2011) have confirmed the correlation between distance inland and elevation within the Maya area. The explanation for why this correlation exists is due to isotopically heavier rain falling closer to coastal areas and rainfall decreasing in isotopic weight as it moves inland. White et al. (2000, 2004,2007 ) have also indicated high $\delta^{18} \mathrm{O}$ values are typical for low elevations that are hot, humid, and experience minimal rainfall; while low oxygen values are typical for high elevations, that are cooler and drier. Cultural factors such as cooking and breastfeeding practices can affect the accuracy of oxygen isotopes in migration and place of origin research (Jay 2009; Daux et al. 2008; Wright and Schwarcz 1998). However, if these cultural practices do not fluctuate significantly through time and are widely practiced in a similar manner, they should not greatly interfere with the ability to use oxygen isotopes for migration studies.

In addition to the oxygen isotope data, carbon isotope values obtained from enamel can also aid in reconstructing place of origin to a certain degree. Regional dietary differences have been noted throughout the Maya area and are useful for determining expected values of isotope data for given areas and time periods (Gerry 1993; Reed 1999; Sommerville et al. 2013). Gerry's work concludes that the mean values and standard deviations of carbon isotope values overlap between various social statuses, however this overlap is probably due to regional and temporal variation (Gerry 1993). Eventually, as data sets become more robust, these possible causes of variation may be teased out. Until
then, $\delta^{13} \mathrm{C}$ and $\delta^{15} \mathrm{~N}$ signals can be used to determine if an individual's diet fits within expected ranges for the area.

## Methods

## Database Methods

To aid in determining geographical origin of individuals from MTC, a database with isotope values from 640 individuals recovered from archaeological contexts throughout the Central America region was created by the author. The published values included in the database cover large areas of the Belize River Valley and Copan Valley in Honduras. These datasets include results from the work of Freiwald (2011), Gerry (1993), Price et al. (2010), White et al. (2002, 2001, 1993), Wright and Schwarcz (1989), and Wright (1994) (See Table 5.1 for descriptive statistics). While additional isotope data are available for the area, these published large isotope datasets allowed me to create a preliminary baseline, which in turn can be used for statistical applications. Of the 640 individuals in these datasets, 119 have $\delta^{18} \mathrm{O}$ data available from enamel samples, and 68 have $\delta^{18} \mathrm{O}$ data available from bone apatite samples. Sampled individuals represent a wide temporal period, ranging from the Preclassic to the Terminal Classic periods. This wide temporal range was used to try to mitigate fluctuations over time due climatic changes. No attempt was made to convert $\delta^{18} \mathrm{O}$ values obtained from the bioapatite of bone to make them comparable to results from carbonate from enamel. This choice was
influenced by the documented problems with conversion due to inherent problems of regression analysis with available data (Chenery et al. 2012; Pollard et al. 2011).

Variables that are known to affect oxygen isotope values were determined for archaeological sites included in the database. These variables include elevation, altitude, distance from the sea, and known values of local stream or river water collected by Lachniet and Patterson (2009) (Figure 5.1). Stepwise regression of these variables that affect oxygen signals was performed against the available isotope data from bone apatite and dental enamel. Parameters for entry into the stepwise was a probability of F less than or greater than 0.05 and removal if greater than or equal to 0.1 .


Figure 5.1 Map of the Upper Belize River Valley with oxygen isotope values for modern river water from Lachniet and Patterson (2009) noted in parentheses. Larger font indicates ranges of oxygen isotope values from enamel in database and from MTC. Map modified from Helmke (1999) and based on previous maps by Conlon (1998) and Campbell (1991).

## Isotope Methods

Collagen from cortical bone samples of 20 individuals (16.9\%) from MTC with obvious signs of trauma, pathology, or dental modification were part of the initial pilot study of isotope analysis conducted on material from the site. All samples are labeled based upon the collection's catalog number which encodes the Operation (i.e., chamber within the cave, denoted by a Roman numeral), Lot (denoted with an Arabic number), Sublot (if established during the research and denoted with a letter), and finally a unique specimen number for each bone or tooth.

Samples of bone heavily covered with calcium carbonate material deposited in the cave environment were avoided in sampling, although many of the samples came from once-watery features from within the cave. Isotope analysis initially focused on obtaining $\delta^{15} \mathrm{~N}$ and $\delta^{13} \mathrm{C}$ from bone collagen in hopes of finding differences in diet that could be used to infer differences in status. Bone samples were processed similar to the Wright (1994:190) method which uses a 0.5 M EDTA solution to demineralized samples. Following demineralization, samples were rinsed to neutral with purified water, soaked overnight with 0.125 M NaOH to remove humic acids, and rinsed to neutral again before freeze drying. The samples were run at the Center for Stable Isotopes at the University of New Mexico in 2010.

| Site |  | $\begin{aligned} & \delta^{13} \mathrm{C}_{\text {(PDB) }} \\ & \text { (collagen) } \end{aligned}$ | (bone apatite) | $\begin{aligned} & \delta^{15} \mathrm{~N}_{\text {(aIR) }} \\ & \text { (collagen) } \end{aligned}$ | (bone apatite) | $\begin{aligned} & \delta^{13} \mathrm{C}_{\text {(PDB) }} \\ & \text { (enamel) } \end{aligned}$ | $\begin{gathered} \delta^{1 *} \mathrm{O} \text { (\%smow) } \\ \text { (enamel) } \end{gathered}$ | $\begin{gathered} \delta^{* 7} \mathrm{Sr} / \delta^{* 6} \mathrm{Sr} \\ \text { (enamel) } \end{gathered}$ | Reference(s) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Aguateca, Guatemala | Average |  |  |  | 14.94 ( $\mathrm{n}=9$ ) |  |  |  | Wright (1994:235) |
|  | Range |  |  |  | 13.4-19.2 |  |  |  |  |
| Altar de Sacrificios, Guatemala | Average | -8.66 ( $\mathrm{n}=11$ ) | -5.713 ( $n=15$ ) | 6.845 ( $n=11$ ) | 15.63 (n=23) |  |  |  | Gerry (1993:204-206), |
|  | Range | -11.6--8.9 | -7.9--2.9 | 8.6-11 | 11.4-19.3 |  |  |  | Wright (1994:234) |
| Altun Ha, Belize | Average | -11.92 ( $\mathrm{n}=56$ ) | -8.07 ( $n=69$ ) | 10.71(n=53) |  |  |  |  | White et al. (2001:377-378) |
|  | Range | -16.3--7.6 | -11.5--4.9 | 9.2-13.0 |  |  |  |  |  |
| Baking Pot, Belize | Average | -9.45 ( $\mathrm{n}=10$ ) | -5.88 ( $\mathrm{n}=10$ ) | 9.3 ( $\mathrm{n}=10$ ) |  | $-3.07(n=1)$ | -4.27 ( $n=1)$ | 0.7073 ( $n=1$ ) | Freiw ald (2011:432-433), |
|  | Range | -10.0--9.2 | -7.1--4.6 | 7.9-10.6 |  |  |  |  | Gerry (1993:199-200) |
| Barton Ramie, Belize | Average | -10.04 (n=33) | -5.97 ( $n=22$ ) | 9.12 ( $n=44$ ) |  |  |  |  | Freiw ald (2011:415-443), |
|  | Range | -13.9--8.1 | -7.6--5.4 | 7.7-11.0 |  |  |  |  | Gerry (1993:207-210) |
| Caracol, Belize | Average |  |  |  |  | -4.03 ( $n=7$ ) | -3.41( $n=7$ ) | $0.7077(\mathrm{n}=7$ ) | Freiw ald (2011:429) |
|  | Range |  |  |  |  | $-5.56-3.26$ | $-4.35--2.82$ | 0.7072-0.7081 |  |
| ChaaCreek, Belize | Average |  |  |  |  | -6.23 ( $n=12$ ) | -3.42 ( $\mathrm{n}=12$ ) | $0.7094(n=12)$ | Freiwald (2011:434-435) |
|  | Range |  |  |  |  | -5.39 | -4.61--2.9 | 0.7084-0.7112 |  |
| Copan, Honduras | Average | -11.34 ( $\mathrm{n}=39$ ) | -7.08 ( $\mathrm{n}=14$ ) | 9.32 ( $n=39$ ) |  |  | -4.06 ( $\mathrm{n}=42$ ) | $0.707(n-29)$ | Price et al. (2010:24, 28-29), |
|  | Range | -25.04--8.09 | -8.1--5.7 | 16.5-7.5 |  |  | -3.5--0.99 | 0.70605-0.70844 | Gerry (1993:200-201) |
| Copan Valley, Honduras | Average | -8.26 ( $n=23$ ) |  | 9.20 ( $n=23$ ) |  |  |  |  | Gerry (1993:201-204) |
|  | Range | -11.84--7.04 |  | 11.1-7.1 |  |  |  |  |  |
| DosPilas, Guatemala | Average | -9.3 ( $\mathrm{n}=5$ ) |  | 8.52 ( $\mathrm{n}=5$ ) | 16.04 ( $n=20$ ) |  |  |  | Wright (1994:236) |
|  | Range | -9.9--8.7 |  | 8.7-8.2 | 18.2-14.9 |  |  |  |  |
| Esperanza, Belize | Average |  |  |  |  | -6.04 ( $n=4$ ) | -3.36 ( $\mathrm{n}=4$ ) | $0.7094(\mathrm{n}=4)$ | Freiw ald (2011:435) |
|  | Range |  |  |  |  | -8.49--5.54 | -3.5--3.21 | 0.7093-0.70951 |  |
| Floral Park, Belize | Average |  |  |  |  | -8.49( $n=2$ ) | -3.28 ( $n=2$ ) | $0.7103(\mathrm{n}=2)$ | Freiw ald (2011:436) |
|  | Range |  |  |  |  | -8.49 | -3.28 | 0.710286 |  |
| Holmul, Guatemala | Average | -8.36 ( $n=3$ ) |  | 9.55 ( $n=3$ ) |  |  | -3.52 ( $\mathrm{n}=19$ ) |  | Gerry (1993:197-199) |
|  | Range | -8.76--8.1 |  | 9.91-9.26 |  |  | -5.96--0.99 |  |  |
| Itzan, Guatemala | Average | -9.3 ( $n=6$ ) |  | 9.35 ( $\mathrm{n}=6$ ) |  |  |  |  | Wright (1994:234-235) |
|  | Range | -1.40 |  | 10.4-8.3 |  |  |  |  |  |
| Kaminaljuy, Guatemala | Average |  |  |  |  | -9.88 ( $n=24$ ) |  |  | Wright and Schwaroz (1999:1164) |
|  | Range |  |  |  |  | -12.32--8.49 |  |  |  |
| Lamanai, Belize | Average | $-11.02(\mathrm{n}=50)$ | $-6.87(\mathrm{n}=19)$ | 9.33 ( $n=49$ ) |  |  |  |  | White and Sohwaroz (1989) |
|  | Range | -17.2--8 | -7.7--6.1 | 11.4-8.12 |  |  |  |  |  |
| Pacbitun, Belize | Average | -10.39 ( $n=20$ ) |  | $9.16(\mathrm{n}=20)$ |  |  |  |  | White et al. (1993:351) |
|  | Range | -13.67--7.28 |  | 10.64-7.59 |  |  |  |  |  |
| Peligroso, Belize | Average |  |  |  |  | -4.23 ( $n=2$ ) | -3.59 ( $n=2$ ) | 0.7149 ( $n=2$ ) | Freiw ald (2011:430) |
|  | Range |  |  |  |  | $-4.69-3.76$ | $-4.06-3.11$ | $0.7146-0.71507$ |  |
| Ramonal, Belize | Average |  |  |  |  | -5.05 ( $n=5$ ) | -3.59 ( $n=5$ ) | 0.7142 ( $n=5$ ) | Freiwald (2011:429-430) |
|  | Range |  |  |  |  | -6.10--4.31 | -4.44--2.87 | 0.71128-0.71637 |  |
| San Lorenzo, Mexico | Average |  |  |  |  | -6.08 ( $\mathrm{n}=6$ ) | -2.89 ( $\mathrm{n}=6$ ) | 0.7088 ( $\mathrm{n}=6$ ) | Freiwald (2011:440) |
|  | Range |  |  |  |  | $-7.06-5.11$ | -3.74--2.2 | 0.70812-0.70938 |  |
| Seibal, Guatemala | Average | -10.50 ( $n=26$ ) | $-7.10(n=1)$ | 9.69 ( $n=23$ ) | 15.14 ( $\mathrm{n}=7$ ) |  | -4.74 (n=2) |  | Gerry (1993:211-213), |
|  | Range | -15.3--8.5 |  | 13.2-7.0 | 16.1-14.0 |  | -4.92--4.53 |  | Wright (1994:235) |
| Teotihuacan, Mexico | Average | -9.92 ( $\mathrm{n}=57$ ) | $-5.24(\mathrm{n}=48)$ | 8.07 ( $n=55$ ) |  |  |  |  | White et al. (2002:223-224) |
|  | Range | -12.4--7.8 | -7.8--3.3 | 10.9-5.2 |  |  |  |  |  |
| Uaxactun, Guatemala | Average |  |  |  | 16.2 ( $\mathrm{n}=9$ ) |  |  |  | Gerry (1993:206) |
|  | Range |  |  |  | 19.7-14.4 |  |  |  |  |
| Xunantunich, Belize | Average |  |  |  |  | $-5.01(n=38)$ | -2.46 ( $n=38)$ | $0.7087(n=38)$ | Freiw ald (2011:441-443) |
|  | Range |  |  |  |  | -6.99--2.4 | -9.98--0.32 | 0.707969-0.710463 |  |

Table 5.1 Averages and ranges of isotope data from bone apatite, bone collagen, and enamel samples for comparison.

Tooth enamel extracted from 26 individuals ( $22.0 \%$ ) from MTC were sampled. Teeth with excessive amounts of calcium carbonate buildup, due to active cave processes, were avoided for sampling whenever possible. Also whenever possible, left first mandibular molars were sampled in order to reduce the possibility of double sampling the same individual in each concentration of skeletal material in the site. Most issues of isotopic signal skewing due to breastfeeding while these teeth were being formed are mitigated by the fact that a majority of the teeth from the comparative data were also from first molars. When left first mandibular molars were not available or poorly preserved, metric and morphological differences between the molars were used to determine the likelihood that the teeth belonged to different individuals. Only fully developed teeth were sampled. Buccal samples across the whole surface of the crown were taken in an attempt to average seasonal signals inherent in dental development.

Many of the teeth sampled were lost postmortem, mostly due to the poor preservation of alveolar bone at the site. Based upon other skeletal material recovered from the commingled deposits that the teeth were discovered within, a majority of the teeth are from young adults (based upon minimal wear), with at least one older adult (sample V7-91) represented in the sample. More precise ages for the individuals could not be determined due to the commingled and fragmentary nature of the deposits. The formation of the first permanent mandibular molar typically occurs between nine months and three years of age (Ubelaker 1989; Hillson 1996). Thus, the sampling of this tooth will give an oxygen signal indicative of the geographical region where an individual lived during the early years of his or her life.

Enamel samples were pulverized with a diamond bit Dremel Stylus Lithium-Ion Cordless Drill for analysis of carbon and oxygen isotopes. Samples were treated with 3\% hydrogen peroxide solution for 15 minutes, rinsed, treated with 0.1 M acetic acid for 15 minutes, and finally rinsed to neutral with deionized water. No bleach treatments were used during sample preparation, due in part because most of the comparative data in the Maya area was prepared in this manner (Gerry 1993; White et al. 1993, 2001, 2002; Wright 1994; Wright and Schwarcz 1999; Freiwald 2011).

The enamel samples were measured using the method described by Spotl and Vennemann (2003). The samples were loaded into 12 mL borosilicate exetainers, and then flushed with helium before reaction with phosphoric acid at $50^{\circ} \mathrm{C}$ for 24 hours. The evolved carbon dioxide was measured by continuous flow Isotope Ratio Mass Spectrometry using a Gasbench device coupled to a Thermo Scientific Delta V Isotope Ratio Mass Spectrometer. The results are reported using the delta notation, versus the Vienna Pee Dee Belemnite (PDB) standard for carbon and Vienna Standard Mean Ocean Water (VSMOW) for oxygen. Reproducibility was better than $0.1 \%$ for both $\delta^{13} \mathrm{C}$ and $\delta^{18} \mathrm{O}$ based on repeats of a laboratory standard of Carrara Marble. The standards were calibrated versus NBS 19 , which is $1.95 \%$ for $\delta^{13} \mathrm{C}$ is and $2.2 \%$ for $\delta^{18} \mathrm{O}$.

## Existing Datasets Used for Comparison

Copious isotope analysis studies on prehistoric human skeletal material have been conducted throughout Belize, especially the Eastern Lowlands. These available isotope datasets were gathered to create a comparative sample. These datasets, while not exhaustive for the Maya region, include numerous sites near MTC, as well as other more
distant sites in Guatemala, Honduras, and extend into neighboring culture areas in Mexico (Freiwald 2011; Gerry 1993; Price et al. 2010; White et al. 2002, 2001, 1993; Wright and Schwarcz 1989; Wright 1994; Wrobel et al. 2014). The sites chosen for comparison had similar periods of utilization as the site of MTC, thus minimizing the effect of change over time in the comparative data. However, not all of the individuals from these sites have definitively been determined to be either local or non-local, a fact which may cause isotope ranges for some sites to be wider than the actual local range.

Descriptive statistics were performed for all isotope values obtained from bone and teeth from these sites and local pertinent values were mapped for easy comparison (Table 5.1, Figures 5.1-5.3). This was done not only to assist future researchers, but also to aid in determining a potential geographic region or site from which individuals in MTC may have originated. The only issue in using this method for comparison is that it does not preclude comparison to individuals who are non-local to the site from which they were recovered. For this reason, known values of local stream or river water collected by Lachniet and Patterson (2009) were included as a useful comparative dataset (Figure 5.3).

Additional statistical analyses were performed on the data from MTC to determine likelihood that the individuals were from the same geographical area. These methods of varying robusticity included determination of two standard deviations from the mean (2SD), median absolute deviation from the median (MAD), MAD scaled assuming normality $\left(\mathrm{MAD}_{\text {norm }}\right)$, MAD adjusted to inverse of 75 th centile $\left(\mathrm{MAD}_{\mathrm{Q} 3}\right)$, and 1.5 times the interquartile range (IQR) (see Lightfoot and O'Connell 2016:S1 Appendix for calculation methods).


Figure 5.2 Map of southern Mexico, Belize, Guatemala, and part of El Salvador and Honduras showing some of the regional sites yielding comparative isotope values.


Figure 5.3 Map of the Upper Belize River Valley with ranges of oxygen isotope values from enamel from nearby sites included in the comparative datasets and from MTC. Oxygen isotope values for modern river water from Lachniet and Patterson (2009) are noted in parentheses. Map modified from Helmke (1999) and based on earlier maps by Conlon (1998) and Campbell (1991).

## Results

## Database Statistical Results

Stepwise regression indicates that none of the available variables drastically affected $\delta^{18} \mathrm{O}$ values from apatite. The variable most correlated with $\delta^{18} \mathrm{O}$ values from apatite was distance from the sea at $\mathrm{p}=0.267$. Altitude ( $\mathrm{p}=0.409$ ), longitude ( $\mathrm{p}=0.351$ ), and latitude ( $\mathrm{p}=0.70$ ) were less significant, and no $\delta^{18} \mathrm{O}$ values for local river sources were available for sites with apatite data. The stepwise regression indicates that distance from the sea is the only variable significantly impacting oxygen isotope values in the region for the enamel dataset. Regression of the enamel data against the distance from the sea data produced statistically significant difference at the $\mathrm{p}=0.000$ level. Latitude produced similar significant results, but the standard error for that variable was much higher at 1.61. Altitude ( $\mathrm{p}=0.472$ ), longitude $(\mathrm{p}=0.078$ ) were not significantly correlated, while many sites either did not have nearby river values available for regression or they shared the $-3.3 \delta^{18} \mathrm{O}$ value from the Belize River. Anticipated values for sites in the region can be estimated based on results of the stepwise regression which allowed for the creation of the predictive formulae at one standard deviation from the mean:
$\delta^{18} \mathrm{O}$ from enamel $=-2.1086+$ distance from sea $(-0.01009)+/-0.284014$
In the case of MTC, the distance of 55 km estimates that the expected range of $\delta^{18} \mathrm{O}$ values from the site would be between -2.95 and -2.38 (values rounded to the second decimal place). Distance from the sea for other sites within the Upper Belize River Valley was utilized to calculate predictive value ranges (Figure 5.4).


Figure 5.4 Predictive oxygen isotope values for enamel at select sites in the Belize River Valley.

It is important to note what the ability to statistically correlate distance from the sea with oxygen isotope values means for this specific region. This statistically significant correlation between oxygen and distance from the sea would probably not exist if certain cultural traditions greatly varied throughout the region and throughout the time of the ancient Maya. This suggests that breastfeeding and cooking practices which are known to impact oxygen values probably were relatively constant through these time periods within the region. This does not rule out the possibility of variation or slight changes over time. However it does suggest that the changes did not greatly impact how our ability to study variables that can influence oxygen values.

This predictive formula derived from the afore mentioned isotope dataset may not work for every area in Central America, due to the confidence interval and different cultural practices such as breastfeeding and cooking, which are known to impact oxygen variables as well as other isotopes. This may explain why the estimate range encompasses most, but not all, of the recently published results for individuals assumed to be locals discovered in Je'reftheel Cave near Midnight Terror Cave (Wrobel et al. 2014). It is also important to note that there is a large amount of overlap of predictive values for sites that are close to each other. It may be possible for this site value overlap to be reduced if geographic outsiders (who may exist in the dataset) can be removed in the future. While these current estimates do match perfectly with existing data, the formula may aid in finding possible geographic outsiders within datasets. Due to the current amount of overlap between sites, the formula could not and should not be used to distinguish a specific polity from which an individual might have come. The formula is incapable of such precision.

## MTC Samples

All 20 bone samples contained minimal amounts of collagen, very low $\delta^{15} \mathrm{~N}$ values, and abnormally low $\delta^{13} \mathrm{C}$ values (Table 6.2). More importantly, the $\mathrm{C}: \mathrm{N}$ ratios of all the samples fall outside of the acceptable range of 2.9-3.6 proposed by DeNiro (1985:808), and thus indicate diagenesis. Three of the samples appear to be valid values for $\delta^{15} \mathrm{~N}$ and $\delta^{13} \mathrm{C}$ values, although their $\mathrm{C}: \mathrm{N}$ ratios are still slightly above DeNiro's recommended range. It is the assumption of the author that the carbonic acid that is produced during the precipitation of limestone (Palmer 2007:113) may have contributed to the degradation of collagen. Due to this evidence of diagenesis, interpretations of place of origin for this site should be based upon data from dental enamel, which is less susceptible to diagenetic contamination.

| Location in Cave | Bone Sampled | $\boldsymbol{\delta}^{\mathbf{1 5}} \mathbf{N}_{\text {(AIR) }}$ | $\boldsymbol{\delta}^{\mathbf{1 3}} \mathbf{C}_{(\mathbf{P D B})}$ | $\mathbf{C / N}$ |
| :---: | :---: | :---: | :---: | :---: |
| VIII-16A | Cranial Fragment | 2.82 | -32.08 | $5.21^{*}$ |
| V-2D | Shaft Fragment | 1.69 | -33.7 | $5.12^{*}$ |
| VI-2B | Parietal Fragment | 8.61 | -14.71 | 3.77 |
| VI-2B | Occipital Fragment | 2.55 | -32.22 | $4.99^{*}$ |
| V-1E | Occipital Fragment | 1.99 | -34.31 | $4.73^{*}$ |
| V-1E | Tibia Fragment | 2.12 | -34.32 | $4.99^{*}$ |
| V-1E | Shaft Fragment | 2.43 | -34.3 | $4.69^{*}$ |
| VI-3C | Femur Fragment | -0.55 | -29.45 | $4.87^{*}$ |
| V-1E | Shaft Fragment | 7.29 | -18.79 | 3.84 |
| VIII-1A | Femur Fragment | 2.38 | -32.43 | $5.25^{*}$ |
| V-1E | Cranial Fragment | 0 | 0 | 0 |
| V-1C | Cranial Fragment | 7.99 | -14.76 | 3.66 |
| VII-4 | Shaft Fragment | 3.29 | -27.17 | $5.38^{*}$ |
| V-1E | Shaft Fragment | 0.96 | -20.11 | $7.27^{*}$ |
| V-1C | Cranial Fragment | -0.05 | -28.77 | $4.36^{*}$ |
| SD-4E | Cranial Fragment | 0.33 | -32.97 | $4.69^{*}$ |
| VI-2D | Shaft Fragment | 0.19 | -30.33 | $5.03^{*}$ |
| VI-3G | Cranial Fragment | 1.36 | -35.74 | $5.17^{*}$ |
| V-1C | Cranial Fragment | 0.44 | -28.87 | $4.65^{*}$ |
| V-1E | Shaft Fragment | 3.61 | -27.68 | $5.94^{*}$ |

Table $5.2 \delta{ }^{13} \mathrm{C}$ and $\delta^{15} \mathrm{~N}$ values from bone collagen from the site of MTC. All asterisked samples indicate C:N ratios outside the recommended range proposed by DeNiro (1985), and thus indicate alteration due to diagenesis.

The 26 individuals' enamel sampled from MTC had wide ranges of values for both carbon and oxygen isotopes (Table 5.2 and Figure 5.3). The average carbon isotope value for the MTC data is $-6.19 \delta^{13} \mathrm{C}$, which is more negative than many other site averages in Belize. One explanation for what may cause this difference is that the individuals sampled at MTC consumed less maize than individuals elsewhere in Belize. A much greater range of variability was observed among the $\delta^{13} \mathrm{C}$ values than the $\delta^{18} \mathrm{O}$, demonstrating a standard deviation of 1.38 and 0.66 respectively. This range and standard
deviation for $\delta^{13} \mathrm{C}$ was higher at the site of MTC than any of the other sites included in the comparative set.

| Sample | Tooth | $\boldsymbol{\delta}^{\mathbf{1 3}} \mathbf{C}_{\text {(PDB) }} \boldsymbol{\delta}^{\mathbf{1 8}} \mathbf{O}_{\text {(VSMOW) }}$ |  |
| :---: | :---: | :---: | :---: |
| V4-32 | RLM1 | -6.99 | -5.35 |
| V4-34 | RLM1 | -5.87 | -5.49 |
| V5-19 | RLM1 | -5.78 | -3.54 |
| V5-21 | LLM1 | -6.02 | -4.34 |
| V7-91 | RLM1 | -4.32 | -3.63 |
| VI3E-48 | RLM1 | -5.64 | -4.24 |
| VII12-24 | LLM1 | -4.30 | -3.26 |
| VIII1C-415 | RLM1 | -10.00 | -4.42 |
| VIII2A-1 | LLM1 | -5.64 | -4.40 |
| VIII 7D-184 | LLM1 | -8.06 | -4.43 |
| VIII7D-188 | LLM1 | -6.56 | -4.51 |
| VIII 8C-188 | LLM1 | -5.21 | -3.93 |
| VIII 8C-189 | LLM1 | -5.91 | -5.01 |
| VIII 11B-362 | LLM1 | -6.89 | -4.69 |
| VIII 11B-363 | LLM1 | -4.60 | -4.33 |
| VIII 11D-211 | RLM1 | -7.58 | -4.03 |
| VIII 11D-212 | LLM1 | -5.88 | -4.70 |
| VIII 11D-213 | LLM1 | -6.26 | -4.77 |
| VIII 14AD-1 | RLM1 | -7.18 | -4.14 |
| VIII 14AD-2 | RLM1 | -9.06 | -4.37 |
| VIII 14B-198 | LLM1 | -6.23 | -4.72 |
| VIII 14B-201 | LLM1 | -5.62 | -5.71 |
| VIII 14B-205 | RLM1 | -5.55 | -6.07 |
| VIII 15A-20 | LLM1 | -6.41 | -4.58 |
| VIII 16C-1 | RLM1 | -4.64 | -3.69 |
| VIII 4-148 | LLM1 | -4.71 | -4.17 |

Table $5.3 \delta^{13} \mathrm{C}$ and $\delta^{18} \mathrm{O}$ isotope values obtained from enamel samples from individuals at MTC, Belize.


## $\delta^{13} C_{\text {PDB }}$

Figure $5.5 \delta^{18} \mathrm{O}$ and $\delta^{13} \mathrm{C}$ values from enamel samples taken from MTC and mean values for other local sites. MTC values are indicated with solid diamonds.

The range of oxygen isotope values from enamel for the site of MTC is -6.07 to $3.54 \delta^{18} \mathrm{O}$, while the average value is $-4.48 \delta^{18} \mathrm{O}(\mathrm{n}=26)$. This average is lower than documented average site values in the Belize River Valley (Table 5.1, Figure 5.3 and 5.5). Based upon all the standard statistical methods used to analyze intra-sample variation in isotope values, multiple places of origin are indicated (Table 5.5). At least one sample fell outside the calculated expected range based upon every measure of robustness, thus indicating at least two places of origin are probably represented. The more robust statistical tests had up to four or five samples falling outside the expected calculated range for the site based upon existing data. Based on the available data, this does not necessarily mean that five or six places of origin are possible. Rather, it simply indicates that four or five of the individuals are not from the same place of origin as the rest of the individuals in the data set. Due to the quantity of overlap for isotope values
between different sites, these statistical methods on their own are not capable of determining the exact number of sites from which the individuals recovered at MTC had originally come.

| Statistical <br> Method | Value | Expected $\delta^{18} \mathrm{O}$ <br> Range | MTC Samples <br> Outside Range |
| :---: | :---: | :---: | :---: |
| 2 SD | 1.32 | $-5.8--3.16 \%$ | 1 |
| MAD | 0.9 | $-5.31--3.51 \%$ | 4 |
| $\mathrm{MAD}_{\mathrm{Q} 3}$ | 1.176 | $-5.586--3.234 \%$ | 2 |
| $\mathrm{MAD}_{\text {norm }}$ | 1.335 | $-5.745--3.075 \%$ | 1 |
| 1.5 IQR | 0.851 | $-5.331--3.629 \%$ | 5 |

Table 5.4. Expected ranges of $\delta 180$ for MTC based upon robust statistical estimators calculated from the tooth enamel samples from MTC.

## Discussion

Due to the diagenesis noted with the collagen samples from MTC, they cannot be compared to data from other sites. This is also why analysis of bone apatite was never pursued on material from this site. Research by Chenery et al. (2012) and Pollard et al. (2011) indicate that isotope values obtained by apatite and enamel are not always comparable even with conversion due to inherent problems with regression analysis. For this reason, valid isotope data acquired from teeth from the site of MTC will not be compared to the existing comparative data for bone apatite and collagen.

While the sites of Ramonal and Baking Pot have individuals with oxygen isotope values that fall within the range of values documented at MTC, it is important to note that these individuals could be outliers for the local range of the Mountain Pine Ridge and Belize River Valleys respectively. The first indication that individuals from MTC may be non local is based upon data from site of Je'reftheel, which is less than 4 km away.

Oxygen isotope values from MTC are more negative than Je'reftheel (Wrobel et al. 2014: 96-97, Fig. 4.7, Table 4.2). This trend of lower oxygen isotope values is also seen in sites further away such as Chaa Creek. Statistical comparison via a t-test of data from 12 enamel samples from Chaa Creek to the first 12 enamel samples from MTC (Figure 5.3) indicates a statistical difference in their mean at a $\mathrm{p}=0.001$ level. This is notable as the first 12 enamel samples from MTC do not include the one individual (VIII 14B-205) sampled that is two standard deviations away from the mean of the site.

From a regional perspective, the oxygen isotope values from MTC are more negative than a majority of the nearby sites in the Eastern Lowlands (Table 5.1 and 5.3, Figure 5.1 and 5.3). The only way that oxygen isotope values as low as many of those documented at MTC could be achieved is if many of the individuals had drunk from an aguada or other rain-capturing system, which is prone to depletion in oxygen isotope values once the rainy season starts (Scherer et al. 2015:673). This thus suggests at least some of the individuals sampled at MTC may not have grown up in the local area.

Ranges in isotope variation can be useful when determining the presence of outsiders. All local people would display a narrow range of values, while mixing of nonlocals would widen the range of variability. Price et al. (2014:40) have used a standard $\pm 2 \%$ for $\delta^{18} \mathrm{O}$ as the standard variation expected within a site. This arbitrary $2 \%$ value has been previously critiqued by Wright et al. (2013:130), due to intra-tooth variability. Notwithstanding this possible source of deviation, sites such as Mayapán document the sacrifice of geographical outsiders (based upon strontium isotope data) and have standard variation exceeding $2 \%$ for $\delta^{18} \mathrm{O}$ (Wright 2007).

Based upon $\delta^{18} \mathrm{O}$ values from many sites included in the comparison data, many of the sites have ranges well below this arbitrarily set variation of $2 \%$ (Table 6.1). Many of the sites are more in line with $1.5 \%$ or less. Exceptions to this narrow range of variation include Copan, Holmul, and Xunantunich. It is important to note that at the site of Copan, geographical outsiders (including K'inich Yax K'uk' Mo', the first king of Copan) were documented amongst the individuals sampled (Price et al. 2010, 2014). While there is no definitive evidence from Holmul, a possible source of outsiders would be invaders that may have settled following Teotihuacan's "entrada," which affected ruling powers in the area (Estrada-Belli et al. 2009:229). Iconographic and graffiti evidence from the sites of Holmul and the nearby La Sufricaya contribute to the idea of foreigners residing in the area (Estrada-Belli 2001, Estrada-Belli et al. 2009:229). This post -"entrada" settlement by Teotihuacan's invaders at Tikal is already suggested by isotope data (Wright 2012:344). Future research may discover additional evidence supporting the presence of outsiders at the site of Xunantunich. The presence of outsiders at Xunantunich has also been documented based upon burial patterns and strontium isotope values (Freiwald et al. 2014). Due to the confirmed outsiders at Xunantunich and possible outsiders at Holmul, data from these sites cannot be used to determine a possible place of origin for outsiders at MTC.

MTC displays a $2.8 \%$ range, thus suggesting that these individuals may have come from multiple places of origin. The possibility of multiple places of origin is also supported by the rather large range of $\delta^{13} \mathrm{C}$ values from MTC. This range of carbon isotope values from enamel is greater than that at other sites in the Maya area. This idea that the individuals from MTC may have originated from more than one location is
supported by the work of Price et al. (2014), which indicates that no one specific region in the Maya area has produced a range into which all of the individuals at MTC would fall. The probability of multiple places of geographical origin is further supported by the $\mathrm{MAD}, \mathrm{MAD}_{\text {norm }}, \mathrm{MAD}_{\mathrm{Q} 3}$, and 1.5 times IQR calculations which aid in understanding the degree of variability within the MTC samples. By comparing isotope results to published data from other sites, individuals from MTC have isotope values similar to those of individuals from as far away as non-Yucatán regions of Mexico (potentially the Basin of Mexico, Cholula, Southern Highlands, or Northwest Mexico), Honduras, as well as other areas within Belize.

Other isotope studies with smaller datasets suggest more possible locations from which the MTC individuals may have originated. Based upon averaged oxygen isotope values published by Price et al. (2010:23), it is possible that the individuals at MTC could also have originated from Campeche (-2.9\%), Tikal (-3.8\%), Palmarejo ( $-3.7 \%$ ), Palenque ( $-3.9 \%$ ), Maltrata ( $-3.9 \%$ ), Kalminaljuyu ( $-4.2 \%$ ), Tzintzuntzan ( $-5.4 \%$ ), Champantongo $(-5.6 \%)$, or even Teotihuacan $(-5.3 \%)$. The individuals with the highest oxygen isotope signals (samples V7-91, VII12-24, and VIII16C-1) also fall within the upper range of elite individuals from the site of Uxbenká, Belize (Trask et al. 2012:68).

The carbon isotope data from MTC was useful in suggesting the individuals may not originally be from Baking Pot. As Figure 3 demonstrates, the known oxygen isotope value from the site fell within the documented values from MTC, however the carbon isotope value is noticeably different. However Baking Pot should not be completely ruled out as a place of possible origin until more data are collected from that site.

Combining the carbon and oxygen data did not prove very useful in determining exactly from where these individuals may have originated. For individuals with $\delta^{18} \mathrm{O}$ values between the -4 and $-6 \%$, it was possible to rule out some possible sites for which data exist; however for others it did not shorten the list of possible sites the individuals may have been from based upon the oxygen data alone.

The isotope values at MTC are much lower than those of the local area, thus indicating probable foreign origins. Since the values do not fit neatly into just one site's known range, there is the possibility that the individuals came from multiple places outside the local area. The plots of oxygen and carbon values do not show distinct clusters (Figure 6.3), which means that some of the areas from which these individuals originated may have been near each other or may have had similar values.

As commonly expressed in sacrifice theory (Bell 1997; Girard 1979), non-local origin may have contributed to choosing individuals for sacrifice. The ritual act of human sacrifice has been well documented both throughout time and cross-culturally. Theorists have discussed at length the reasons why some sacrifice other human beings. Crossculturally, periods of crisis are correlated with increased ritual activity (Beattie 1980), including pleas for divine intervention (Malinowski 1954; van Gennep 1960). However, some ritual theorists state that this sacred obligation becomes neglected during times of great peril (Girard 1979).

In Mesoamerica, when the act of human sacrifice occurs in a cave, it is often interpreted as an offering to the rain deities (Scott and Brady 2005:275-278). These hypothesized sacrifices to the rain gods were not limited to children, but also included adults (Marcus 1978). Many Maya sites even have evidence of the use of captives for
human sacrifice (Lucero 1999). Ethnohistoric accounts at Chichén Itzá by Bishop Diego de Landa (Tozzer 1941:44n) indicate that war captives were one group of sacrificed individuals at the site. Epigraphic evidence of captive sacrifice has been observed on monumental architecture that depicts bound captives where glyphs of war were commonly followed by sacrifice (Schele and Miller 1986; Schele 1984). Iconographic evidence of captive sacrifice has also been interpreted from architectural elements at sites in Mexico such as Bonampak, Tonia (Berryman 2007), and Palenque as well as Dos Pilas and Tamarindito in Guatemala (Baudez and Mathews 1979; Marcus 1974). These examples support the commonly held idea that captive sacrifice was a ritualized institution among the ancient Maya that was tied to warfare (Brown and Garber 2003:92).

Interpretation of when the MTC individuals came to the area is limited due to the fact that the isotope data only come from teeth, which form over a specific, restricted time span in life. Typically comparing dental values to bone values, which average isotope values over many years, one can determine if the individuals had lived locally for a while before death. However, due to diagenesis in the bone samples, it is impossible to determine if these individuals lived at another site for a period after their teeth formed. There is also no way to accurately determine whether these individuals were acquired via warfare raiding or if they had been residing for some time in the area around MTC before they were sacrificed.

If these individuals were not captives acquired in warfare for the purpose of sacrifice, there could have been other causes for the migration of non-local individuals into the Belize River Valley. Migration theory contemplates several types of "push-pull" models (i.e., overpopulation, political conflict, economic pressures, and environmental
pressures) that have been documented in modern and prehistoric times with evidence in various regions of the world (Tsuda 2011). Although the rituals in MTC indicate utilization as early as the Middle Preclassic period, the peak in utilization occurred during the Late and Terminal Classic period as indicated by the ceramics at MTC and the establishment of the adjacent site of TCU. Given the period of peak utilization for the cave, a number of the "push-pull" migration factors could explain the migration of these individuals to the area at that time.

A plausible explanation of environmentally caused, push-pull model of migration in the Maya region derives from the climatic instability of the region during this period. Extensive environmental research in the region has documented changes in precipitation, with not all areas equally affected (Gill 2000; Hodell et al. 1995, 2001; Haug et al. 2003; Kennett et al. 2012; Medina-Elizalde et al. 2010). It is possible that individuals from other areas moved into the Belize River Valley and near MTC when rainfall declined in their home areas. The impact of these climatic fluctuations has not yet been documented via isotope data from humans in the Maya area. There is the possibility that climate affected the values from MTC. However local samples from other sites in the area from this time period were included in the database to mitigate this potential problem.

In addition to precipitation changes, numerous volcanic eruptions in many areas of Central America could have caused disintegration of ceremonial centers in addition to increasing migration from much further south. Volcanic events that could have spurred migration into the region during the peak utilization of TCU and MTC include Loma Caldera around AD 610 to 671 (Sheets 2004:615), Volcano Baru around AD 700 (Sheets

2012:51), the Ilopango eruption around AD 656 (Sheets 2004:113), and the eruption of Boqueron around the 9th century AD (Sheets 2007:68).

The possibility that the MTC individuals originated from various areas had implications for social relations within Belize and the broader Maya region. The documented Maya practice of raiding and warfare associated with acquiring captives for sacrifice (Berryman 2007:378; Schele 1984; Schele and Miller 1986) may explain the transport of these individuals to TCU and ultimately to the adjacent MTC. The local surface site of TCU is a major civic-ceremonial center (Andres et al. 2010:90). The architecture located on top of the cave would suggest an elite appropriation and utilization of MTC (see Brady et al. 1997; King et al. 2012). While there is currently no proof of TCU's involvement in warfare with distant or even neighboring polities, Monument 1 at the site suggests that the site had autonomy as a political entity due to the use of the "ajaw" glyph (Andres and Helmke 2013). Additionally, this monument dates to a period of endemic warfare for the area (Andres et al. 2014:51). Therefore, the ritual killing of captives remains a possible explanation for how these non-local individuals came to be deposited in the adjacent MTC.

Other political conflicts during the Late to Terminal Classic period could have contributed to the movement of non-local individuals to the site. Internal conflict at other, more distant, sites had the potential to cause internal conflict and political disintegration, which could have contributed to the emigration of individuals or groups of individuals (Tsuda 2011). In-migration could also occur as a consequence of individuals or groups seeking to take advantage of a power vacuum that occurs when internal conflicts caused disintegration of a political structure (Beekman and Christensen 2003). Evidence for such
warfare activity and political fluctuations throughout the western Peten and parts of Belize is well documented (Barrett and Scherer 2005; Chase and Chase 1989; Demarest et al. 1997; Inomata 2008; Massey 1989; Palka 2001; Webster 2000). More work at the site of TCU is needed before interpretations of how political development and disintegration could have been affected by or possibly caused the in-migration of the individuals deposited in MTC.

## Future Research and Conclusions

Future research should also focus on determining whether any of the sites used in the comparative datasets contain more geographic outsiders than previously assumed. By removing some of these outliers, greater refinement of oxygen isotope analysis for migration and place of origin may be possible.

The analysis of oxygen isotope data acquired from the teeth of 26 individuals deposited at MTC indicates that none of the individuals sampled were originally from the MTC area, unless diagenesis is also impacting the tight crystalline structure of dental enamel. Additional investigation as to the extent that diagenesis has or has not impacted the teeth at the site should be further explored. Stepwise regression of presently available data and oxygen isotope data alone is unable to narrow down where these individuals may have originated, but it demonstrates that they were not local. The only certainty is that they came from outside the Belize River Valley and may have come from as far away as Mexico or Honduras. Currently, strontium isotope analysis has only been conducted on children from the site, producing a range of results $0.7079-0.7093 \delta^{87 / 86} \mathrm{Sr}$ and a mean of $0.7084 \delta^{87 / 86} \mathrm{Sr}$ (Lorenz et al. 2016). On their own, these values are not
sufficient to narrow down place of origin, as such values are known to exist locally in Belize and elsewhere in the Maya area, as Table 5.1 demonstrates. Hopefully, additional strontium isotope analysis on teeth will aid in refining from where these individuals may have originated. Additionally, future isotope analysis in other areas of Mexico and Central America may help refine techniques such as the one reported here.

It currently is not possible to determine whether the MTC individuals had migrated to the Roaring Creek Valley shortly after their molars had formed (roughly between nine months and three years of age) or if they were brought to the site shortly before they died. If bone samples at the site had not been subject to diagenesis to the extent documented in the karstic environment, comparison between bone and tooth samples from the same individuals could have been carried out to aid in determining if their $\delta^{18} \mathrm{O}$ apatite values are comparable to their enamel signals, which were established decades before the individuals' death. In terms of how these results might articulate with the documented practice of human sacrifice in the Maya culture area, they demonstrate that geographic outsiders might have been targeted for human sacrifices at the site.

Both the isotope data and the sociopolitical interpretations for the immediate region and the broader Maya lowlands are vast. Multidecadal droughts have been documented in the Maya lowlands between AD 820 and 870, with broader trends or regional drying occurring since AD 640 (Kennett et al. 2012; Medina-Elizalde and Rohling 2012; Medina-Elizalde et al. 2010). This corresponds to the time period of peak utilization for the site of MTC, further supporting the idea that both cultural material and human lives may have been offered as rain petitions. The fact that analyzed individuals recovered from MTC were not originally from this site or the nearby areas suggests the
possibility that they were chosen due to their outsider status and may have been obtained during war or in raids.

# CHAPTER 6 SACRIFICE OF THE SOCIAL OUTCASTS: TWO CASES OF KLIPPEL-FEIL SYNDROME AT MIDNIGHT TERROR CAVE, BELIZE. 

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## Introduction

Ritual theorists propose that individuals chosen for sacrifice are typically outsiders or foreigners either geographically or socially, but not too foreign (Girard 1979). Girard elaborates that those being sacrificed have to be known by the sacrificing group as people who do not belong or do not yet belong to the group. In the Maya area, this would probably translate to people who looked Maya, spoke a Mayan language (possibly a different dialect), but might not have been born or resided in the polity that performed the sacrifice. This idea of outsider or another could also be applied to individuals from within the polity that was performing the sacrifice, but were not socially accepted as full members of the group due to illness or age. Social outcasts on the fringe of society have been suggested to include: "prisoners of war, slaves, small children, unmarried adolescents, and the handicapped" (Girard 1979:12). This theory fits the Maya situation, since captives and children who may not have been initiated into the community or orphaned are commonly noted as sacrificial victims in the ethnohistorical accounts (Tozzer 1941).

Until now, the one class of "social outcasts" that has not been documented as sacrificial victims are individuals with disfigurements or physical handicaps. The absence of social outcasts documented as sacrifices is rather surprising, given some physically handicapping conditions would render them useless in putting up a fight if someone
attempted to capture and sacrifice them. These two individuals from a mostly sacrificial Maya assemblage in Midnight Terror Cave (MTC), Belize are unique in being the first cases demonstrating sacrifice of physically handicapped individuals in the Maya area.

## Background

## Maya Sacrifice

There is no doubt that the ancient Maya practiced ritual human sacrifice. The act of sacrifice is a critical component to their creation story in the Popol Vuh. Images of sacrifices, both human and animal, are commonly depicted in murals, codices, and ceramics. These depictions of human sacrifice are, no doubt, biased since they were created as political and ritual propaganda by the elite. For this reason, the archaeological record is required to bridge disparities between depictions of sacrifice, theories of sacrifice, and the actual practice of sacrifice.

Captives are among the most commonly documented sacrificial victims of the ancient Maya, and this idea is supported with iconography throughout the Maya area. In a cave at the site of Dos Pilas, Guatemala a vessel was discovered that depicted a "lower body of a fallen or reclining individual" (Brady et al. 1997:361). Based primarily upon body positioning, probably bound victims of sacrifice have also been interpreted from skeletal material recovered from Barton Creek Cave (Owen 2002, 2005) and Actun Tunich Muknal (Gibbs 2000).

Little work has been done on the topic of sorcerers and witchcraft among the ancient Maya. However, their association with caves has been discussed in ethnographic accounts (Nash 1967), as well as archaeological discovery of inalienable objects such as
crystals found at the sites of Naj Tunich, Cueva de los Quetzales in Guatemala, Cueva del Río Murciélago (Brady and Prufer 1999). So far the only bioarchaeological evidence of witch sacrifice comes from Actun Tunichil Muknal, Belize. There, Lucero and Gibbs (2007) make the argument for witch sacrifice based upon ethnographic analogy and multiple deposits, some of which are tucked away or hidden in alcoves as if to entrap the witch's essence.

The documentation of orphan sacrifice from the archaeological record is difficult, because we cannot determine with any certainty that the child was an orphan. However, ethnohistoric accounts among the Maya document that the sacrifice of orphans did occur (Tozzer 1941). Therefore, it is possible that at least some of the children found in sacrificial deposits may have been orphans. The sacrifice of children in caves and cenotes throughout the Maya area is one of the more documented sacrificial preferences. Archaeological evidence from sites such as Actun Tunichil Muknal (Gibbs 2000), Barton Creek Cave (Owens 2002, 2005), Naj Tunich (Brady 1989), Petroglyph Cave (ReentsBudet and MacLeod 1986), and MTC (Kieffer 2011) all have children deposited in wet watery contexts. These watery contexts have been argued by many archaeologists to be preferred sacrificial locations of sacrificial deposits based upon ethnohistoric accounts (Scott and Brady 2005).

The sacrifice of disabled individuals is something that has not been mentioned in the ethnohistoric, ethnographic, or iconographic literature within the Maya region. Part of the reason for this may be due to the fact that not all physical or mental disabilities are blatantly obvious at first. With the inclusion of these two cases of probable Klippel-Feil
from MTC, individuals chosen for sacrifice in Maya caves complete the theoretical predictions of who should be chosen for sacrifice.

## Klippel-Feil Syndrome

Klippel-Feil syndrome is a congenital condition caused by a genetic mutation that is characterized by the fusion of two or more vertebrae. The earliest recorded descriptions of abnormal cervical vertebrae were by Haller (1745) and Morgagni (1746), however it was not officially named until much later (Klippel and Feil, 1912). Originally, the abnormality was classified into three different types (Type I, Type II, and Type III), dependent upon the location and severity of the defect (Feil, 1919). Current medical literature has proposed clarification of these types with varying degrees of disagreement. Typically Type I Klippel-Feil is classified as a single segment fusion of C2 and C3. Type II Klippel-Feil syndrome and is distinguished from Type I by the fusion of more than two vertebrae in the cervical region. While Type III Klippel-Feil typically involves multiple vertebra segment fusions and is not necessarily limited to the cervical vertebrae. The rarity and difficulty in documenting cases of Klippel-Feil has caused the rate of incidence among modern populations to fluctuate between $0.0025 \%$ (Gonzalez-Reimers et al. 2001; Larson et al. 2001; Thomsen et al. 1997) and $0.5 \%$ (Clark et al. 1998), with the highest estimate of occurrence at $1 \%$ of births (Jones and Mayer 2000). Males and females are equally affected according to Gray et al (1964), while Gorlin et al. (1976) found 65\% of those affected to be women, and Helmi and Pruzansky (1980) found 57\% of those affected were female.

This condition results in a short neck, limited range of motion when the cervical vertebrae are affected, narrowing of the spinal cord and brain stem, and a variety of
associated abnormalities which impact the individual's comfort and longevity. There have been numerous cases of this rare spinal defect noted in the archaeological record. Klippel-Feil diagnoses have been made for a skeleton at a Neolithic sites in Vietnam (Oxenham et al. 2009), Japan (Fukashima 1988), Greece (Papathanasiou 2005). Numerous medieval and post medieval sites have documented this condition including a site in Portugal (Fernandes and Costa 2007), and two cases from St. Mary Spital, England (Walker 2012:14-15). Other cases of the syndrome in the old world include: a Magyar period individual from Austria (Pany and Teschler-Nicola 2007), a Middle Bronze Age individual from Syria (Ricaut, 2008), multiple individuals from El Hierro in the Canary Islands (Gonzalez-Reimers et al. 2001), and it is believed that Tutankhamun suffered from this syndrome (Boyer et al. 2003; Rosti 2013). In the Americas, multiple cases of Klippel-Feil syndrome have been recorded from the Southwest Pueblo period (Barnes 1994:69-72; Merbs and Euler 1985; Miles 1975; Wade 1981; Danforth et al. 1994). Documented Central and South American cases include a prehistoric case from the site of Poricarcancha, Peru (MacCurdy 1923; Jarcho 1965; Ortner and Putchar 1981:357), a prehispanic skeleton from Cholula, Mexico (Urunuela and Alvarez 1994), and one from the pre-Columbian site of Tancah, Quintana Roo, Mexico (Saul 1982).

There has been disagreement over the exact role genetic inheritance has played on the expression of the syndrome. Arguments have included the importance of recessive genes, dominant genes, and genetic mutation in the expression of Klippel-Feil (Da Silva 1982; McGanghran et al. 2003; Tracy et al. 2004; Charcón-Camacho et al. 2012). Ultimately, the heterogeneous genes of individuals with Klippel-Feil (in a few documented cases), small pedigrees, and wide degree of abnormalities limit the overall
understanding of genetic inheritance (Clark et al. 1996). The knowledge of how genetics played into the congenital inheritance of the syndrome caused Clark et al. (1998) to create a new classification system which includes a fourth type, while Larson et al. (2001) still employed the initial three types originally proposed by Feil (1919).

Commonly associated abnormalities range from physically visible abnormalities to more hidden defects. The physically apparent associated abnormalities can include: facial asymmetry, torticollis (webbing of the neck caused by prominent trapezium muscles); abnormal morphology in the hand, including the thumb; cleft palate; shortened neck and reduced mobility; quadriplegia; and Spengle's Deformity. The less visible abnormalities include: spina bifida; intravenous pyelography and renal abnormalities such as absence of kidneys, pyelonephritis of the kidney, renial ectopia; dermoid cysts, which can cause intracranial hypertension or compression of the cerebellum or brain stem; narrowing of the spinal canal secondary to hypermobility and osteoarthritic bone spurs; heart malformations, fused ribs and reduced vertebral disc space; respiratory problems and pulmonary hypertension; speech and hearing defects; and mental retardation (See Table 7.1 for rates and references for associated abnormalities). Hensinger et al. (1974) believe that these sometimes "hidden" abnormalities associated with the syndrome create a greater threat to the general wellbeing of the individual's life, more so than the deformity itself.

Many of these abnormalities associated with Klippel-Feil have high rates of incidence (Table 6.1), and the modern medical literature commonly documents individuals having multiple associated abnormalities. Some of these abnormalities include physical restrictions that range from invisible, but painful and/or tiring to more
obvious limitations making movement and interactions with others limited. While not all of these associated abnormalities leave physical traces on skeletal remains, many of these abnormalities may have labeled the individuals as social outcasts due to their differences.

| Associated Abnormalities | Rate of Incidence | Study Size | Publication |
| :---: | :---: | :---: | :---: |
| Spengel's Deformity | 42-79\% | 30 | Samartzis et al., 2007 |
|  | 30\% | 298 | Winter et al., 1984 |
|  | 20-42\% | 50 | Hensinger et al., 1974 |
|  | 20-30\% | Not Provided** | Tracey et al., 2004 |
|  | 23\% | 418** | Gray et al., 1967 |
| Speech and Hearing Defects | 16.87-71.4\% | 346** | Hemi and Pruzansky, 1980 |
|  | 30\% | 298 | Winter et al., 1984 |
|  | 30\% | 50 | Hensinger et al., 1974 |
|  | 30\% | Not Provided** | Tracey et al., 2004 |
|  |  | Three Case Studies | McLay and Maran, 1969; |
| Scoliosis | 70\% | 57 | Thomsen et al., 1997 |
|  | > $50 \%$ | Not Provided** | Tracey et al., 2004 |
|  | 50\% | 50 | Hensinger et al., 1974 |
|  | 25-60\% | 298 | Winter et al., 1984 |
|  | 35\% | 337* | Wynn-Davies, 1975 |
| Other Skeletal Deformities | 52\% | 418** | Gray et al., 1967 |
| Shortened Neck and Reduced Mobility | 52\% | 50 | Hensinger et al., 1974 |
|  | < $50 \%$ | Not Provided** | Tracey et al., 1967 |
|  |  | Case Study | Larson et al., 2001 |
|  | No Rate Given | Not Provided | Barnes, 1994 |
| Spina Bifida | 45.30\% | 418** | Gray et al., 1967 |
|  | 49.30\% | 337* | Wynne-Davies, 1975 |
|  | 45.30\% | 418** | Gray et al.,1964 |
|  |  | No Rate Given | Aufderheide and Rodriguez-Martin, 1998 |
| Deformed, Absent, or Fused Ribs | 33\% | Not Provided** | Tracey et al., 2004 |
|  | 30\% | 418** | Gray et al., 1967 |
|  | 15\% | Not Provided** | Tracey et al. 2004 |
| Intravenous Pyelography and Renal |  |  |  |
| Abnormalities | 30\% | 50 | Hensinger et al., 1974 |
|  | 30\% | 298 | Winter et al., 1984 |
|  |  | Two Case Studies | Ramsey and Blizmak, 1971; |
| Heart Malformations | 4-29\% | Not Provided** | Tracey et al., 2004 |
|  | 14\% | 298 | Winter et al., 1984 |
|  | 8.75\% | 346** | Hemi and Pruzansky, 1980 |
|  | 14\% | 50 | Hensinger et al., 1974 |
|  | No Rate Given | Not Provided | Barnes, 1994 |
| Facial Asymmetry, Torticollis | 20-26\% | 50 | Hensinger et al., 1974 |
| Muscular Atrophy, Flacid Paralysis, |  |  |  |
| Cleft Palate | 15-16.88\% | 346** | Helmi and Pruzansky, 1980 |
| Dermoid Cysts |  | Seven Case Studies | Gonzalez-Darder et al., 2002 |
| Mental Retardation |  | Two Case Studies | Peters, 1962 |
|  |  | Three Case Studies | McLay and Maran, 1969 |
|  | 8.75\% | 346** | Hemi and Pruzansky, 1980 |
| Spinal Canal Narrowing |  | Case Study | Gunderson et al., 1967 |
|  |  | Case Study | Michie and Clark, 1968 |
| Abnormal Hand Morphology |  | Case Study | Larson et al., 2001 |
| Quadriplegia |  | Case Study | Michie and Clark, 1968 |
|  |  | Case Study | Elster, 1984 |
| Reduced Disk Space | No Rate Given | Not Provided | Barnes, 1994 |
| Respiratory Problems and Pulmonary Hypertension |  | Case Study | Suga et al., 1999 |

*Study includes other causes of congenital vertebra abnormalities. The number of Klippel-Feil cases within the study was not given.
** Included previously published cases.
Table 6.1 Types of abnormalities and rate of incidence associated with Klippel-Feil
syndrome.

Midnight Terror Cave (MTC), Belize
The site of MTC is a multi-level cave covering an area more than 200 meters long by 50 meters wide in the karstic Roaring Creek Valley near the village of Springfield in the Cayo District of Belize. The site was discovered in 2006 and received immediate attention from the Institute of Archaeology due to its large numbers of human remains. Fieldwork was conducted by the Western Belize Regional Cave Survey Project and California State University, Los Angeles, between 2008 and 2010, with detailed mapping, descriptive analysis of space utilization and surface collection of artifacts and skeletal material. Operation, Lot, and Sublot designations were used for the purpose of maintaining spatial provenience of artifacts and skeletal material. The cave was divided into a total of eight Operations, which correspond to the cave's chambers. Lot designations were numerically assigned as needed within each Operation. Typically rooms and space bound by boulders or large formations were given discrete Lot numbers within an Operation.

Reconnaissance by the Caves Branch Archaeological Survey discovered the surface site of Tipan Chen Uitz approximately 1000 meters from MTC in 2009. Archaeological investigations at the site of Tipan Chen Uitz indicate that it dates to the Late to Terminal Classic, based on ceramics, architectural features, and a stela date of AD 711 (Andres et al. 2014). The site of Tipan Chen Uitz is associated with more than 20 caves and numerous rockshelters, many of which contain abundant ceramics and skeletal remains that have been interpreted as cemetery burials (Glassman and Bonor 2005; Wrobel et. al In Press).

The skeletal collection at MTC has produced the largest skeletal collection of any cave in the area, with at least 118 individuals recovered from 37 isolated, commingled surface deposits. These deposits lacked traditional grave goods other than a few items of personal adornment. Many of these skeletal deposits are spatially associated with areas of large scale modification such as trails, plazas, and leveled surfaces, which suggest the remains may have been involved in public ritual acts (Brady and Kieffer 2011, 2012; Tiesler 2007). Perimortem cut marks, sharp force trauma, and blunt force trauma have been recorded on at least 28 bones from 12 commingled deposits throughout the cave, representing a minimum of at least 16 individuals. These cut marks have been noted on the ends of long bones, with only one cut mark on a sternum and two on cranial bones. According to Tiesler (2007), these locations of cut marks are consistent with likely markers of heart extraction, flaying, and defleshing which typically occurs with ritual human sacrifice.

There is not enough trauma to prove that all individuals at the site died of sacrifice. Similarly, not every context exhibits multiple traits of sacrificial. One deposit in the twilight of the cave even suggests the possibility of mixed mortuary use due to the secondary placement of two individuals (Kieffer 2011). However, the demographic data indicates the assemblage is mostly sacrificial. The local cave and rockshelter sites interpreted as cemeteries have J-shaped mortality curves which are the typical distribution for "normal" mortuary patterns (Wrobel et al. 2014; Chamberlain 2006; Weiss 1973). Rather than displaying a J-shaped mortuary distribution, MTC has an irregular distribution of ages with a noticeable peak of children ages five to nine years old and predominately young adults (Figure 6.1). This pattern is an expected pattern in post-
sacrificial deposits (Tiesler 2007), that has been documented ethnographically (Tozzer 1941) and archaeologically at the Sacred Cenote at Chichén Itzá (De Anda Alanís 2007).


Figure 6.1 Demographic age and sex distribution for the skeletal assemblage from Midnight Terror Cave, Belize that highly suggests sacrifice.

## Material and Methods

Prior to removal from the cave, all bones were photographed in situ and detailed descriptions of the context were made. Due to the commingled nature of the deposits,
every bone was analyzed and photographed, and pertinent metric and morphological descriptions that could aid in age and sex estimation based on standard bioarchaeological and forensic anthropology methods were recorded. The technique for age or sex determination varied from deposit to deposit depending on preservation and elements present. This information was then put into a spreadsheet to aid in determining minimum number of individuals (MNI) for every discrete deposit within the cave, determine if there was any movement of skeletal material between deposits, and determine how that then changed MNI counts for discrete deposits. Minimum number of individuals was determined by standard techniques of sorting elements by side, size, and pairing. All radiocarbon dates were provided by University of Georgia's Center for Applied Isotope Studies.

Operation VIII Lot 13
One individual with skeletal indications of possible Klippel-Feil was recovered from the surface of Operation VIII Lot 13, an alcove that measures 1.24 meters wide, 2.37 meters high, and extended in 1.87 meters. The walls of this lot are covered by previously active cave formations. Much of the bone had been crushed into powder and thus could not be removed. No grave goods were associated with these individuals. Due to the preservation conditions in this area only 562 of the 795 skeletal elements recovered from this deposit were identifiable. Much of the material included unidentifiable shaft fragments and cranial elements. The recovery of smaller skeletal elements suggests the minimum of eight individuals in this deposit may have been primary deposits. With the exception of the inner ear ossicles and some of the carpals and tarsals, every bone of the skeleton was represented in the deposit with varying levels of preservation..

## Operation VI Lot 2B

The other individual with possible Klippel-Feil was recovered from the surface of Operation VI Lot 2B, an alcove located along the cave's main trail along the southern portion of the western cave wall. This alcove measures one meter wide east to west and 2.3 meters north to south with a height of approximately three meters. Flowstone curtains within this area have evidence of breakage, and much of the western wall near a natural ledge along the alcove wall was fire blackened, indicating ritual activity. Almost 520 bone fragments were recovered from the sublots of Operation VI Lot 2. Similar to the previously mentioned deposit, almost every bone from the skeleton was represented with the exception of the inner ear ossicles and some of the carpals and tarsals. However, the better preservation in this area did allow for a higher percentage of skeletal recovery within this deposit.

## Results

## Operation VIII Lot 13

At least five adults were present based upon number and sides of elements; however, sex for only one adult male could be estimated based upon distal morphology of the humerus. Lack of severe indications of degenerative disease suggests that all of these individuals were probably young adults. At least two subadults are present in this deposit that lacked grave goods. Dental development for one subadult indicates an individual six to seven years of age $+/-24$ months. This is supported by the stage of development for neural arch fragments in the deposit. The presence of a perinate is also
indicated in this deposit based upon os coxa fragments, a clavicle, and neural arch development.

One of the adults in this lot exhibited signs of Klippel-Feil. Initially this individual's second and third cervical vertebrae were found as two separate fragments that had been broken post-mortem (VIII-13-363 and VIII-13-367). Initial investigation of the body fragment suggested that calcium carbonate from the cave had caused the two bones to adhere to each other in anatomical position due to a lack of spondylophytes and arthritic lipping along the bodies' margins. However, the irregular morphology of the fragment with the laminae and spinous processes made it apparent that the vertebrae were conjoined (Figure 6.2). The fusion of the two bones was complete including full articulation of the laminae and the bodies. Differential diagnosis ruled out the probability of trauma and stress as causes for this fusion due to no indication of vertebral body crushing. Lack of hypertrophic bone formation on any of the vertebrae in the deposit indicates that diffuse idiopathic skeletal hyperostosis (DISH) was unlikely. The only indications for arthritis in the entire deposit included slight lipping on a first proximal pedal phalanx, two lumbar vertebrae, and three unidentified vertebral body fragments. No vertebral wedging consistent with scoliosis was notable, albeit some of the vertebrae were fragmentary and incomplete. No morphological changes were noticed on the fragments of ribs that were recovered from the deposit. Only one sacral vertebra fragment was recovered from this deposit, but it was not complete enough to determine the presence or absence of any indication of spina bifida.


Figure 6.2 Fused second and third vertebrae from an individual recovered from Operation VIII Lot 13.

Radiocarbon dating performed on an adult femur fragment in this comingled deposit produced a date of $670 \pm 20$ years AD, during the Maya Late Classic (A.D. 600800). Due to the commingled remains in this deposit, it cannot be definitively determined if this date is a direct date for the person with probable Klippel-Feil, rather it does suggest a possible time period for the deposit.

## Operation VI Lot 2B

An adult and juvenile were distributed throughout five sublots in Lot 2, with the bulk of the skeletal material recovered from sublot B. The juvenile in the deposit was approximately five to six years of age based upon the stage of fusion for the thoracic vertebrae and the size of the long bones present in the deposit. This juvenile had perimortem cut marks present on one of his or her humeral fragments consistent with other post-mortem sacrificial body treatment documented at Chichén Itzá (De Anda, 2007), further indicating a sacrificial context.

The adult appears to be a primary deposition based on the quantity and type of material recovered. Metric analysis of a femur diameter and scapular glenoid height produced inconclusive identification of sex. However the chin and mastoid process morphology indicates a probable male. The complete, circumferential fused second and third cervical vertebrae (VI-2B-118) (Figure 6.3) and the unfused laminae of the sacrum indicative of spina bifida occulta, suggest this individual probably suffered from Type 1 Klippel-Feil syndrome based on the single fused segment in the cervical region (Samartzis et al., 2006). Additional abnormalities included supernumerary incisors and slight porosity consistent with porotic hyperostosis throughout the frontal, parietal, and occipital bones. A radiocarbon date of $690 \pm 20$ years AD obtained from this individual's ulna indicates the individual died during the Maya Late Classic.


Figure 6.3 Fused second and third vertebrae from an individual recovered from Operation VI Lot 2.

Differential diagnosis of this individual ruled out any indication of associated trauma to the vertebrae. A probable thoracic vertebral fragment with a possible Schmorl's node, suggestive of osteoarthritis, was recovered from the deposit. However, the documentation of this Schmorl's node is not conclusive due to the poor preservation of the thoracic vertebra. Slight lipping of the inferior articular facets of the second cervical vertebra was noted. Such lipping is typically consistent with osteoarthritis, a condition
known to be associated with Klippel-Feil (Gunderson et al. 1967). However, lack of erosion and eburnation of the facets, as well as an absence of morphological changes to more commonly affected bones ruled out the possibility of rheumatoid arthritis. No hypertrophic bone formation was noted along the vertebral bodies which would be suggestive of DISH. There was no visible disk space between the bodies, mineralization of connective tissues, or noticeable bone porosity which would be consistent with ankylosing spondylitis. No osteophyte formation was noted along the body of the vertebrae, suggesting the possible arthritis was mild and localized. The only other indication of arthritis was noted on the margin of the glenoid fossa on the right scapula. Similar to the previous individuals, no vertebral wedging consistent with scoliosis was notable on any of the fragmentary or complete vertebrae. Also, no morphological changes were recorded from the rib fragments recovered from the deposit.

## Discussion

Preservation conditions at the site of MTC were less than ideal, and incomplete recovery of these fragmentary remains occurred. However, in both instances, there is a clear fusion of the second and third cervical vertebrae. For the adult found in Operation VIII Lot 13, enough skeletal material was recovered from both deposits in question to perform a differential diagnosis that ruled out other conditions such as trauma, DISH, and ankylosing spondylitis. This suggests that the defect may have been in utero and/or genetic in origin. Incomplete recovery of the individual's vertebrae recovered from Operation VI Lot 2B prevents a more conclusive differential diagnosis. Even if the lipping documented on the available vertebrae from this context is due to arthritis, the
individual may have acquired the arthritis from everyday movements that were done to compensate for the lack of mobility between the first and second vertebrae.

If these two individuals did in fact suffer from Klippel-Feil syndrome, it is possible that they were genetically related given the inheritance of the syndrome. More importantly, they likely suffered from one or more of the other associated abnormalities discussed above due to the high rates of incidence these abnormalities have in modern populations. Such physical handicaps may have limited their ability to be productive members of their community. Based upon Girard's theories about sacrifice, these individuals may have been construed as social outsiders due to their difference. The probability these two individuals were related, may have increased the likelihood that one would be labeled a social outsider shortly after the other on the basis of familial ties. If they could easily be labeled as social outsiders when times were hard, this social status and some of the commonly associated abnormalities would have allowed these individuals to become easy targets of violence. However, it is important to note that most of the individuals recovered from the site appear healthy; indicating that numerous factors may have been taken into account when sacrifices were chosen.

## Conclusion

Many theories of ritual and sacrifice are based off of cross-cultural research and data collection. This is done so that theories will encompass a wide spectrum of human behavior. While not all societies fit perfectly into these theoretical assumptions, it appears that this is a case where the Maya do fall within expected patterns. In the case of the two individuals with probable Klippel-Feil from MTC, the social implications of their
physical disability in life may have dictated their ultimate treatment when it came time for them to die. Given the overall assemblage at MTC highly suggests large scale sacrifice; these two individuals could be the first indication of physically handicapped individuals chosen for sacrifice within a Maya cave. Such biased treatment of social outsiders is expected given expectations set forth in ritual theory and what is known about Maya sacrifice practices. While individuals chosen for sacrifice in caves may encompasses a wide variety of individuals, they do not vary much from what would otherwise be considered the "norm" of preferred victims for human sacrifice crossculturally based upon Girard's model.

This article aimed to connect the physical condition of two ancient Maya individuals who suffered from Klippel-Feil syndrome with how they may have been treated differently, excluded from society, and ultimately documenting a condition that may have led to them being chosen for ritual sacrifice. Only one archaeological case of Klippel-Feil documents the type of care the individual probably received directly due to their syndrome. In this instance a young adult male discovered in Vietnam was probably quadriplegic due to his advanced Type III Klippel-Feil (Oxenham et al. 2009). Further evidence from his skeleton suggested that the individual was left incapacitated for the last decade of his life, completely relying on the welfare of others to feed and bathe him.

Documenting these social implications of treatment, good or bad, with pathological abnormalities or diseases should ultimately be included whenever possible with reconstructions of paleopathological conditions of prehistoric populations. Fay (2006: 192) points out that "palaeopathologists en masse have not addressed how disease as a conceptual structure was understood in the past, seemingly preferring a narrative
grounded in present, biomedical paradigms." These types of considerations are just beginning to be discussed in the paleopathological literature, with the most notable interpretations of societal treatments based upon illness made by Marsteller et al. (2011) and Oxenham et al. (2009). The social perspectives of a condition can change through time (Cross 2007). However, before we can begin to understand if change occurred, we first must fully document the contexts individuals are found in and discuss the social implications that they suggest. When these types of social implications are included, we can connect the more physical anthropological and biological aspects of human life with the more cultural and social aspects of humanity. This detailed documentation may eventually give us an understanding for how specific cultures may have viewed particular abnormities or diseases. Eventually, this will allow for cross-cultural comparisons for how different cultures cared for different medical conditions.

# CHAPTER 7 THE DEMOGRAPHY OF SACRIFICE: COMPARISONS OF OBSERVED AGE-AT-DEATH ASSEMBLAGES FROM THE ANCIENT MAYA SITES OF MIDNIGHT TERROR CAVE (BELIZE) AND CHICHÉN ITZÁ (MEXICO) TO A REFERENCE HORTICULTURALIST MORTALITY SCHEDULE. 

(Chapter originally co-authored with Dr. Jack Baker, originally intended for peerreviewed publication and updated here with co-author's permission. )


#### Abstract

This chapter examines age-at-death profiles of ancient Maya mortuary assemblages from the sites of Midnight Terror Cave (MTC), Belize and Chichén Itzá (CI), Mexico; two sites where evidence strongly suggests that human sacrifice was the driving formational force. Statistical comparisons to a model life table for traditional horticulturalist populations further strengthen the conclusion that these skeletal deposit did not accumulated due to a normal mortality process. This comparison includes a novel approach to the consideration of preservation bias in which a Monte Carlo model of this bias is incorporated into comparisons of the observed age-at-death distribution to that which would be expected based on the model horticulturalist life-table. At low levels of modeled bias ( $5^{\text {th }}$ percentile), neither MTC nor CI assemblages could be distinguished from the reference mortality model; however, at average to higher levels of modeled bias ( $50^{\text {th }}$ and $95^{\text {th }}$ percentiles), both populations clearly differ from the reference model in one or more age intervals. After accounting for preservation bias, the findings suggest that neither the MTC nor CI assemblages were likely to have accumulated due to a normal mortality regime experienced within traditional horticulturalist populations.


## Introduction

This chapter compares the age-at-death distribution of two Maya mortuary assemblages (Midnight Terror Cave, Belize and Chichén Itzá, Mexico) to the distribution that would be anticipated under a model life-table of horticulturalist mortality published by Gurven and Kaplan (2007). Previous examinations of the Midnight Terror Cave (MTC) site have concluded that there is strong archaeological evidence suggesting that the assemblage accumulated due to cultural practices associated with human sacrifice (Kieffer 2011, 2015). The assemblage associated with Chichén Itzá's (CI) Sacred Cenote is also widely considered to have accumulated in conjunction with human sacrifice practices (Tozzer 1941; Tiesler 2005; de Anda Alanís 2007). In spite of the strength of these lines of evidence, no analysis to date has ruled out the possibility that either site accumulated due to a typical mortality regime associated with horticulturalist populations. Lohse et al. $(2006,2010)$ have reviewed evidence supporting the idea that the Maya living in the periods during which these two assemblages accumulated made their living via horticulture. This suggests that the model life table of Gurven and Kaplan (2007) may be used to as a reference mortality schedule, which rules out the likelihood that these assemblages accumulated as the result of a natural mortality process. This comparison forms the basis of this chapter.

To accomplish this aim, this discussion focuses not on the mortality process itself; rather, it models the relationship of the age-at-death distribution observed in both assemblages to an expected one under the null model of Gurven and Kaplan (2007). There are several reasons why we focus upon the age-at death distribution instead of
seeking to describe mortality processes from these bioarchaeological assemblages. The limitations of mortuary assemblages from archaeological sites are well-known (Wood et al. 1992), and the focus on age-at-death has been recommended by previous researchers (Paine 1989; Milner et al.1989; Wood 2002). Significant biases may exist in mortuary assemblages. These may be due to unanticipated disasters such as epidemics, warfare, and human sacrifice (Chamberlain 2006) or they may accumulate via taphonomic processes related to culturally-specific mortuary practices (Scrimshaw 1984; Saunders et al., 1992), soil conditions (Gordon and Buikstra 1981; Haglund and Sorg 1997, 2002), or even as artifacts of excavation methods (Paine and Harpending 1998). For all of these reasons, bioarchaeologists have long been suspicious of the assumption that mortuary assemblages directly represent mortality processes (Angel 1969 Weiss 1973; BocquetAppel and Massett 1982). McCaa (2002:102) goes as far as to call this idea the "Whopper Assumption." While it is clear that mortuary assemblages do not directly reflect mortality, they provide direct data in the form of an age-at-death distribution that is related to the underlying mortality process that interacts with all of the factors listed above (Milner et al. 1989; Paine 1989; Wood et al. 1992; Wood 2002).

In light of these challenges, bioarchaeologists and paleodemographers have often resorted to using model life tables-reference mortality schedules thought to reflect the population for which only incomplete data are available (Coale and Demeny, 1966; Shyrock et. al., 1980)-to correct for deficiencies in bioarchaeological data (BocquetAppel and Massett 1982; Preston et al. 1994; Paine and Harpending 1996; Milner et al. 1989; Paine 1989). This is a common tool in the analysis of contemporary population dynamics with incomplete data (Coale and Demeny 1966; Shyrock et al. 1980; Howell,
1976); however, it must be acknowledged that this approach makes important assumptions about demographic non-stationarity, differences in frailty across subsets of the population, and the role of selective mortality (Wood et al. 1992; Howell 1976; Brass 1960; Preston et al. 1994). Unfortunately, these assumptions are not always acknowledged within a given analysis (Keckler 1997; Hill and Hurtado 1996). Perhaps the strongest assumptions associated with such an approach revolve around the influence, (or lack thereof) of fertility on age-distributions. Fertility shifts induce differences in population age structure much more quickly than mortality (Coale 1957, 1972; Coale and Trussell 1974; Keyfitz and Caswell 2005; Preston et al. 2001) and can have a reverberating impact on mortuary assemblages sampled from populations experiencing such transient population dynamics (Milner et al. 1989; Paine 1989; McCaa 2002). If a specific skeletal assemblage is drawn over a short period of time during which assumptions of population stationarity are untenable due to rapid shifts induced via fertility, then it may be argued that observed age-at-death distributions may tell us much more about fertility than the mortality processes that we wish to measure and make inferences about (Johanson and Horowitz 1986; Sattenspiel and Harpending 1983; Wood et al. 1992; McCaa 2002). Methods of statistical "pattern-fitting" based on maximum likelihood have much to offer in improving the match of mortuary assemblages to reference mortality schedules (Milner et al. 1989; Paine 1989); however, these methods are subject to the same inherent limitations. Our fundamental inability to observe and describe known biasing processes associated with archaeological mortuary assemblage formation places intractable limits on the analysis of these datasets. Often, methods of choosing a best-fitting model life-table degenerates to a problem of choosing between a
number of acceptable candidates with no compelling scientific reason to prefer one over the other (Coale and Demeny 1966; Howell 1976; Hill and Hurtado 1996; Keckler 1997). In this chapter, these challenges will be addressed in two specific ways. First, instead of seeking to match observed age-at-death distributions to "one of many" potential reference mortality models that may or may not reflect the population of interest, we take the opposite approach and choose a scientifically appropriate model lifetable upon which to base our analysis (Brault and Caswell 1993; Howell 1976). As described briefly above, this analysis employs the reference horticulturalist mortality schedule provided by Gurven and Kaplan (2007) as an appropriate model life-table for the horticulturalist Maya from which our assemblages were drawn (Lohse et al. 2006, 2010). The Gurven and Kaplan (2007) reference model was based on a comprehensive review of available mortality schedules for small scale horticulturalists and was fit as a reference mortality curve to these data based on the Siler model of mortality (Siler 1979; 1983). The Siler model enjoys high plausibility in capturing biological processes relevant to the human life-course (Siler 1979, 1983; Gurven and Kaplan 2007) and as such has been argued to be a model of choice for analyzing mortality in traditional, deceased populations studied by anthropologists (Gage and Dyke 1986; Wood et al. 2002). This choice of reference model greatly enhances the scientific utility of our analysis over search methods based on pattern-matching (Milner et al. 1989; Paine 1989), regressionbased choices based on similarity of imagined mortality and fertility schedules (Bogue and Palmore 1974; Coale and Demeny 1966; Coale and Trussell 1974; Howell 1976; Hill and Hurtado 1996; Keckler 1997), or simple "best-guess" estimates (McCaa 2002). Here, rather than focus on matching our data to a reference standard, we persistently adhere to
the question of whether the observed age-at-death distribution observed in the MTC and CI assemblages could have been produced by random sampling of persons experiencing our best estimate of "reference" mortality in horticulturalist populations.

To strengthen the comparisons, the issue of preservation/observation bias described above is directly addressed. This is accomplish through the employment of a Monte Carlo model, based on the consensus expert opinion of several practicing bioarchaeologists (personal communications Heather Edgar, Anna Medendorp, and Kate Rusk 2012), a paleodemographer (personal communication Jack Baker 2012), and my own experience in the Maya area about the likely level of age-specific bias might be found in these assemblages. These estimates are open to modification - which is one strength of this approach. The approach grows out of the work of Saunders et al. (1992, 2002), who treat observability bias as proportional to the observed age-at-death counts and measure ratios of observed cemetery populations to a corresponding registry system provided through parish records. This idea may be extended directly through the theory of Horvitz-Thompson estimators in the field of statistical sampling (Horvitz and Thompson 1952; Longford 2005). It provides a logical and mathematical basis for upweighting observations according to a Monte Carlo model that treats age-specific patterns of bias as Bernoulli random variables ranging from zero to one and characterized by parameters of mean and variance (Taylor and Karlin 2001). As such, we may utilize random resampling of a binomial probability process to generate distributions of bias estimates that may be used to get $5^{\text {th, }} 50^{\text {th }}$, and $95^{\text {th }}$ percentile levels of bias adjustments and make appropriate statistical comparisons between the null model of mortality and a range of plausible bias-corrected age-at-death counts (Graham and Talay 2013; LeMieux

2009; Longford 2005). The approach allows for direct assessment of how much bias must be present in our age-at-death estimates in order to invalidate a statistical test of differences in age-at-death distributions between the Gurven-Kaplan reference mortality model and that observed in our study assemblages.

While careful attention to methods in order to strengthen inferences has been made, the goal of this chapter is not to establish new methods in bioarchaeology or paleodemography. Rather, the goal is to examine the important question of whether the MTC and CI assemblages could have accumulated due to natural processes instead of cultural practices associated with human sacrifice among the ancient Maya. The results of this chapter, therefore, address both a specific and important question in the anthropological sciences while providing a simple, repeatable methodological alternative that could be adapted to similar studies in other settings.

## Ethnographic and Archaeological Background

## Mortuary Rituals in Maya Karst Features

Throughout the Maya culture area in Central America, there were a variety of preColumbian mortuary practices that occurred in caves and karst features. Due to the diverse post-mortem mortuary treatments that occur in these features, bioarchaeologists working in the area currently rely heavily upon contextualization of the skeletal material in order to interpret skeletal assemblages. In addition to utilizing ethnographic and ethnohistoric analogy to interpret cave contexts, indicators have been established that aid bioarchaeologists working in the region to determine funerary from non-funerary contexts. These indicators include: biographical profile of the individuals, form of death,
predepositional body treatment, primary vs. secondary deposition, and postdepositional manipulation (Tiesler 2007:22).

Both primary and secondary burials have been recorded in Maya caves. Examples of isolated or a limited number of secondary burials have been noted at cave sites in Guatemala and the Yucatán (Ruz Lhuillier 1965). However, the use of caves as ossuaries or places to store cremation assemblages was not a wide spread practice. This phenomenon is primarily restricted temporally to the Postclassic (AD 1000-1675) and spatially to the southern periphery of the Maya area in Honduras and western periphery in Chiapas, Mexico (Ricketson 1925:392; Blom 1954; Ruz Lhuillier 1968:165). Furthermore, this type of secondary cave burial was suggested by many to be a practice reserved for the elite (Dahlgren de Jordan 1966; Moser 1975). The mortuary practice of primary cave burial also appears to have been restricted to the elite, as indicated by the appropriation of caves for masonry tombs and elaborate elite burials that are documented throughout Guatemala and Mexico (Thompson 1938; Burgoa 1934; Dahlgren de Jordan 1966; Moser 1975, 1976; Brady 1989:348; Kieffer 2009). Primary and secondary Maya commoner burials appear to be restricted to house mounds (Rathje 1970) and rock shelters - which differ from caves due to their inherent lack of a dark zone (Bonor 1995; Bonor and Martínez Klemm 1995; Prufer 2002; Saul et al. 2005; Glassman and Bonor Villarejo 2005). These "dark zone" spaces are defined as any area of a cave in which one cannot see your hand in front of your face without assistance from a light source.

The dark zone of caves in the Southern Lowlands and Peten were commonly used for sacrifice (Scott and Brady 2005; Gibbs 2000; Moyes and Gibbs 2000; Owen 2005; Saldana and Kieffer 2009). There are a number of Maya cave sites that have been
interpreted as including sacrificed individuals due to surface skeletal deposits located on the cave floor, commingled, with evidence of trauma, and/or within watery features (Pendergast 1971; Reents-Budet MacLeod 1986; Brady 1989; Gibbs 2000; Scott and Brady 2005; Woodfill 2007). These watery contexts have been proposed as places of sacrifices to the Maya rain gods based upon ethnographic and ethnohistoric analogy (Scott and Brady 2005). Based on this criteria, skeletal material in the sites of Eduardo Quiroz Cave (Pendergast 1971), Naj Tunich (Brady 1989), Petroglyph Cave (ReentsBudet MacLeod 1986), Actun Tunichil Muknal (Gibbs 2000), Cueva de Sangre (Scott and Brady 2005), La Iluminada and Hun Nal Ye (Woodfill 2007) have been interpreted as sacrifices. However, many of these sites only have a few individuals, which makes any statistical comparison to them difficult if not impossible.

## The Site of MTC

The site of MTC is located in the Roaring Creek Valley in western Belize. This karstic region is well known for a variety of inhumation practices in caves and rock shelters by the ancient Maya from the Preclassic to the Terminal Classic. The cave is associated with the mid-sized surface site of Tipan Chen Uitz, which has two causeways extending out to the smaller satellite sites of Cahal Uitz Na and Yaxbe, indicating that Tipan Chen Uitz is the largest site in the area (Andres et al. 2011). Due to the large-scale modification of MTC and associated surface architecture, it seems highly plausible that the elite at Tipan Chen Uitz appropriated utilization of MTC.

The osteological analysis I conducted on skeletal material from the site indicates numerous types of perimortem trauma, including puncture wounds, blunt force, sharp
force, and defensive wounds. The vast majority of the individuals were found commingled on the surface in the dark zones of the cave, lacking grave goods, and recovered from watery contexts. All of which is suggestive of a sacrificial assemblage. To date, three individuals from the site have been radiocarbon dated to $700-750 \mathrm{cal} . \mathrm{AD}^{1}$, $670 \pm 20$ years AD (UGAMS \#16771, MTC VIII 13-168), and $690 \pm 20$ years AD (UGAMS\#16770, MTC VI 23-140), which corresponds to the Maya Late Classic (A.D. 600-800) (Kieffer 2015). However, the ceramic assemblage for the cave site suggests the peak utilization of the cave occurred during the Late and Terminal Classic (800-1000 AD) (Scott 2011), which corresponds to a period of major climatic instability in the region (Gill 2000; Haug et al. 2003; Hodell et al. 1995, 2001; Kennett et al. 2012; Medina-Elizalde et al. 2010, 2012).

## The Site of Chichén Itzá

The Cenote Saratoga (also known as the Cenote of Sacrifice and Sacred Well) is located in the Yucatán at the site of Chichén Itzá. This Maya site was occupied from the Late Classic (600-900 AD) into the Postclassic (900-1200 AD), with continued pilgrimage to the cenote during the time of the Spanish conquest (Landa 1937:90). One unique aspect of this site, which makes it an ideal example for the expected demography of sacrifice, is the ethnohistoric literature that documents sacrifice occurring there (Tozzer 1941). In addition to this, the architectural art throughout the site displays an emphasis on vivid imagery of sacrifice and death (Miller 2007:183).

[^0]Much of the material, including human skeletal remains, removed from the cenote was dredged up by Edward H. Thompson between 1904 and 1910 (Coggins 1992). Numerous studies of Chichén Itzá's Sacred Cenote mortuary assemblage have revealed high percentages of infants and men recovered at the site (Hooton 1940; Saul and Saul 1989; Tiesler 2005; de Anda Alanís 2007). Of the remains studied, numerous instances of various cut marks, charring, defleshing, and dismemberment were used to sacrifice individuals or alter their remains shortly after death (de Anda Alanís 2007:205). In a recent re-examination of the skeletal assemblage recovered from the site, at least 127 individuals were recovered; 88 (over $69 \%$ ) were children or juveniles under 18 years of age (de Anda Alanís 2007:193). Unfortunately, this data set could not be used in this study because the age distribution developed in de Anda Alanis' reanalysis has yet to be published. Therefore the original analysis conducted by Hooton (1940) was used as the data set in this study.

## Methods

## Methods for Age Estimation

Due to the commingled nature of the human remains recovered from MTC, each bone was analyzed, photographed, catalogued, and pertinent measurements or morphological descriptions recorded using standard bioarchaeological and forensic anthropological techniques (i.e. Buikstra and Ubelaker 1994; Moore-Jansen et al. 1994) (see Appendices A and B). Preservation bias and looting at the site limited the ability to create age estimations for every skeleton based on metric and morphological traits on the pelvis (Todd 1920; Brooks 1955; Lovejoy et al. 1985; Brooks and Suchey 1990), skull
(Masset 1989), and dentition (Hillson 1996; Ubelaker 1999). Similarly, due to absence of some skeletal elements, no one method could be used consistently across the assemblage to create age estimates. So, whenever possible, stage of epiphyseal fusion and bone lengths or other pertinent metric analysis of individual bones were recorded along with corresponding age range estimates based upon Bass (1995), Baker et al. (2005), Schaefer et al. (2008), and White et al. (1999, 2011). Similarly, any degenerative bone changes such as arthritis, wear, and bone resorption were noted when present and factored into age determination. Because many age estimation techniques are based on modern European skeleton assemblages rather than pre-contact indigenous Americans, care was taken to note any possible overlap of age ranges for different age estimation techniques derived from different skeletal elements within a deposit so that an individual would not be counted more than once within a deposit.

The minimum number of individuals was calculated based upon standard bioarchaeological methods, which rely on knowing the quantity and size of the same sided elements as well as any pertinent age and sex information (White et al. 1999, 2011). Minimum number of individuals was calculated numerous times due to the possibility of skeletal material being moved from one deposit to another or even completely removed from the cave due to looting, prehistoric reuse, or natural processes. First MNI was calculated at the sublot level (typically an arbitrary spatial area), then at the lot level (typically a room or alcove within a larger chamber), next at the operation level (cave chamber), and finally at the level of the entire cave site. This method made it possible to see the movement of certain skeletal element between sublots and lots. At MTC at least 118 individuals were recorded, a majority were young adults and subadults between five
and twelve years of age (Figure 7.1) (Kieffer 2015). This demographic distribution is similar to other Maya sacrificial deposits, which consist of predominantly infants, adolescents, and young adult males (Tiesler 2007).

Current bioarchaeolgical standards did not exist when Hooton (1940) conducted his analysis. His report does not explicitly indicate which skeletal elements were used to determine age of individuals; however, the report focuses heavily on skulls and pelves in discussion of age and sex of the individuals from CI.


Figure 7.1. Age distribution based upon the osteological analysis of Midnight Terror Cave material removed from the cave and analyzed in situ prior to rectangular proration.

## Age Adjustments and Sample Characteristics

Methods for assigning ages to skeletal remains are not without uncertainties (Sattenspiel and Harpending 1983; Saunders et al. 1991, 2002; Bass 1995) and often this
results in interval-based estimates of age for individual remains. Since demographic analyses of mortality are facilitated by assignment of individuals to more fine-grained groupings, such as five-year age intervals, data utilized in this analysis were subjected to the method of rectangular proration (Brass 1960; Shyrock et al. 1980). Rectangular proration is built upon the assumption of rectangularity, which assumes that within a fiveyear age group, every year has equal proportional distribution (Shyrock et al. 1980). In this analysis, rectangular proration was utilized to assign individuals to five year age categories from more coarse-grained ones, and the summarized counts of deaths by age utilized in the remainder of the analysis. The resulting "observed" death counts for both the MTC and CI assemblages are reported in Table 7.1.

| Age | Midnight Terror <br> Cave | Chichén Itzá |
| :---: | :---: | :---: |
| 0 to 1 | 6 | 7 |
| 2 to 4 | 18 | 7 |
| 5 to 9 | 17 | 2 |
| 10 to 14 | 5 | 8 |
| 15 to 19 | 3 | 5 |
| 20 to 24 | 15 | 2 |
| 25 to 29 | 12 | 2 |
| 30 to 34 | 12 | 2 |
| 35 to 39 | 4 | 2 |
| 40 to 44 | 4 | 2 |
| 45 to 49 | 4 | 2 |
| $50+$ |  | 2 |

Table 7.1. Age-adjusted datasets post rectangular proration utilized in this analysis.

## A Horticulturalist Model Life Table Using the Siler Competing Hazards Method

The Siler model is a competing hazards approach to life-table estimation, with each individual potentially dying from forces associated with infant mortality, initial adult mortality, and shifts in the force of mortality as senescence occurs (Siler 1979, 1983). In formulaic terms, the Siler model formulates the force of mortality as:

$$
\mu(a)=\alpha_{1} e^{-\beta_{1} \alpha}+\alpha_{2}+\alpha_{2} e^{\beta_{3} \alpha}
$$

Here, $\beta_{1}$ represents the rate of decline in early mortality with age, associated with the parameter $\alpha_{1}$, which represents the force of mortality associated with neonatal life together this represents a term that reflects early-life mortality risk that is decelerating with age (Siler 1979, 1983). The second term parameter $\alpha_{2}$ reflects a constant force of mortality across the life span (Makeham 1860). The third term-- $\alpha_{2} e^{\beta_{3} \alpha}$-reflects the senescent component of mortality which is the constant force of mortality $\left(\alpha_{2}\right)$ with an acceleration component $e^{\beta_{3} \alpha}$ reflecting increased risks of mortality across the aging spectrum (Gompertz 1825). The model is reviewed in greater detail in Gurven and Kaplan (2007), Wood et al. (2002), and Gage and Dyke (1986), but one of its main perceived advantages is that it provides a biologically plausible basis for a model lifetable that speaks to species-specific mortality patterns experienced as part of the human life course (Siler 1979, 1983; Hill and Hurtado 1996). In the context of anthropology, this model also has been argued to be the most biologically-plausible mortality model for traditional populations (Gage 1988; Wood et al. 2002). In this analysis, we used the parameters suggested by Gurven and Kaplan (2007): $\alpha_{1}=0.2798, \beta_{1}=1.1037, \alpha_{2}=$ 0.0223 , and $\beta_{3}=0.1274$ as a model life-table, predicting the anticipated number of deaths in each age interval we would expect to see within the MTC and CI assemblages, if such a mortality schedule characterized the populations from which they were drawn.

## A Monte-Carlo Model of Preservation Bias \& Statistical Comparisons

This approach builds on results from Saunders et al. (2002), who compared cemetery assemblages to parish records, which indicated discrepancies between the
observed cemetery assemblages and those expected in a register-type tracking system (see Figure 5.4, pp. 144). Using this as an initial basis, we constructed estimates of observability bias by age via expert opinion. These estimates were derived based upon the life experience of three other bioarchaeologists (personal communications Heather Edgar, Anna Medendorp, and Kate Rusk 2012), a paleodemographer (personal communication Jack Baker 2012) and myself. Each of us ranging between five to almost 30 years of experience in our respective fields. Two of these five experts have excavated Maya skeletal assemblages from these regions, while another one of the experts has worked with numerous Maya skeletal collections in museum and laboratory settings. All three of these researchers were familiar with the preservation conditions of the collections used in this study when they came to a consensus of preservation bias percentages. The greater bias for the young and old is justified by the known preservation bias that greatly affects the preservation of very young and older individuals in the archaeological record typically due to minimal or decreased bone density (Angel 1969; Walker et al. 1988; Larsen et al. 1995:142; Guy and Masset 1997; Bello et al. 2002, 2003; Bello et al. 2006; Jackes 2011).

The expert-based ranges for the analysis of preservation bias utilized in this model include a most-likely "average" preservation bias as well as the upper and lower bounds of the preservation bias (Table 7.2), which reflect the lower rates of preservation seen among the youngest and oldest age cohorts in most archaeological assemblages. This best-guess estimate approach is utilized in stochastic simulation studies where available estimates of a phenomenon are not available, as when a research topic is new and a paucity of literature exists (LeMieux 2009; Graham and Talay 2013). They are presented
for each five year age category, truncated at the 50 plus years due to a paucity of available individuals beyond this age. These values were used to operationalize a set of resampled Monte Carlo based estimates of the distribution of the probability of observing a death.

| Age Cohort | 5th Percentile | 50th Percentile | 95th Percentile |
| :---: | :---: | :---: | :---: |
| 0 to 1 | 0.05 | 0.43 | 0.80 |
| 2 to 4 | 0.07 | 0.31 | 0.55 |
| 5 to 9 | 0.03 | 0.19 | 0.35 |
| 10 to 14 | 0.03 | 0.09 | 0.15 |
| 15 to 19 | 0.03 | 0.07 | 0.10 |
| 20 to 24 | 0.03 | 0.07 | 0.10 |
| 25 to 29 | 0.03 | 0.07 | 0.10 |
| 30 to 34 | 0.03 | 0.07 | 0.10 |
| 35 to 39 | 0.03 | 0.09 | 0.15 |
| 40 to 44 | 0.03 | 0.14 | 0.25 |
| 45 to 49 | 0.07 | 0.21 | 0.35 |
| $50+$ | 0.07 | 0.26 | 0.45 |

Table 7.2. The ranges of preservation bias utilized in the Monte Carlo simulations to determine if differential preservation may exist within an assemblage.

The basis for the Monte Carlo model was a random resampling of rates under a binomial probability model (Chiang 1964, 1984), operationalized as a normal random
variable (LeMieux 2009; Graham and Talay 2013). Each Monte Carlo experiment resampled the assumed distribution 1,000 times, and we accounted for autocorrelation in random number generation ("burn-in" bias) by excluding the first 500 resampled estimates and thinning to each $100^{\text {th }}$ iteration (LeMieux 2009; Linstrom et al. 2011). These distributions were utilized in the analysis at the $5^{\text {th }}, 50^{\text {th }}$, and $95^{\text {th }}$ percentiles to account for uncertainty in the expert-based judgments (Le Mieux 2009; Graham and Talay 2013). Graphically, this produced survival plots that were visually inspected (Figures 7.2 and 7.3) to qualitatively assess the impact of the Monte Carlo based adjustments. In both cases, the adjusted datasets appear to be significantly different from the observed age-distribution once the Siler model is fit to both using maximum likelihood methods with code custom-written in the R software package (r-project.org). These qualitative observations suggest that if preservation bias is present in these assemblages, which is a significant likelihood even with the watery conditions that the remains were recovered from, that directly modeling it should impact our assessment of hypotheses.

To test the null hypothesis of no differences in the age-at-death structure between null models and adjusted age-at-death counts for the MTC and CI assemblages, we employed simple categorical and parametric data analysis including chi-squared tests of association for overall differences and paired z-tests of the binomial proportions for specific age intervals (Agresti 2004; Christensen 1997; Samuels et al. 2012).

## Results

Tables 7.3-7.5 present the results of statistical comparisons of the adjusted agespecific death counts to those expected under the null model of horticulturalist mortality. Table 7.3 captures analyses made using the $5^{\text {th }}$ percentile of the modeled distribution of observability bias. While Table 7.4 displays analyses from the $50^{\text {th }}$ percentile (the average and "most-likely" value) and Table 7.5 reviews results associated with comparisons at the $95^{\text {th }}$ percentile. Across all age intervals, statistically significant differences are observed at the $50^{\text {th }}$ and $95^{\text {th }}$ percentiles only for the CI assemblage ( $50^{\text {th }}$ percentile: chi-squared $=25.18, \mathrm{p}=0.02 ; 95^{\text {th }}$ percentile: chi-squared $=149.27, \mathrm{p}=0.001$ ). Overall, only a weak statistically significant difference was observed for the MTC site at the $95^{\text {th }}$ percentile (chi squared $=15.88, \mathrm{p}=0.1$ ).

Within specific age-intervals, however, both sites deviate significantly from the horticulturalist model life table, but those deviations depend upon the level of observability bias incorporated into the estimate. At the $5^{\text {th }}$ percentile of the modeled distribution for MTC (Table 7.3), significant differences were noted for the newborns to one year of age $(\mathrm{p}=0.007), 11$ to $15(\mathrm{p}=0.005)$ and 36 to 40 year olds $(\mathrm{p}=0.008)$. At the $50^{\text {th }}$ percentile, statistically significant differences were noted for the 11 to $15(\mathrm{p}=0.002)$ and 36 to $40(\mathrm{p}=0.005)$ age intervals (Table 7.4). Similarly the $95^{\text {th }}$ percentile noted statistically significant differences in the same age intervals ( $\mathrm{p}=0.0001$ and $\mathrm{p}=0.0037$ respectively) as well as the 16 to 20 age interval ( $\mathrm{p}=0.002$ ) (Table 7.5).

For the site if CI, no statistically significant differences were noted at $5^{\text {th }}$ percentile of the modeled distribution (Table 7.3). At the $50^{\text {th }}$ percentile of the modeled distribution a significant difference was noted for the six to 10 age interval for CI
$(\mathrm{p}<0.001)\left(\right.$ Table 7.4). Finally the $95^{\text {th }}$ percentile for CI had significant differences for the newborn to one ( $\mathrm{p}<0.001$ ), six to $10(\mathrm{p}<0.001)$, and 51 and above ( $\mathrm{p}=0.01$ ) age intervals.


Table 7.3. Comparisons of sacrifice assemblages to reference horticultural mortality schedule, at the $5^{\text {th }}$ percentile.


Table 7.4. Comparisons of sacrifice assemblages to reference horticulturalists mortality schedule, at the $50^{\text {th }}$ percentile.


Table 7.5. Comparisons of sacrifice assemblages to reference horticulturalists mortality schedule, at the $95^{\text {th }}$ percentile.

If we relax the criteria for statistical significance to $\mathrm{p}=0.05$ or even $\mathrm{p}=0.1$ for the z-score test results at the level of age-groups, the number of age intervals that are statistically significant increases. This increase is more noticeable among the MTC age cohorts, which would then have significant differences for more than half the age intervals in the 5th, 50th, and 95th percentiles. Given the small sample sizes involved that relaxation may be justified.

## Discussion

The fact that the both overall and age-specific differences are observed after correcting for preservation bias via Monte Carlo simulations suggests that the MTC and CI mortuary assemblages were unlikely to have accumulated due to natural mortality processes. The statistically significant differences observed appear most similar to the age profile of deaths observed among mass graves attributed to selective targeting of specific age groups in warfare. Two clear, though disturbing, examples are drawn from Palestine and Srebrenica (Bosnia), where civilian mortality was greatest for individuals between the ages of 15 and 25, with the highest numbers being 20 year olds (Radlauer 2002; Brunborg et al. 2003). While the relationship between these warfare-based examples may only vaguely relate to patterns associated with ritual sacrifice, it is clear that the elevated number of children observed in the assemblages is not typical of those observed for any pre-industrial horticultural societies (Chamberlain 2006:64, see Figure 2) such as those contributing to the Gurven-Kaplan reference model. It is also important to note that existing evidence does not suggest that it should be expected for periods of famine (Chamberlain 2006:72, see Figure 3). The age-specific differences for MTC and CI also
aid in ruling out the possibility that the bimodal age distribution of the assemblages is due to some sort of "accident hump" (spike in mortality at a specific age or interval) within the once living population that attributed to these assemblages. Gage and Mode (1993) note that when "accident humps" are noticeable they should only have miniscule mortality increases. As the simple z-score test results indicate (Tables 7.3-7.5), there are statistically significant differences among specific cohorts for both MTC and CI compared to what a normal horticultural society should display.

For both the MTC and CI assemblages, at varying percentiles of the modeled bias distribution, we have noted statistically significant differences across all age cohorts. These age cohorts tend to be over represented by those ethnohistorically chosen for sacrifice (older children and young adults) (Fuentes y Guzmán 1932; Tozzer 1941; Roys 1943; Scholes and Roy 1968), and underrepresented by those not typically targeted for sacrifice (older adults). These statistical differences within specific age intervals indicate similarity with known ethnographic patternings of sacrifice and further bolster the finding that the MTC and CI assemblages are not likely to have accumulated due to natural mortality processes. In fact, these observations are in harmony specifically with the idea that they accumulated due to sacrifice as suggested by the ethnohistoric record.

Due to the impact of demographic nonstationarity on mortuary assemblages, one could attempt to make an argument that the statistically significant differences for the younger age cohorts in this study may be due to increases in fertility which would result in a greater proportion of individuals in younger age intervals. However, it is important to contextualize the MTC and CI assemblages within the time periods that they accumulated. The height of MTC's utilization occurred during the Terminal Classic,
while the height of CI's utilization was during Late and Post Classic. This is important as these periods are notable for the decline of the traditional Classic Maya socio-political system in their respective regions (Aimers 2007:339, 342-343). This period of sociopolitical "collapse" throughout the Maya region is noted through archaeological evidence of site abandonment, the cessation of large scale architecture, as well as dramatic population declines in the regions that never recovered (Stantley et al. 1986; Culbert and Rice 1990; Haug et al. 2003; Turner and Sabloff 2012). Therefore an increase in fertility would be unlikely as a cause for these spikes in age-at-death.

We also doubt that fertility can explain these differences, because the impact of fertility on age-at-death distributions will be most pronounced when short-term fertility increases are observed, as in the US Baby-Boom of the 1940s-1970s (Preston et al. 2001; Coale 1972; Coale and Trussell 1974). The mortuary assemblages utilized in this study potentially accumulated over the course of hundreds of years, which would largely dampen the impact of such short-term bumps. Over longer periods of time, stable population theory and models both suggest that population age-structures will become younger in general as general fertility rates converge upon a stable equilibrium and mortality re-asserts its long-term impact on population structure (Schoen 2010; Kim and Schoen 1993). Assumptions about demographic stationarity in model life tables are important, but their impact is lessened when skeletal assemblages accumulate over longer periods of time than they are when an assemblage is deposited over a shorter interval (Milner et al. 1989; Paine 1989).

It is interesting that the cohort specific differences documented for MTC do not correspond perfectly with the statistically significant results from CI's demographic data.

This indicates that preferred ages of sacrificial individuals may not be consistent throughout the Maya area. Given the temporal differences between the sites, these differences may also be due to change in ritual practices over time. The weak difference noted between the MTC and CI assemblages could also be due to a variety of cultural choices relating to sacrifice at the site. For instance, if sacrificial preference changed over time or a more randomized selection process for selecting sacrificial individuals existed, then these choices may be contributing to why the models are not different but a number of differences are noted at specific age intervals.

## Conclusions

Prior to the development of the types of statistical analysis employed in this research, bioarchaeologists could look at an overall patterns of a mortality curve and determine if mortality for a site was normal or not. Data that reflected a J-shaped or "bath-tub shaped" curve demonstrated a relatively normal distribution with high infant mortality that decreases before rising again for older individuals (Weiss 1973). This pattern is seen in Mesoamerican mortuary assemblages interpreted as burials at Caves Branch Rockshelter, Belize (Glassman and Bonor Villarejo 2005) and Teotihuacan, Mexico (Storey 1992). However, this is not the type of pattern demonstrated by MTC or CI. The analysis and modeling introduced by this article provide a visual and statistical means to determine if an assemblage can be considered to be drawn from a mortality process measured in existing mortality models for horticulturalist populations. The specific age intervals where statistical differences were noted are also consistent with the idea that sacrifice could have contributed to the formation of the assemblage.


Figure 7.2. Graphical depiction of a Siler Model for the Midnight Terror Cave assemblage based on adjusted (Black) and unadjusted (Grey) datasets.


Figure 7.3. Graphical depiction of adjusted (black) and unadjusted (gray) Siler curves for Chichén Itzá.

It is important to note that the two different assemblages did not demonstrate the same age-specific statistical differences when compared to reference horticulturalist model. This reflects the robust nature of the model comparisons made here. While the MTC and CI assemblages both appear to differ from the reference model, the method
preserves their ability to differ from one another as well. The finding that the dynamics of assemblage formation at each site differ from one another, as well as from the reference model, speaks to the complex nature of population dynamics and their interaction with cultural and taphonomic factors in producing mortuary assemblages. Fortunately, the tools employed here permit a legitimate assessment of the differences between a reference mortality process and an observed data set in a manner that allows study and analysis in meaningful ways. As such, these results reflect not only a step forward in our understanding of the MTC and CI assemblages and ancient Maya cultural practices, they also present a robust method for enhancing future similar studies.

## CHAPTER 8 DISCUSSION AND CONCLUSIONS

## Evidence of Sacrifice

Human skeletal material was recovered from six of the eight Operations (spatially delimited concentrations of archeological materials in cave chambers excavated as separate units) in Midnight Terror Cave (Operation III, IV, V, VI, VII, and VIII). Within the six Operations that contained human skeletal material, there were 37 deposits (groupings of bones) and a few scatters of commingled surface clusters of skeletal material. Most of the individuals recovered came from the dark zones of Operations V and VIII. A vast majority of the remains were interpreted as primary deposits, due to the quantity of small skeletal elements present and the discovery of semi-articulated bones in many of the deposits. There are, however, a few cases of secondary movement and/or placement.

Incomplete recovery of individuals (due to preservation problems, removal by looting, and brecciation or CaCO3-cementation of bone) led to the decision to use a contextual approach for calculating MNI. Arbitrarily defined adjoining sublots and lots were analyzed together if there were indications of movement of skeletal material between the areas (see Appendix A for details). The descriptive and quantitative data provided in Appendix A outline a very unevenly preserved mortuary assemblage.

Sex could not be determined for a vast majority $(\mathrm{n}=82)$ of the 118 individuals via standard bioarchaeological methods, due either to their subadult status or their fragmentary nature (Table 8.1 and Figure 8.1). Almost half ( $\mathrm{n}=46$ ) of the mortuary assemblage consists of subadults, with a majority ( $n=19$ ) of those subadults estimated to
be 5-8 years of age. As some of the previous chapters have indicated, this is not a typical mortuary assemblage for a cemetery. Rather, this age distribution is more in line with human sacrifice as it has been documented at Chichén Itzá (De Anda Alanís 2007;

Hooton 1940).

| Sex | 0-1.5 <br> years | $\mathbf{1 . 6 - 4}$ <br> years | $\mathbf{5 - 8}$ <br> years | $\mathbf{9 - 1 5}$ <br> years | $\mathbf{1 6 - 2 0}$ <br> years | $\mathbf{2 0 - 2 5}$ <br> years | Young <br> Adult | Undetermined Age <br> (Adult) | Old <br> Adult | Undetermined <br> Child |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Undetermined | 9 | 10 | 19 | 8 |  | 2 | 19 | 12 | 2 |  |
| Female |  |  |  |  | 1 | 1 | 13 | 3 | 1 |  |
| Male |  |  |  |  |  | 2 | 8 | 5 | 2 |  |

Table 8.1. Age and sex distribution of the individuals recovered from Midnight Terror Cave and those studied in situ.


Figure 8.1. Graphical age and sex distribution of the individuals recovered from Midnight Terror Cave and those studied in situ.

There has been some criticism of this MNI calculation of 118 at MTC, with other estimates establishing a slightly lower MNI of 114 juveniles (Prout 2016a,b; Verdugo et al. 2016a,b). This alternative calculation is based on an incorrect method of calculating

MNI. First of all, Prout failed to consider overlapping age ranges of various methods for determining age. Relying upon the work of Prout (2015, 2016a,b), Verdugo et al.'s (2016a) work indicates the presence of two children in Operation VI Lot 2B. These children were estimated to be two to four years of age and four to six years of age (Verdugo et al. 2016a). Based upon these age estimates alone, there is the potential for only one child of approximately four years of age. For this same deposit, I calculated one child five to six years of age. The fact that our age estimates are slightly different may be due to a difference in methods for determining age. Thus with standard means of calculating MNI, there would still only be one child in this deposit.

Calculating the presence of two individuals simply because the age estimates based on different skeletal elements do not perfectly overlap is not an accepted practice in bioarchaeology. First, this method is considered a poor choice because most commonly used age estimation techniques are based off of relatively modern populations of European descent, which do not accurately estimate prehistoric and other ethnic population groups (Schmeling et al. 1999). While steps are being taken to remedy this problem (Pavón et al. 2010; Danforth et al. 2009), there will still be age range estimates for juveniles based on single skeletal elements that will not always correspond perfectly to an estimate based on another skeletal element's development. Second, as the only osteologist who personally collected remains from many of the deposits within the cave, I was able to determine which deposits had incomplete recovery and made note of it when possible. Without this first-hand information, one would be relying on the assumption that the rest of these individuals had not been recovered either because of loss due to
looting and/or because they had been left in situ. Such reliance on absence of evidence is not an indication that the material still exists in the cave.

The MNI count determined by Verdugo and collogues (2016b) also raises concern. Their analysis indicated the two children in Lot VI-02B are 6-10 year old and 10-16 years old respectively. Without more detailed documentation, it seems possible that these two estimates could represent an individual roughly 10 years of age. None of the specimens they listed provide the original catalog numbers assigned to them. This prevents their work from being directly compared with the data in this dissertation. The specimen numbers I assigned to every skeletal element encoded provenience information such as Operation, Lot, and Sublot are part of the number convention. If a new specimen numbering system was used for their research without encoding provenience information, this may also then explain why the MNI calculated by Verdugo and colleagues is different than the one I have calculated.

Even with these variations in MNI, Chapter 7 demonstrates that the demographic distribution for the site of MTC does not fit a normal mortuary pattern for a horticultural society. When Siler models for the sites of Chichén Itzá and MTC are compared to Monte Carlo resampled models that correct for preservation bias, significant differences are observable across the $5^{\text {th }}, 50^{\text {th }}$, and $95^{\text {th }}$ percentiles. Although the model comparisons for MTC only have a weak level of significant difference ( $\mathrm{p}=0.1$ ), there are multiple age intervals that are statistically different between the models. The age intervals correspond with age groups preferentially selected for sacrificed (older children and young adults) and age groups that were not as targeted (older adults).

Z-Score tests of proportions at cohort levels conducted with data from 49 other mortuary assemblages further highlight the uniqueness of Midnight Terror Cave's demographic distribution (Kieffer and Baker 2017). When statistically compared to cemeteries and warfare-based assemblages, significant differences are noted at a $\mathrm{p}=0.01$ level for almost all the comparisons in the six to ten year age cohort. When data from Caves Branch Rockshelter is compared in the same way to these mortuary assemblages, the abnormality of this level of significance for the six to ten year age cohort becomes apparent, because it is only statistically different than four of the assemblages at a $\mathrm{p}=0.05$ or $\mathrm{p}=0.10$ level. While Caves Branch Rock Shelter also displays statistical differences between many of the assemblages for other cohort groups, these differences are isolated mostly to the very young and the very old. These statistical differences can be explained in part by poor preservation conditions experienced in the tropics. While the statistics from the demographic data cannot prove that sacrifice occurred at the site, they do indicate that Midnight Terror Cave and Chichén Itzá are very similar in demographic distribution. Overall, these statistical tests suggest that the type of demographic distribution seen at Midnight Terror Cave may have been impacted by similar means at Chichén Itzá, which, as noted long ago, was affected by human sacrifice (Tozzer 1941).

Direct evidence of trauma on the bones is not apparent on all of the individuals recovered from the MTC assemblage. The 28 cases of perimortem trauma (including blunt force, sharp force, puncture wounds, and scalping) are confined to 16 individuals only $23.6 \%$ of the overall assemblage (Kieffer 2011, 2015a). For some of the individuals with cut marks, multiple cut marks were observed on a single bone. Only one case of scalping was noted in the entire assemblage (Operation V Lot 1), while two cases of
puncture wounds to the crania were noted (a child in Operation V and an adult in Operation VIII). Only one of the sharp force injuries was discovered on a sternum (Operation V Lot 1). The rest of the sharp force injuries were discovered on the ends of long bones, and multiple crania. According to Tiesler (2007), these injuries are consistent with the ancient Maya practices of defleshing, skin flaying, and heart extraction.

Although the traumatic evidence was documented on an estimated $23.6 \%$ of the individuals recovered from the cave, contextual evidence further suggests that a vast majority of the individuals were sacrificed. Grave goods, other than the occasional items of personal adornment, were not found in most deposits. Although no conclusive data on cultural material counts and locations where they were discovered within the cave have been published, multiple individuals working on the project noticed an inverse relationship between quantity of skeletal material and cultural material in many of the deposits within the cave (personal communication Allan Cobb, James Brady, Ann Scott, 2008; C. L. Kieffer unpublished field notes). In the most abundant deposits of skeletal material, there were few if any ceramics and vice versa.

The two individuals who do not display enough evidence to indicate that they had been sacrificed were discovered in Operation IV in Special Deposit 3. Although these two individuals lack grave goods and were comingled in a watery depression, they were otherwise unique in the assemblage (Kieffer 2011; see Appendix A, pages 224-225). A lack of smaller skeletal elements and the small space of the depositional area suggested these two individuals decomposed elsewhere and were placed in the cave as a secondary deposit. These two individuals both lacked any indication of trauma and they were discovered in the twilight area of the cave (Kieffer 2011). It seems more likely that these
two individuals were deposited in some type of ancestor veneration ritual or were secondary "sacrifices" (ritual deposition of ancestor remains in an otherwise sacrificial context) after they had died and decomposed elsewhere (Kieffer 2011).

## Spatial Distribution of Sacrifice Indications

In terms of the spatial distribution of human remains within the cave, there is no clear-cut pattern, other than association with wet/watery areas (See Table 8.2). The largest deposit of individuals occurred in association with an area of modification that has already been interpreted as an area of public space (Brady and Kieffer 2011, 2012 Figure 4). Operation V Lot 1 , which produced a MNI of 17, is located in the two rooms adjacent to the large chamber with the massive fire blackened column formation in Operation V Lot 4 and the large terrace-like steps in Operation V Lot 7 (Figure 8.2).

| Location | Width (cm) | Length (cm) | Floor |  |  | Instances |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Height (cm) | Space <br> (m2) | Volume <br> (m3) | MNI | of Trauma | Bone <br> Count |
| Op. III Lot 8 | 333 | 238 | 150 | 7.9254 | 11.8881 | 1 | 0 | 2 |
| Op. IV Lot 5 |  |  |  |  |  | secondary | 0 | 1 |
| Op. IV Lot 10 | 1125 | 523 |  | 58.8375 |  | 1 | 0 | 44 |
| Op. IV Lot 11C | 167 | 330 |  | 5.511 |  | secondary | 0 | 1 |
| Op. IV Special |  |  |  |  |  |  |  |  |
| Deposit 1 |  |  |  |  |  | secondary | 0 | 1 |
| Op. IV Special |  |  |  |  |  |  |  |  |
| Deposit 3 | 142 | 96 | 93 | 1.3632 | 1.267776 | 2 | 0 | 100 |
| Op. V Lot 1 C, E, G | 1470 | 592 | 150 | 87.024 | 130.536 | 17 | 9 | 820 |
| Op. V Lot 2 | 493 | 657 | 230 | 32.3901 | 74.49723 | 5 | 2 | 66 |
| Op. V Lot 3 | 370 | 380 | 370 | 14.06 | 52.022 | 1 | 0 | 30 |
| Op. V. Lot 4 | 950 | 780 | 235 | 74.1 | 174.135 | 2 | 0 | 98 |
| Op. V Lot 5 | 253 | 450 |  | 11.385 | 0 | 3 | 0 | 114 |
| Op. V Lot 6 | 1890 | 820 | 600 | 154.98 | 929.88 | 3 | 1 | 200 |
| Op. V Lot 7 | 1250 | 900 |  | 112.5 | 0 | 3 | 0 | 150 |
| Op. VI Lot 1 A, B, C | 800 | 580 | 565 | 46.4 | 262.16 | 2 | 3 | 230 |
| Op. VI Lot 2 A, B, C | 610 | 670 | 300 | 40.87 | 122.61 | 2 | 1 | 520 |
| Op. VI Lot 3 D, E |  |  |  |  |  | 4 | 3 | 114 |
| Op. VI Lot 3 F | 99 | 80 |  | 0.792 |  | 2 | 0 | 10 |
| Op. VI Lot 3 G | 4130 | 449 | 150 | 185.437 | 278.1555 | 4 | 1 | 41 |
| Op. VI Lot 4 | 612 | 590 | 1534 | 36.108 | 553.8967 | 1 | 0 | 137 |
| Op. VI Lot 6 | 180 | 170 |  | 3.06 |  | secondary | 0 | 1 |
| Op. VI Lot 8 | 550 | 235 |  | 12.925 |  | 2 | 0 | 105 |
| Op. VI Lot 9 |  |  |  |  |  | 1 | 0 | 10 |
| Op. VI Lot 11 |  |  |  |  |  | 1 | 0 | 6 |
| Op. VI Lot 12 |  |  |  |  |  | 1 | 0 | 42 |
| Op. VII Lot 1 |  |  |  |  |  | 4 | 0 | 560 |
| Op. VII Lot 2 | 850 | 700 | 240 | 59.5 | 142.8 | secondary | 0 | 29 |
| Op. VII Lot 11C | 370 | 50 | 33 | 1.85 | 0.6105 | secondary | 0 | 5 |
| Op. VII Lot 12 | 700 | 260 |  | 18.2 |  | 2 | 0 | 87 |
| Op. VIII Lot 1 |  |  |  |  |  |  |  |  |
| ABCD | 581 | 610 | 400 | 35.441 | 141.754 | 11 | 2 | 800 |
| Op. VIII Lot 2 | 370 | 100 |  | 3.7 |  | 5 | 0 | 630 |
| Op. VIII Lot 3 | 150 | 104 | 263 | 1.56 | 4.1028 | 1 | 0 | 148 |
| Op. VIII Lot 5 |  |  |  |  |  | 2 | 0 | 154 |
| Op. VIII Lot 7 |  |  |  |  |  |  |  |  |
| A,B,C,D | 910 | 342.5 | 1100 | 31.1675 | 342.8425 | 4 | 0 | 1060 |
| Op. VIII Lot 8 A, C | 1993 | 510 | 600 | 101.643 | 609.858 | 4 | 0 | 318 |
| Op. VIII Lot 10 |  |  |  |  |  |  |  |  |
| A,B,D,E | 653 | 771 | 168 | 50.3463 | 84.58178 | 4 | 0 | 178 |
| Op. VIII Lot 11 A , |  |  |  |  |  |  |  |  |
| B, C, D, E | 677 | 886 | 340 | 59.9822 | 203.9395 | 8 | 1 | 939 |
| Op. VIII Lot 13 | 279 | 500 | 237 | 13.95 | 33.0615 | 3 | 1 | 795 |
| Op. VIII Lot 14 | 906 | 1070 | 1600 | 19.344 | 309.504 | 5 | 0 | 784 |
| Op. VIII Lot 15 A |  |  |  |  |  | secondary | 0 | 26 |
| Op. VIII Lot 16 |  |  |  |  |  | 6 | 3 | 1004 |
| Special Deposit 4 |  |  |  |  |  | undetermined | 1 | 81 |

Table 8.2 Size of space, bone quantity, human MNI, and quantity of individuals affected by trauma by deposit.


Figure 8.2. Large terraced steps in Operation V Lot 7 of Midnight Terror Cave. Photo taken by C. L. Kieffer.

These terraced steps in Operation V Lot 7 create more space for observers to stand on a slope with otherwise difficult footing. Thus suggesting that this space may have been used for public ritual activities, or at least semi-public ceremonies with multiple observers. Although remains of not many individuals were found in direct association with these large terraced steps in Operation $V$, ethnographic analogy suggests that individuals may have been sacrificed on or near the steps, and their still-fleshed bodies were dragged and/or rolled into the muddy depression areas within the adjacent rooms. This possible movement of the bodies after the ritual can be justified based upon other documented ethnographic examples of ritual sweeping of a space or clearing of a space, which are performed before or after a ritual to animate the space (Scott 2009). Evidence for some post mortem movement of skeletal elements in Operation V was noted
based upon the deliberate stacking of long bones into piles in the commingled deposits. Additional moving of the bodies would have been necessary in order to clear the large modified area, as the compact floor in most of the larger chamber in Operation V does not have any indication of fluvial movement strong enough to have moved the corpses into the smaller rooms. Additionally, the floor of the cave has a natural incline before descending out of view in the smaller rooms of Operation V where most of the individuals were recovered (Figure 8.3). This slope, along with a meter of vertical space above the muddy depressions in the adjacent rooms, would have greatly minimized the public performance aspect of sacrifice if the individuals were sacrificed in the same location from which their remains were ultimately recovered.


Figure 8.3. The incline on the southeastern extent of the large chamber in Operation V prior to descending into to smaller rooms which were designated Lot 1 . Photo taken by C. L. Kieffer.

The next largest deposit of skeletal material was located in Operation VIII Lot 1.
This deposit produced an MNI of 11 with two instances of trauma, and is located in a
hard-to-access upper level of the cave. While there is a level area in the room where spectators could have stood, the size of the room would limit the number of spectators to perhaps half a dozen. This is many fewer than what the larger chamber in Operation V could hold, suggesting the space may have been used for more private rituals of human sacrifice.

This lack of clear-cut correlation between numbers of individuals with the overall size of the room in which they are found is consistent throughout the cave. Scatter plots demonstrate this lack of a relationship between quantity of bones distributed in an area and MNI when compared to size of space from which they were recovered (Figure 8.4). Statistical tests between floor size and volume to number of bones and MNI failed to find any statistically significant correlations.


Figure 8.4. Scatter plots for quantity of bone to floor area and volumetric area as well as human MNI to floor area and volumetric area of rooms or chambers where they were recovered from. See Appendix Table A. 1 for raw data.

It is important to note, however, that data in these scatter plots do display the space in which the skeletal material was discovered. Although the individuals in

Operation V Lot 1 were associated with one of the larger modifications of the cave that indicate the space was used for public ritual, they were actually discovered and recovered from a relatively small space that is believed to be where they were disposed of presumably after the ritual. It seems plausible that the act of ritual sweeping may be preventing an accurate determination of how large spaces were utilized for the purpose of ritual activity. Therefore, it is plausible that sacrifices were for the most part made in large public spaces, and then just moved into smaller areas after the ritual, after decomposition and/or prior to a subsequent ritual performance.

One correlate that does exist for large public spaces is the ratio of trauma to number of individuals associated with these spaces. Operation V Lot 1 had nine cases of trauma (eight instances of bones with cut marks and one case of puncture wounds) in a deposit of at least 17 individuals. The only other deposits with this high of a ratio or higher for trauma to MNI are Operation VI Lot 1 (three instances of trauma in a deposit of at least two individuals), Operation VI Lot 3 (three instances of trauma in a deposit of at least four individuals), and Operation VIII Lot 16 (three instances of trauma in a deposit of at least six individuals). It is important to note that while Operation VI Lot 3 is not associated with public space, the skeletal material discovered there is believed to have washed or fallen in from Operation V, which contains one of the largest public spaces in the cave. Operation VIII Lot 16 on the other hand is directly associated with the large constructed plaza in Operation VII. Activities that occurred in the southwestern end of Operation VIII Lot 16 can easily be seen in the plaza below in Operation VII.

Operation VI Lot 1 appears to be the only anomaly in this correlation of high rates of trauma with public space, as it is not associated with a plausible public space. All other
areas in the cave, which are not directly associated with large areas of public space had lower rates of trauma and no more than two or three instances of bones being affected by trauma. This includes the second largest deposit of 11 individuals in Operation VIII Lot 1, which only had two instances of trauma.

This greater quantity of trauma in association with possible public spaces might be due to the public ritual performance of sacrifice. With the presence of spectators to observe the ritual, there may have been a desire for the ritual to appear more dramatic with increased brutality and blood. This desire for dramatics might cause the sacrificer to inflict more harm to the individual being sacrificed, although this is a highly speculative suggestion.

Although these kinds of rituals may be performed in a cave with restricted access, Inomata (2006a:810,814) states it is still possible for the space to be used for large-scale public ritual. Inomata (2006a,b) indicates that large-scale performance rituals may have real and direct political consequences. By making these sacrifices of both human and material remains public performances, the local elite may have been able to achieve a certain extent of control during an ever-changing political and environmental climate. This control may have been both direct and indirect. Indirectly, those watching these public rituals may not have been passive in the experience. Even if they were not actively doing something in the ritual, their mere presence might aid in defining relationships within the community and shapes their identity (Turner 1969). Such relationship-defining is made possible through the sense of communitas that is created during the liminal state of the publically performed ritual (Schechner 2006:87; Turner 1969).

In the same way that sacrifice could have been used to gain control and power, the theatrical public performance of sacrifice rituals might have eventually weakened the social structure of the residential site on the surface near MTC. This can be explained with the evolution of signaling theory as it pertains to ritual performances. Rappaport (1999) states that participating in a ritual signals beliefs and group affiliation to others. By turning these rituals into public performances, they became more than just a means to enforce ideology and reenact mythological events - the ritual became capable of changing perceptions and interpretations experienced by the actors (Bell 1979:74, 161). In a forum where perceptions of rituals and performers become malleable, the elite would have created a forum in which political power became negotiable. Elite people could have easily used these public performances to signal their power and access to resources. This type of signaling can then be used as a means to create intragroup cooperation and maintain solidarity, if participants are forced to sacrifice material wealth to signal their high level of commitment to the social group (Sosis and Bressler 2003; Sosis 2004; Henrich 2009). The applicability of this theoretical transition may seem like it would not escalate to the extent of participation in human sacrifice, however modern extremist religious behavior, which does escalate to the point of self-sacrifice, has already been explained within this same theoretical framework (Sosis and Alcorta 2008).

## Individuals Chosen for Sacrifice

The mortuary age distribution of the site not only suggests sacrifice, but also suggests that there was some degree of choice when determining who would be sacrificed. The preferred choice to sacrifice children and young adults is apparent from
the unnatural peaks in the demographic age curve for these groups as compared to other mortuary assemblages from around the world. What is harder to tease out is how other individuals were chosen for sacrifice.

As discussed in Chapters 5 and 6, there is strong (albeit not definitive) evidence that the ancient Maya did preferentially choose individuals for sacrifice who may have been considered "outsiders" by the local residents living around Midnight Terror Cave. Isotopic evidence indicates that this included geographical outsiders. As the isotope data demonstrates, none of the 26 individuals recovered from the cave whose remains were chosen for isotope analysis were from the surrounding Roaring Creek Valley based upon comparison with known oxygen isotope values from numerous local sites. As discussed in Chapter 5, the predictive model based upon stepwise regression of these isotope values and known isotope-impacting variables (i.e., distance from the sea, altitude, local water sources) at these sites indicate the values for those considered local to the area of Midnight Terror Cave would be between -2.95 and $-2.38 \delta^{18} \mathrm{O}$. As Chapter 5 presents, the values from Midnight Terror Cave have a mean of $-4.48 \delta^{18} \mathrm{O}$ and a range of -6.07 to $3.54 \delta^{18} \mathrm{O}$, thus indicating that none of the individuals sampled were living in the area when their sampled tooth was formed. Currently available comparable data do not allow for detailed determination of where these individuals may have originated. As mentioned in Chapter 5, similar values as those documented at Midnight Terror Cave have also been documented at, Xunantunich, Peligroso, Ramonal, Campeche, Tikal, Palmarejo, Palenque, Maltrata, Kalminaljuyu, Tzintzuntzan, Champantongo, and Teotihuacan.

Recent strontium ( $\left.{ }^{87} \mathrm{Sr} /{ }^{86} \mathrm{Sr}\right)$ isotope ratio analysis on 31 children's teeth from the site has led to an interpretation that a majority of them (73\%) were local, while the rest
were probably from the slightly more distant Mopan and Macal River Valleys (Lorenz et al. 2016). Lorenz based this interpretation on a strontium value range of 0.7079-0.7093, with a mean of 0.7084 . It is important to note that these same values can also occur elsewhere in the Lowland Maya region (Hodell et al. 2004), and thus the possibility of these children as geographical outsiders cannot be ruled out by strontium analysis at this time.

For the most part, individuals with evidence of pathological conditions do not appear to be over represented within the assemblage. However, as posited by the Osteological Paradox (Wood et al. 1992), it is still possible for individuals to have been sick without leaving pathological evidence on their bones. Only five instances of porotic hyperostosis were noted, none of which were extreme cases with extensive bone remodeling. At least six individuals suffered from varying degrees of osteoarthritis, as indicated by degenerative changes and spondylophyte growth on vertebrae. The only other pathological condition noted in the assemblage was a case of probable gout. Minimal quantities of caries and calculus and only three abscesses were noted within the entire assemblage. Such excellent dental health is not unexpected given the young age of many individuals in the assemblage. Only one case of healed traumatic injury resulting in slight disfigurement was noted in the form of a clavicle fracture. However, it is highly unlikely that these pathological findings would result in extreme burden on the individual in question or their family members.

The only pathological findings from the cave that suggest individuals may have been sacrificed due to their social outsider status as probably disabled individuals are the two cases of Klippel-Feil syndrome (Kieffer 2017). These findings have caused some
discussion over what it means to be an social outsider (Prout 2016c; Scott 2016; Kieffer 2016; 2017). Scott (2016) provided a number of ethnographic examples and artistic depictions in the Maya and Aztec cultures of dwarfs and hunchbacks in an attempt to demonstrate that "deformed" individuals are not social outcasts. I fully acknowledge that not all individuals with physical abnormalities are social outcasts in all societies. However, there is a major distinction between physical abnormality and physical disability. The ancient Mesoamerican artistic depictions are not capable of demonstrating disability. However, the osteological evidence from MTC and the medically documented, associated abnormalities (i.e. speech and hearing defects, spina bifida, renal abnormalities, heart malformations, muscular atrophy and weakness, cleft palate, mental retardation, respiratory problems, hypertension, scoliosis, narrowing of the spinal canal, and quadriplegia) that occur in individuals with Klippel-Feil indicate impaired mobility in these two individuals and thus a physical disability.

For some abnormalities, disability is in part a social construct and not everyone who is impaired is necessarily perceived as or consider themselves to be disabled (Oliver 1990). Dwarfism has only recently been accepted as a disability, and many "little people" today still do not consider it a disability (Kruse 2003). Similarly, many individuals without physical or cognitive abnormalities have definite attitudes about individuals with abnormalities or disabilities. Included in these views is a social hierarchy of how particular individuals with certain types of disabilities are respected and treated differently than individuals with a completely different disability (Munyi 2012; Deal 2003; Westbrook et al. 1993; Schmelkin 1984; Tringo 1970; Shears and Jensema 1969). Schmelkin's (1984) research in particular indicates that people do not view dwarfs and
hunchbacks in the same way as paraplegics, the very ill, or individuals with cognitive deficiencies. As I have previously pointed out, these are some of the abnormalities associated with Klippel-Feil syndrome (Kieffer 2017:46-48). While not all cultures treat specific physical abnormalities and disabilities in the same ways, Schmelkin's (1984) research indicates that sweeping generalizations of social status within any society cannot be made between individuals with different abnormalities or disabilities. That is why I clearly outlined the associated abnormalities and limitations of individuals with KlippelFeil syndrome in Chapter 6.

The literature that Scott presented indicates that among the Aztec and Maya, some dwarfs and hunchbacks held special places in society - in many cases as servants to the elite. However, no evidence is provided to indicate the Maya or Aztec viewed them as disabled or that these particular individuals were actually disabled. Classifying dwarfs and hunchbacks as disabled is a modern Euro-American view that goes against standards in the bioarchaeology of care (Tilley 2012:39). These ideas include understanding that disability for one person may not be disability for another, as views of disability vary from culture to culture, and in order to postulate the presence of a disability there needs to be evidence of physical impairment (Tilley 2012). Physical abnormalities depicted in iconography such as dwarfism and hunchbacks cannot be equally compared to other abnormalities because they have mythical correlates within specific cultures. For instance, individuals with dwarfism have direct analogy with mythical creatures referred to as Aluxes among the Maya (Spenard 2014; Redfield and Villa Rojas1934). Having mythical correlates would make deciphering images of the two difficult and may explain why individuals with these abnormalities were held in high regard.

The fault that Scott finds with my study of these two possible Klippel-Feil individuals is due to our differing opinions of disability. Scott (2016) states that hunchbacks and dwarfs are disabled. I, on the other hand, disagree. By highlighting all of the physical abnormalities associated with Klippel-Feil at Midnight Terror Cave, it becomes possible to understand the increased likelihood that the individuals were probably physically disabled and/or or seen by society as disabled.

On a similar note, Verdugo et al. (2016b:498) disagree with my assessment of porotic hyperostosis and use this as an argument against my classification of type I Klippel-Feil syndrome. In no place do I state in my article that porotic hyperostosis is an abnormality associated with any type of Klippel-Feil syndrome. I merely included it in my overall assessment for the differential diagnosis. The fact that Alison Galloway and I disagreed in the assessment of the presence or absence of porotic hyperostosis is par for the course of interobserver error, which has already been documented as being rather high in cases like this (Jacobi and Danforth 2002).

Verdugo et al. (2016b:498) stated that I "speculated that the two individuals with Klippel-Feil syndrome were closely related." First, my actual speculation was that the individuals were possibly "genetically related" (Kieffer 2017:52). The authors credit themselves for removing speculation and establishing fact (Verdugo et al. 2016b:498). However, they have neither proven nor disproven the possibility that the two individuals were related, nor disproven that these two individuals are genetically related. Merely they demonstrated they do not come from the same matrilineal haploid group. A level of speculation about their possible relationship still exists, as does the possibility that these individuals were social outsiders.

## Structural Violence at Midnight Terror Cave

Gerald Martin (2000:162) states that in order to understand violence, it must be classified as political or non-political, organized or disorganized, criminal or social. Given what we know about Maya society and the interwoven aspects of its politics and religion, as well as the elite appropriation of caves, it seems that the violence that occurred in Midnight Terror Cave may have been political. The fact that the sacrifices in Midnight Terror Cave were conducted in a ritualized manner suggests that it was organized violence. The fact that some of this violence was performed in apparently prepared public venues of the cave suggests that it was an accepted social act condoned by society. This type of politically organized and socially sanctioned violence is an essential classification necessary towards establishing the presence of structural violence.

Those working within the structural violence framework emphasize that violence is not senseless, rather it is a symbolic and meaningful action (Blok 2000:31). It is these symbolic meanings and actions that allow for a particular type of violence to occur within a society and therefore allow for the repetitious and reaffirming nature of structural violence. These symbols and meanings that a culture imbues into their ritualized violent actions also allow for the violence to become understandable (Pérez 2012:18). Therefore this act of organized public and political human sacrifice within the Maya culture can be understood when we analyze the symbols surrounding the act with the help of known ancient Maya ideology and religious beliefs. Based upon ethnographic and ethnohistoric accounts mentioned early in Chapter 3, we know that sacrifices in caves are associated with rain petitions and made in order to bring the rains. Therefore, the elite who had
politically appropriated the cave's use, made these sacrifices or commanded them, possibly in order to bring the rains.

As this belief in cave sacrifice was probably universal throughout the Maya culture area, there may have been similar cultural buffering systems used in different regions thereof. I propose that these cultural buffering systems included warfare and raiding. This adaptation provides a means by which to acquire sacrifices, thus preventing the sacrifice of your own kin, and increasing the likelihood that your genetic material will survive to subsequent generations. All of this is then dependent on polity and individual persistence and resilience in the face of warfare, raiding, and resource depletion. With these variables in place, we can then see how Klaus' (2013) flow chart of structural violence can be modified to describe the more specific case of how structural violence allowed for human sacrifice to persist in the Maya area (Figure 8.5).

While this feedback loop succinctly explains the factors influencing the actions that eventually contribute to the passive and active forms of violence, it lacks individual and group actions that break free from the status quo of the society. Even when a society has accepted and institutionalized violence, eventually change does occur. As history has shown us, these changes can come in the way of individuals making a grandiose stand against the status quo or it can occur in the form of group action.


Figure 8.5. Structural violence feedback loop for the ancient Maya. Modeled after Klaus (2012).

## Relating Structural Sacrifice to Existing Models of Sociopolitical Collapse

One cannot bring up the topic of Maya "Collapse" without defining what is meant by the term. In no way is it the complete disappearance of the Maya culture or language family; after all there are still many Maya descendants throughout Central America to this day. The term "Maya Collapse" is meant to refer to the sociopolitical collapse of the Classic Maya city-state/kingship system. This collapse occurred throughout the Maya
area at varying degrees, with sites being affected at different times due to a variety of variables (Aimers 2007). These variables include internal forces within a polity, as well as external forces outside a polity's control (Sabloff 1973). Additionally, it is also likely that forces contributing to the collapse of one polity may have directly or indirectly triggered the collapse of others (Culbert 1977), thus creating a chain reaction or domino effect. This collapse of sociopolitical complexity was not sudden; rather it was a slowmoving, multigenerational change (Tainter 1988; Adams 1973).

Amongst the ideas, theories, and models used to discuss this sociopolitical collapse of the ancient Maya are some that take into account individualistic and group reactions in response to actions made by existing political structures. The scapegoat king theory is one such theory that has been gaining momentum in its applicability to the ancient Maya over the past few decades (Iannone et al. 2016). In the simplest terms this idea is grounded in the idea that the legitimacy and power of kings is tied to prosperity of the kingdom (Quigley 2005). This prosperity can be maintained by feeding the gods, presenting themselves in an exceptional and/or god like manner, and redistributing resources (Feeley-Harnik 1985). When these conditions are not met or not perceived to be met by members of a polity, the king becomes the scapegoat and is eventually removed from power.

This concept of "the scapegoat king" and the conditions that play into the model are similar to the theory of structural violence. In fact, the utilization of structural violence by an ancient Maya king would actually aid in his ability to present himself as an exceptional or god-like being, due to his ability to inflict violence onto others as a means to obtain resources. Additionally, the relationship that the ancient Maya kings had
with the Maya deities (who controlled resources) can also easily be combined with the well-documented environmental changes that have been argued as contributing factors to the collapse (Kennett et al. 2012; Medina-Elizalde et al. 2010; Gill et al. 2007; Webster et al. 2007; Shaw 2003; Hodell et al. 2001, 1995; Gill 2000). Iannone et al. (2016) have critiqued the overreliance of blaming droughts and environmental factors on the collapse of the Classic Maya sociopolitical structure on current issues impacting our research interpretations. However, the environment of the past should still be included in our discussions of the ancient Maya collapse as it affected resource availability which in turn inevitably did impact human behavior.

The structural violence/scapegoat king hybrid model in Figure 8.6 proposes a more complete model that includes multiple factors (i.e., environment, warfare, and politics) by combining the scapegoat king model with the structural violence that is indicated by the practice of human sacrifice. Such a model is a more holistic approach to discussing how sacrifice may have also contributed to the collapse. More importantly, it weighs the influence of numerous variables rather than focusing on only one factor. Figure 9.6 indicates some of the possible actions and reactions that can occur with structural violence among the ancient Maya and how a polity becomes susceptible to dissolution after the king becomes the scapegoat for all that is going wrong for an individual polity. Unlike previous models of structural violence, this one gives more power to the Maya commoners, who are capable of negotiating the sociopolitical environment through avoidance and resistance (Joyce et al. 2001).

In this hybrid model (Figure 9.6), the environmental constraints are controlled by the deities. The elite are capable of interacting with these deities in order to influence the
resources that are then made available to the people. This influence is conducted by means of material and human sacrifice. This is seen as more than simply a gift exchange in some parts of the Maya area, rather it is seen as a substitution of life (Monaghan 2000). This need for sacrifice among the Maya is believed to have been related to the crosscultural relationships between people and their gods. A relationship that reinforces an idea of original debt or a contract which requires people to supply the gods with what they need in order to care for the needs of the people (Inannone 2016; McAnany 2010; Monaghan 2000; Joyce 2000).


Figure 8.6 Flow chart that outlines the impact and consequences of structural violence among the Ancient Maya.

When these environmental constraints posed a limitation on necessary resources, the cultural buffering systems, which include warfare and raiding for sacrificial captives and resources, would be enacted. All of these activities are well documented throughout the Maya area. The extent of sacrifice, and specifically captive sacrifices. was covered previously in Chapter 3 of this dissertation. While the extent to which warfare occurred and was documented on monumental architecture fueled the models of Maya Collapse that focused primarily upon warfare as the cause (Webster 2002, 2000, 1977; Demarest et al. 1997; Freidel 1992, 1986). In the proposed model (Figure 8.3), buffering systems could supply much needed resources to the exiting population, which contribute to their ability to resist disease, growth disturbances, and possibly even death. Other factors that play into physiological disturbances are the strength of the polity and their ability to resist outsiders, as well as the outside forces from other polities. These are critical aspects to include in the already existing structural violence model, because structural violence in the Maya area was not a closed system, reliant mainly upon resources and hierarchy. Rather it was a system in which structural violence was dependent upon the commoners and used within the polity on other polities as well as by other polities.

Once these impacts of physiological disturbance occurred to a population, a variety of things could have occurred. First of all these physiological disturbances could cause a biological impact, which leads to certain genetic material being selected against or left in the population's gene pool. This then feeds back into the model and impacts future generations' ability or inability to resist physiological disturbances. The societal impacts of death, disease, and stress from warfare and sacrifice means that fewer
individuals would be available to support the society's needs in terms of labor and reproduction. This societal impact then requires action on the part of those in the polity.

Depending on the life style conditions within the polity, one of three reactions to the situation seems plausible. The first one is to accept that life within the polity, possibly compared to the status of those around them, is not that bad and that thus people consent to continue living with the status quo. In this scenario, they continue to pay into the sociopolitical system and established hierarchy of the existing polity. This outcome would only seem the obvious choice if the individuals within the polity felt as though the king were continuing to provide for them. If this copasetic outlook is not maintained, then the two possible outcomes of the scapegoat king model come into play. Those living within the polity will blame the king for the condition of things. This will either lead to local abandonment or the people will forcefully rise up against the existing hierarchy and overthrow it. There are a number of cases of forceful and violent revolts and acts of monument termination associated with site abandonment within the Maya area (see Harrison-Buck 2012 for an overview of the topic). However abandonment of a site is rather hard to demonstrate in the archaeological record, and the only cases documented thus far to my knowledge focus on abandonment after a military defeat (Dahlin 2000).

The more blatant examples of contexts that have been interpreted as elites being overthrown in the Maya area include mass burials at Tikal (Laporte and Fialko 1990) and Yaxuná (Schuler and Freidel 1998), the skull pit at Colha, Belize (Buttles and Valdez 2016; Barrett and Scherer 2005; Massey 1989), and the multiple individuals found in a water feature at Cancuen, Guatemala (Demarest et al. 2016). In the Colha case there was enough material evidence from the rest of the site and surrounding area to suggest that
the polity's supplying of economic demands and status as producer of lithic weapons contributed to their downfall and abrupt site abandonment (Barrett and Scherer 2005).

Researchers working within the Maya area have managed to document what they interpret to be gradual or abrupt abandonment of sites, typically following a defeat or violent event typically from outsiders (Palka 2001, 1997, 1995; Demarest and Houston 1989, 1990; Demarest et al. 1992, 1991; Inomata, 1995; Valdes et al. 1993). In the case of Chunchucmil, Mexico, abandonment occurred following some kind of defeat, possibly brought on due to their proximity to resources (Dahlin 2000). These scenarios comfortably fit into possible scenarios covered in the hybrid model because outside polity forces were too strong, thus causing death, destruction, and sociopolitical disruption, all of which would have contributed to the decision for survivors to migrate away from the site.

The internal class conflict that eventually gives way to revolt in a model that relies upon social hierarchy and inequality to bolster warfare and raiding responses from the masses is inevitable. Hamblin and Pitcher (1980) outline many arguments that support the idea of internal revolts due to class conflict, including murals that depict elite response to a peasant uprising, cessation of deposition of elite goods in refuse dumps after site rebellion, as well as destruction and movement of monuments. The destruction of monuments and site desecration are well documented throughout the Maya area, with examples from the sites of Aguateca (Inomata and Stiver 1998; Inomata 1997), Blackman Eddy (Brown and Garber 2003), Copán (Fash 1989), Cueva de El Duende and Cueva de Sangre (Brady and Colas 2005), Cueva Tabano (Ishihara-Brito et al. 2011), El Perú Waka' (Navarro-Farr 2016), Hershey Site (Harrison-Buck et al. 2008), Piedras Negras
(Golden et al. 2016), Tikal (Freidel et al. 2003; Satterthwite 1958), and Sabalam (Helmke and Brady 2014). In addition to the difficulty in determining the difference between reverential and desecration termination rituals that seem to have occurred at these types of locations (Pagliaro et al. 2003); it is difficult to determine if the destruction and desecration were conducted as part of revolt or after defeat by another polity in warfare.

In addition to these examples of violent overthrowing of the ruling families, there are nutrition and health data that changed through time within the Peten region. As Wright and White (1996) note, there is a general decrease in the trend of corn consumption in the Peten area that corresponds to the period of warfare and political collapse in the region. One of their assumptions is that this is due in part to differential access of resources between elite and commoners. This is supported by site-specific data throughout the Maya area (White et al. 2001; Wright 1997; White et al. 1993; Reed 1994; Gerry 1993, 1997; White 1986; White and Schwarcz 1989). In the hybrid model, this differential access to resources would contribute to the stress felt by commoners within the polity and would contribute to their desire to go to war to obtain additional resources including individuals for sacrifice.

## Conclusions

Why then did the ancient Maya stop performing human sacrifice near the site of Midnight Terror Cave? This ultimately brings us back to the theoretical debate of sacrifice between Beattie (1980), who indicated periods of crisis are correlated with increased ritual activity, and Girard (1979), who felt that the sacred obligation of sacrifice becomes neglected during times of great peril. These conflicting views on sacrifice
highlight how difficult the creation a general theory or law regarding sacrifice is. The range of human responses to their environments is too broad to narrowly force a theory or law onto all human behavior.

In this specific case of the ancient Maya, maybe the period of crisis passed, or maybe the tradition of human sacrifice was dropped because times became too difficult. Hopefully, future work on skeletal material from the site on the topics of more refined dating techniques, area specific paleoclimate reconstruction, individuals' places of origin, molecular health, and genetic diversity will help shed light onto the details of sociopolitical and environmental conditions that contributed to the structural violence that occurred at Midnight Terror Cave.

While I believe in the ability for the human spirit to endure difficult conditions and for individuals to continue on with their way of life, I also believe in humankind's ability to see when something is not working. While religious institutions have the ability to affect an individual's line of thinking, eventually, if the rituals and religious ideology do not provide the expected or necessary outcome people seek, they will either rise up against the institution or walk away. As of now, there is not enough evidence at either the site of Midnight Terror Cave or the surface site of Tipan Chen Uitz to determine which of these actions was more likely in this particular instance.

# APPENDIX A DEPOSIT DESCRIPTIONS FOR MIDNIGHT TERROR CAVE, 

 BELIZE
## Midnight Terror Cave

Midnight Terror Cave is located in the karstic Roaring Creek Valley near the village of Springfield in the Cayo District of Belize. The site was discovered in 2006 and received immediate attention and was mapped by the Institute of Archaeology in Belize due to the existence of large deposits of human remains (Figure A. 1 and A.2). The cave is comprised of multiple levels of passages due to its fluvial limestone nature, with passages covering an area more than 200 meters by 50 meters, and contains numerous areas of extensive modification. Many areas in the cave that are easy to access have undergone substantial modification indicated by large leveled plazas, a trail system, and terraced steps on the sloping floors of the cave (Brady et al. 2009). Many of these large areas of modification are in direct association with deposits of human remains, suggesting the remains may have been involved in public ritual acts (Brady and Kieffer 2011, 2012). Inomata (2006a, 2006b) has argued that these features suggest the creation of performance space and viewing platforms which suggest these rituals were public. Although this space is located in a cave, Inomata (2006a:810, 814) indicates that even caves were places of public ritual, and suggests that locations with some level of access restriction still create a sense of inclusion for large scale public rituals.


Figure A.1. Plan View of Midnight Terror Cave. Map reproduced with permission from Nancy Pistole.


Figure A.2. Profile view and select passage profiles throughout Midnight Terror Cave. Map reproduced with permission from Nancy Pistole.

During the 2009 field season structures, terraces, and a plaza were discovered atop the hill directly above the cave. Reconnaissance exploration by the Caves Branch Archaeological Survey conducted in the same year discovered the site core of Tipan Chen Uitz approximately 1000 meters from Midnight Terror Cave. Archaeological investigations at the site of Tipan Chen Uitz indicate the site dates to the Late to Terminal Classic, based on ceramics and a stela date of AD 711 (Wrobel et al. 2011, 2012). The site of Tipan Chen Uitz is surrounded by more than 20 caves, many of which contain
abundant amounts of ceramic and some skeletal remains. However it is, Midnight Terror Cave that has the largest skeletal collection of any of the caves, is the only one with large- scale modification in terms of constructed trails, terraces, and large plaza areas, and has the most associated surface architecture (i.e., the structures on top of the hill the cave is located) of any of the site's caves.

This pattern of structures associated with caves is well documented (see Brady and Ashmore 1999). The existence of structures in association with caves and large scale modification within caves has been used to argue for elite appropriation of caves at the sites of Dos Pilas, Guatemala (Brady 1997b, and Brady et al. 1997) and Naj Tunich, Guatemala (Brady and Stone 1986). The site of Tipan Chen Uitz has two causeways extending out to the smaller satellite sites of Cahal Uitz Na and Yaxbe indicate that Tipan Chen Uitz is the largest site in the area (Andres et al. 2011). Due to the large-scale modification of Midnight Terror Cave and associated surface architecture, it seems highly plausible that the elite at Tipan Chen Uitz appropriated utilization of Midnight Terror Cave.

Archaeological survey of the Midnight Terror Cave was conducted in, monthlong, spring field seasons in 2008 through 2010 by CSULA. These three field seasons focused on detailed mapping, descriptive analysis of space utilization and surfacecollection of artifacts and skeletal material. Operation, Lot, and Sublot designations were used for the purpose of maintaining geographical provenience of artifacts and skeletal material. The cave was divided into a total of eight Operations, with each Operation corresponding to a major cave chamber. Lot designations were numerically assigned as needed within each Operation. Typically distinct rooms within chambers and spaces
bounded by boulders or large cave formations were given discrete Lot numbers within an Operation. Sublot designations were not always made, and were typically reserved for smaller features such as alcoves, niches, ledges, rimstone pools, or dense deposits of cultural or skeletal material. This provenience system works well in cave contexts as it can easily be fitted within the natural boundaries created by caves and cave formations.


Figure A.3. Operations I-III indicated by darkened area. Map reproduced with permission from Nancy Pistole. Modified by C. L. Kieffer.

## Operations I and II

Operations I and II were located near the entrance area of the cave, prior to and along the area right before the drop down into Operation III. No skeletal material was recovered from either one of these Operations. Minimal ceramic material was recovered from these areas.

## Operation III

Field notes with the general description of Operation III were lost and thus a description of the overall area cannot be written.

## Operation III Lot 05

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. Seven human skeletal fragments were recovered from Operation III Lot 05 . This included two long bone fragments (radius and fibula), two metacarpal fragments, two metatarsal fragments, and a proximal manual phalanx. The minimum number of individuals present was one adult of unknown sex and age. However, Maya mortuary practices, the fragmentary nature of the bones, and the few bones represented do not allow for positive identification of just one individual. This deposit was secondary placement, and it cannot be determined if the rest of the individual was discovered elsewhere in the cave or was moved from a surface deposit.

## Operation III Lot 08

This lot is located directly east of Operation III Lot 03 and west of Operation III Lot 09 . Operation III Lot 08 was an oval shaped chamber that measured 3.33 meters East to West and 2.38 meters north to south. The floor of this chamber slopes down towards the eastern boundary of this lot, near survey marker A35. The wet nature of this area is noticeable via the flowstone covered walls and the prominent stalagmite approximately 1.5 meters tall in the southern area of this lot. The abundant quantity of stalactite breakage and numerous speleothems scattered amongst the ceramics on the floor along the western extent of this lot further suggests that access to the area was maintained and the collection of speleothems for other ritual means may have occurred.

Two bone fragments were recovered from Operation III Lot 08. This included an unidentifiable long bone fragment and a rib fragment found amongst the ceramic sherds.

The fragmentary nature of the bones does not give any indication as to how old the adult was or the individual's sex.

## Summary for Operation III

Operation III Lot 05 and Operation III Lot 08 were incomplete assemblages of bones indicative of secondary placement. Scenarios that seem likely for this deposit include possible association with a ceramic offering prior to breakage, movement from another deposit within the cave, or secondary offering of an ancestor who may have died by other means and decomposed elsewhere outside the cave. At the lot level, the minimum number of individuals represented in Operation III is two adults of unknown age and sex. However at the Operation level, only one individual is represented.

## Operation IV

Operation IV was the initial large chamber that the cave opens down into and thus most of the chamber is considered light to twilight zone depending on the time of day and year. The floor of this chamber is scattered with ceramics, ceiling breakdown and large stalagmites. Between these obstructions is the beginning of a trail system that connects many of the Operations throughout the cave.


Figure A.4. Operation IV indicated by darkened area. Map reproduced with permission from Nancy Pistole. Modified by C. L. Kieffer.

## Operation IV Lot 05

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. The skeletal material recovered from this lot is limited to a deciduous right second incisor. It is not possible to determine a precise age of this child, other than to say that he or she was over 2 years ( $+/-8$ month) of age based on crown and root development (Ubelaker 1989). The presence of just a tooth also does not indicate the sacrifice of an individual; rather it could be an offering or natural loss of only that tooth.

## Operation IV Lot 10

Operation IV Lot 10 was located east of Lot 11 and west of Lot 5 and 6. The nature of this location places the lot in the dark zone of the cave. The northern boundary of the lot measured 5.32 meters in length, the eastern measured 6.92 meters, the southern measured 4.97 meters, and the western measured 11.25 meters. The southern border of the lot is comprised of a large speleothem covered boulder located against the cave wall.

The eastern boundary of this Lot was defined by a line of deteriorating rocks and boulders that created a wall almost a meter in height and half a meter wide. Some of this material from this decomposing wall covered the sloping floor of Lot 10. The northern border of the lot contains a human constructed niche that measured 5.32 meters wide. This niche has been symbolically classified as a modified cave within the cave and was probably an area of ritual activity. In addition to the human remains recovered in this lot, ceramics and a metate were also recovered.

Forty-four skeletal fragments were recovered from Operation IV Lot 10. Much of the human skeletal material discovered in this lot was covered in calcium carbonate, indicating they were left in an area that was either wet or seasonally wet. A vast majority of the skeletal material recovered from this area was unidentifiable. Identifiable material include five rib fragments, a distal femur fragment, two vertebrae fragments (one cervical fragment and one probable lumbar fragment), and numerous humerus fragments. All of the remains were adult, and the only indication that the individual might have been a female would be based upon the gracile nature of the humerus fragments since the not enough of the distal end remained to perform metric and morphological analysis. The probable lumbar vertebra fragment suggests a possible laborious life style based upon the lipping and spondylophyte formations on the body fragment which would be indicative of arthritis.

## Operation IV Lot 11 Sublot C

The northern border of Lot 11 was defined by multiple speleothem formations along the north and northeastern boundary. The lot sloped downward from the northern
border to the southern border in a series of natural flowstone steps. Lot 11 consisted of an open room with three discrete spaces at its southern border. These discrete areas were given sublot designations A, B, and C. Ceramics were found in all of these sublots, however skeletal material was only discovered in Sublot C. Sublot C was an alcove that measures 1.67 meters wide and 3.3 meters in length located southwest of Lot 11 Sublot A. The alcove sloped southward into a deep inaccessible pit located on the western edge of the alcove. While much of the alcove floor consisted of stones, this western extent was comprised mostly of a clayish soil. A third of the alcove floor consisted of another deep pit. Overall the soil in this sublot was damp to wet in many places due to active formations above. Such wetness was not noted for the other sublots in this lot.

Human skeletal material recovered from this area was limited to one small unidentifiable cranial fragment from an adult of unknown age and sex. The scarcity of skeletal material in this area seems odd; given other secondary deposits within the cave consist of more skeletal material. This may represent a secondary deposit associated with a ritual event, or it may just be caused by movement within the cave.

## Special Deposit 1

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included The only human skeletal material recovered in association with this jute cache was an adult proximal pedal phalanx. It seems likely that such secondary placement was probably ritual reuse that either came from within the cave or elsewhere on the surface. For this reason, sacrifice as the means of death cannot be accurately determined for this individual.

## Special Deposit 3

Special Deposit 3 was located between massive boulders in the northwestern area of Operation IV. The area leading up to the niche was twilight; however the deposit itself was located in the dark zone that has been created by the boulders. Access to this area was restricted to an opening between rocks that measured 29 centimeters wide and 1.21 meters high. The niche was ovate in shape with the opening of the niche located on the southeast edge of the niche. The niche measured 1.42 meters southeast to northwest, 96 centimeter northeast to southwest, and the height of the space ranged between 93 and 53 centimeters. The walls on the interior of this niche were formed by curtain formations, indicating a once previously wet context. The northern area of this niche was a now dry depression which was either wet in prehistory or flooded seasonally. This dry pool measured 55 centimeters east to west and 29 centimeter north to south.

Over 100 bone fragments were recovered from this area; much of it was recovered from the now dry pool and thus has calcium carbonate deposits on their surfaces. Two long bone fragments could not be recovered from this deposit because they were cemented in place with calcium carbonate on the northern wall of the pool. Two individuals were present based upon the two pairs of calcanei, two pairs of radii, quantity of thoracic and lumbar vertebrae, two left ulnae, two pairs of scapulae, and two right second metacarpals. However, both adult individuals were significantly incomplete suggesting they were both secondary deposits. Further indication that they were secondary deposits is the minimal quantity of ribs and phalanges recovered from the deposit along with the size of the niche which barely provides enough room for one
fleshed individual let alone two. Indications of medical conditions were suggested by the lipping, macroporosity, and crushing of a lumbar vertebrae body; all of which is consistent with arthritis. The second lower premolar on one of the individuals showed indication of an abscess. There was also faint indication of porotic hyperostosis based upon pin prick porosity on a frontal bone fragment.

The layers of calcium carbonate on much of the bone made morphological and metric sex and age estimation difficult. The two os coxae (which were from the same individual) appeared to be female based upon the right greater sciatic notch. The deteriorated pubic fragment associated with these os coxae has some horizontal undulations consistent with Phase 2 or 3 of the Todd Pubic Symphysis System, indicating a young female probably 20-24 years of age. The distal morphology of a right humerus fragment confirmed the presence of a female in the deposit based upon an oval shaped olecranon fossa, symmetrical trochlea, spool shaped trochlea and the angle of the medial epicondyle (Rogers 1994). Based upon the comparison of available matching bones in this deposit, a difference in size and gracility of the bones due to sexual dimorphism was apparent. The presence of an older male in the deposit was confirmed by the mandible with tooth resorption and male morphological traits. The arthritic lumbar vertebrae found in this deposit probably belong to him.

## Summary for Operation IV

Operation IV Lots 05,10 and 11C are similar to the odd and incomplete assemblages of bones indicative of secondary placement recovered from Operation III. Scenarios that seem likely for this deposit include possible association with a ceramic
offering prior to breakage, movement from another deposit within the cave, or secondary offering of an ancestor who may have died by other means and decomposed elsewhere outside the cave. At the lot level, the minimum number of individuals represented in Operation IV is one child and five adults (one female in her early 20s, an older male, and three adults of undetermined sex). However at the Operation level, one child and three adult individuals are represented. This reduction to three adults is based upon complete and fragmentary humeri recovered from Lot 10 and the Special Deposit 3. These three individuals consist of an older male, a female in her early twenties and an adult of unknown age and sex. It is highly possible that the one tooth discovered that indicates the presence of a child may not actually represent the sacrifice of a child.

## Operation V

Operation V is the most southern chamber of the cave. This chamber is also located at a lower elevation than much of the cave and all of it is located in Dark Zone. It is one of the more extensively modified chambers in the cave and is noted as one of the areas in the cave that experiences changes in seasonal flooding and water inundation. After the trail system that winds through Operation IV and VI, one can enter this Operation through a small opening on the most northeastern boundary of the Operation. The chamber is roughly 75 meters in length from northeast to southwest, and ranges between five to 25 meters in width from northwest to southeast. The floor of the chamber generally slopes downward toward the southwest with the exception of the narrowing passageway before Operation V Lot 1. A trail runs through the entire Operation, beginning in the northeast in Lot 6, continuing down a slope and past terraces in Lot 7,
and through Lot 3 before continuing along the northern wall of both rooms which comprise Lot 1 .


Figure A.5. Operation V indicated by darkened area. Map reproduced with permission from Nancy Pistole. Modified by C. L. Kieffer.

## Operation V Lot 1 Sublot C

This sublot is located in the first room of Operation V at the base of a slope which is comprised of Sublots A and B to the north. This room measures approximately ten meters north to south by 5.25 meters east to west. Sublot C is the more eastern portion of the muddy ditch located along the southeastern wall in the room located in the southeast portion of Operation V. The seasonally inundated muddy depression ranges between one to two meters wide north to south and extends the entire length of this room. The vertical restriction over the muddy deposit is at its highest only a meter and a half tall. This muddy ditch continues under low hanging formations into the room to the east, where it is considered Sublot E. Because these areas are interconnected and seasonally flood, the MNI for these areas will be calculated together.

## Operation V Lot 1 Sublot E

Sublot E is located in the second room of Operation V , to the west of the first room. This second room is connected to the first room via a compacted trail along the northern extent of the room. Between this room and the second room is a cluster of numerous columns that covers an area 2.5 meters east to west between the two rooms. The niche between these columns was the focus of numerous burning events. The second room measures roughly six meters north to south and 4 meters east to west. Sublot E was the seasonally inundated muddy depression that measured one to 2 meters in width along the southern wall. Due to this sublot's association with sublots C and G , the MNI for these areas was calculated together.

This second room was morphologically similar to the first in that the floor and ceiling drastically sloped downward as one traveled south in the room. The vertical restriction over the muddy depression in the room was also low, no greater than a meter and a half. The only other skeletal remains that were discovered in this room outside of the muddy depression were the remains of a child associated with blue pigment located along the western wall of the room along the slope. These remains however were not recovered prior to looting. Much of the skeletal material in the muddy deposit showed signs of secondary placement, including the stacking of long bones. However, a foot was noted in anatomical position plantar surface up. Such a position would indicate the individual was deposited or left in a prone position. Because this foot was found along the periphery of the muddy deposit, it seems possible that the secondary placement of
bones may have been conducted to clear and establish a ritual space in the muddy depression.

## Operation V Lot 1 Sublot $G$

Sublot G is not located on the original map of Midnight Terror. It is a small room located to the east of Sublot A. This area consists of a 60 centimeter diameter shaft that extends for 2.25 meters before opening into a small ovate shaped room no taller than 1.40 meters tall which measures 3.20 meters northwest to southeast and 1.92 meters northeast to southwest. This room terminates at a restriction 90 centimeters long and 30 centimeters wide. The northeast aspect of the room contained a looters pit which has disturbed the bone within the room. The room was humid and barometric pressure changes between the rest of Lot 1 and the unmapped passage beyond the final restriction created alternating sucking and blowing breezes in the passageway depending upon the time of day. These conditions in addition to insect activity, culminated in the greatest taphonomic damage to bone in all of Lot 1.

Over 50 bone fragments were removed from Sublot G. The presence of at least two adult individuals was determined based upon two pairs of fragmentary ulnae and humeri. The distal ends of a right and left humeri in this deposit is suggestive of the presence of a female based upon spool shaped trochlear outline, symmetrical trochlea, oval olecranon fossa, and medial epicondyle angle (Rogers 1994). This is supported by a right proximal humerus fragment with a head diameter of 38.40 millimeters. The presence of another left humerus fragment with a significantly larger deltoid tuberosity and an os coxa fragment with a narrow greater sciatic notch indicates a male is also
present in the deposit. Of the two mandibles present, one is complete enough to note an incomplete eruption of the third right molar with a more masculine broad chin. This suggests that the male in the deposit is probably under 21 years of age. However the minimum number of individuals for this sublot is three due to the presence of a left juvenile parietal. Due to the incomplete nature of these individuals and minimal recovery of hand and foot bones, secondary deposit is likely. Due to close proximity to Sublot C it seems likely that some of this skeletal material may have derived from that area. For this reason, the MNI for these areas was calculated together.

## Summary for Operation V Lot 1

Over 820 bone elements were collected in all of the sublots of lot 1 . Cut marks were found on at least twelve bones found in this deposit, more than any of the other deposits. Most of these cut marks were on long bones such as the femur, tibia, fibula, and humerus. Some of the more interesting cut marks included one on a sternum and another on a cranial fragment that was indicative of scalping. There was also a case of two puncture wounds on the parietal of a juvenile (Figure A.6).


Figure A.6. Image of V-01 E-508, a juvenile parietal with two puncture wounds. Photo taken by C. L. Kieffer.

At least 17 individuals are scattered throughout these sublots, with a majority of them deposited in sublot C. Of these 17 individuals, 11 of them are adults based upon the number of mandible fragments. However, only eight of these individuals are represented with other skeletal elements. This suggests that at least three individuals were secondary deposits. Of these eight adults, only six of them could be sexed based on morphology present on the distal humeri. Three of these individuals were females, four were male, and one could not be determined due to a lack of available humeri. Differential preservation and lack of full recovery throughout the sublots caused only three of these 11 adults to be sufficiently recovered. There was only enough evidence on one mandible, select vertebrae and femora to suggest the presence of one older adult due to dental pathology and arthritic conditions. A lytic sacrum that was short and broad in shape
suggests this older individual may have been one of the females in the deposit.
Morphology on the lunate surface of two adult ischium confirm the presence of young individuals. Minimal dental wear and other indicators of degenerative disease, 10 of these individuals are presumed to be young adults.

The presence of at least six subadults was noted in lot 1 based on the number of clavicles and iliums. Based upon stage of development, one subadult was determined to be perinate to one year old. The development of multiple long bones in the deposit allowed for the determination that three of the children were five to six years of age while another was one and a half to three years old. The more advanced stage of epiphyseal fusion on multiple bones allowed for the determination of an older subadult estimated to be between ten and fourteen years of age.

## Operation V Lot 2

Operation V Lot 2 is a sloping open space flanked by a rock on the north, a stalactite and stalagmite on the southwest and by a stalagmite on the southeast. The area measures approximately 4.93 meters north to south, and 6.57 meters east to west and the ceiling height ranges between 2.30 to 1.30 meters. A substantial amount of bones were evenly scattered throughout the lot, with many cemented to the cave floor. Much of this cemented bone is located in a 1.8 meter wide drainage trench that runs five meters in length north to south. The depth of the trench varies from 49.2 centimeters at its deepest to 26 centimeters at its most shallow. Some of the bone had been crushed, but much of it was analyzed in place because any attempt to remove the bone would have destroyed the bone and damaged the cave.

Only 66 skeletal elements could be removed from this deposit. Much of the remains could not be removed without damaging the bones and the cave. For this reason the MNI for this deposit is based off of material collected and field notes which documented other bones that could not be recovered. With material that was removed, the presence of a child estimated three to six years of age is indicated by the size and incomplete proximal epiphyseal fusion of ulnae fragments, a femur fragment with an unfused head, tibiae, a rib, and a fibula. In situ analysis of the remains documented four pairs of femora were documented in place because they are cemented into the cave floor with calcium carbonate. Based upon femoral head diameters, two individuals were male and the other two were female. Age for these adults could not be determined due to layers of calcium carbonate which obscured any age indicators.

## Operation V Lot 3

Lot 3 is located in the southeastern portion of the large chamber of Operation V. The western boundary is the cave wall that separates this Lot from Lot 1 to the west and the eastern boundary is the main pathway that extends through Operation V, and the northern boundary is defined by the pathway that leads to Lot 5 . The Lot measures 3.7 meters north to south, 3.8 meters east to west, with a vertical ceiling height of 3.7 meters in the center of the Lot. Within this Lot is a set of terraces (previously described as Terrace 3) that measures 3.4 meters north to south, 3.6 meters east to west (Saldana and Kieffer 2009). These three steps, which average 1.5 meters in width north to south are approximately 20 centimeters in height, descending eastward.

The proposed use of these platforms has been stated by Dr. Jaime Awe and other individuals on the project (Brady and Kieffer 2011, 2012; Saldana and Kieffer 2009) as viewing platforms for a semi-public ritual. From this set of terraces, it is possible to see the alter and speleothem column (previously described as Speleothem 3) of Lot 4 and the alcove in Lot 5 (Saldana and Kieffer 2009). This Lot does not appear to be inundated with water seasonally or in large quantities during prehistory. While the vantage point of these stairs appears to focus on areas of ritual activity, it appears that care was taken in their construction and location to insure minimal erosion over time.

Approximately 30 fragments of crushed and badly deteriorated bone were recovered from this area. Much of these remains were coated in calcium carbonate indicating they were left in a watery deposit for a prolonged period of time. Multiple fragments (including a left tibia, left femur, and a proximal humerus fragment) indicate the presence of a juvenile approximately 6-10 years of age. The fragmentary nature of the rest of the assemblage precludes determining if another individual is present.

## Operation V Lot 4

Lot 4 is located east and adjacent to Lot 2. The overall size of the Lot measures approximately 9.5 meters east to west and ranges between 6 meters to 7.8 meters north to south. The ceiling high of the Lot varies, measuring 2.35 meters at the northern border and 0.97 meters at the southern border. The variability in ceiling height is caused by the ground and ceiling of Lot 4 slopes toward each other as it approaches the southern and eastern borders. Lot 4 and Lot 2 are separated by a drainage trench that extends from the ceiling breakdown at the northwest border of the Lot and extends south 0.8 meters. This
trench, which is incorporated into Lot 4, terminates in a wet area that parallels the southern wall of the cave for half a meter. Much of the bone in this Lot was discovered cemented in and adjacent to the drainage trenches.

The largest natural feature amongst the breakdown in the northern extent of this Lot includes a speleothem column (Speleothem 3), which is an area of ritual activity based upon the scatter of human remains around its base. Some of this material is intermixed with loose sediment, which may be the result of looting activity. Less than a meter away from this speleothem is a large flat piece of breakdown. The size of this boulder measures 1.45 meters north to south and 1.4 meters east to west, and stands half a meter tall. This stone was an area of ritual activity, possibly an alter, based upon its large size, flat surface top, abundance evidence of burning, ceramic sherds, and skeletal material discovered around it. Some of the sediment around this proposed alter is turned up, indicating that incomplete recovery of skeletal material in this area may be due to looting. This lot is actively wet from dripping stalactites hanging from the ceiling. This has caused the ground to be wet with loose soil and stalagmites. Under the loose wet soil is a more compacted damp to muddy clay, which be a modified floor. Complete recovery of the moist bone could not occur due to trampling and water damage. Also within this Lot was a low density of surface ceramic sherds and jute shells.

Over 98 bone fragments and bone were recovered from this deposit. Calcium carbonate is on a number of the fragments, but not all of them. At least two individuals are present based upon the number, size, and side of the tibia fragments in the deposit. The younger individual in the deposit is probably around 4-6 years of age based upon long bone length, incomplete fusion of thoracic vertebra epiphyses, unfused ischium, and
the thin cranial vault fragments. The other individual is a young adult under 20 years of age based upon the incomplete fusion between the first and second sacral vertebrae. This individual is probably a male based upon sacrum morphology and well developed muscle attachments present on other long bones in the deposit.

## Operation V Lot 5

Lot 5 is a large alcove located west of Lot 2 . The lot measures three meters north to south, 2.53 east to west, and the height ranges between three meters to 4.5. The entrance of the alcove is defined by a placed stalactite that may have been used to define the extent of space, and aspect required to animate space prior to ritual. This restriction and defined space is also demonstrated by the other placed stones that create a narrower entrance to the alcove than the actual size of the alcove. The eastern boundary is defined by a floor to ceiling column (previously described as Speleothem 4). The southern boundary of the alcove is defined by a natural ledge with minimal cultural material located 24 centimeters above the floor. The ledge measures 82.5 centimeters long and 43 centimeters wide. There is evidence of blackening and charcoal deposits along all boundaries of the alcove. There was a large amount of cultural material along the floor, which included human bone, ceramics (including a large almost complete bowl), and 47 human teeth. The majority of the teeth were found in the eastern corner of the Lot.

West of the alcove there was a terraced area consisting of two steps. This area was recorded at Terrace 3 (Saldana and Kieffer 2009). The top step measured three meters long, 63 cm wide, and 18 centimeters tall. The bottom step measured 3.04 meters long, 1.09 meters wide, and 32 centimeters tall. The viewing advantage from these steps was
limited to partial view of activity within the alcove in Lot 5. Although the steps face the general direction of Lot 1 , activity occurring in Lot 1 would still not be visible due to large mound formation prior to Lot 1 and the angles of the slopping ceiling and floor in Lot 1.

One hundred and fourteen bone fragments and teeth were recovered from this deposit. Almost a third $(\mathrm{n}=37)$ of this deposit consisted of teeth. The presence of a child between four to eight years old is indicated by an undeveloped right and left talus. However the dentition in the deposit indicates that at least two other adults are present. The remarkably low quantity of skeletal material present for three individuals suggests that the rest of these individuals may have been crushed, deteriorated by water, or be located in another deposit.

## Operation V Lot 6

This Lot is located in the northwest portion of Operation V. The Lot measures roughly 18.9 meters north to south, and 8.2 meters east to west, with a ceiling height of approximately 6 meters. The northern boundary of the Lot is defined by the cave wall and the entrance into Operation V. The western boundary is defined by the path that transects Operation V and is adjacent to Lot 7. This western border is northwest of Lot 4 but not adjacent to it. The floor of Lot 6 is wet and slopes downward from east to west. The southern boundary is defined by a large piece of ceiling break down that measures 50 centimeters by 30 centimeters. While the eastern border of Lot 6 is defined by the natural cave wall. There are two drainage trenches that that extend through this lot from north to south. These drainages continue down the sloping area to the cave wall. Some ceramics
and human skeletal material was recovered from these drainages and more was exposed in subsequent seasons.

Lot 6 contains another set of terraces (previously described as Terrace 2) (Saldana and Kieffer 2009). This set of terraces consists of four steps that extend downwards from north to south on an otherwise steep slope. The first step at the north measures 80 centimeters in width east to west and 70 centimeters deep north to south and 20 centimeters in height. The second step measures 1.7 meters wide east to west, 1.1 meters deep north to south, and 25 cm in height. The third step measures 1.4 meters wide north to south, 95 centimeters deep north to south; and 26 cm in height. The fourth and last step measures 1.2 meters wide east to west, 1 meter deep north to south, and 30 centimeters in height. Some ceramics (mostly red slipped) were discovered on these steps along with a possible jade pendant with a face carved into it. Similar to the terraced steps in Lot 3, these steps were placed in a slightly drier location. Their function as primarily viewing platforms and alters rather than stairs down the slope is indicated by the lack of stairs down the rest of the steep slope through Operation V. The positioning of these steps allows for optimal viewing of most of Operation V's largest chamber, including activity around Speleothems 1, 2, 3, and 4. However, activity in Lot 1 would still not be visible from these terraces.

Over 200 bone fragments were recovered from this deposit. A fourth of these fragments were too fragmentary to identify. The large quantity of smaller bones such as metacarpals and phalanges from this deposit suggests that this was a primary deposit location. However, the absence of much of the other skeletal material suggests that much of the remains were moved to another location. Based upon the skeletal material removed
from this deposit, at least three individuals are present. A femur fragment with an unfused lesser trochanter indicates one of the individuals is roughly 7-12 years of age. The size of a right humerus fragment indicates an even younger individual around one to two years old is also present in the deposit. The rest of the remains, including many of the metacarpals and phalanges belong to an adult of unknown age or sex. Trauma noted in this deposit includes a possible defensive wound on the posterior surface of the adult's manual phalanx, which could have been obtained while the individual was shielding themselves.

## Operation V Lot 7

Lot 7 is the largest lot within the chamber, measuring 12.5 meters north to south, and 9 meters east to west. The floor of this Lot slopes downward as one moves southeast through the Lot. The eastern boundary of Lot 7 is defined by central pathway that transects Operation V, while the western boundary is defined by the natural cave wall. The northern boundary is defined by north chamber entrance, while the southern boundary extends to the sloping floor near a stalagmite 1.5 meters tall located near Speleothem 1.

Located near Speleothem 1at the northern area of Lot 7 is a set of terraces which have previously been designated Terrace 1 . These terraces consist of four well defined steps and a lower eroded and looted fifth step, which could not be defined well enough to measure. The overall surface area of this terraced area measures 4.3 meters north to south and 3.2 meters east to west. The most northern step is first and highest step in the terraced section. The first step measures 1.4 meters wide east to west, 85 centimeters deep north to
south, and 53 centimeters in height. A small 25 by 25 centimeter section of step one has been carved out, and the quantity of carbon indicates it was an area of heavy ritual utilization. Descending down, the second step measures 3.2 meters wide east to west, 1.4 meters deep north to south, and 80 centimeters in height. After the second step, the natural slopping cave floor continues a little ways before the third step. The third step measures 2.9 meters wide east to west, 1.2 meters deep north to south, and 50 centimeters in height. Descending down further, the slightly eroded fourth step measures 3 meters wide north to south, 1.1 meters deep east to west, and 40 centimeters in height. Two looters pits, each a little over one meter in diameter, were noted on the southwest corner of the terrace. Minimal skeletal material (a rib fragment and a premolar) were recovered from looter's backfill.

These terraces, much like those in Lot 6, exist to level out a rather steep slope in the cave. Similar to the other terraces in Lot 6, their function as merely stairs seems unlikely since they do not extend all the way down the slopping cave floor. The positioning of these terraces appears to allow for easy viewing of any activity occurring around Speleothems 1 and 2, with no line of sight available into Lot 1 . The heavy deposits of charcoal on every step (especially steps two and three), sometimes in circular patterns approximately seven to nine centimeters in diameter, suggests a dual function of these steps. In addition to viewing platforms, they may have also been utilized as alters for burning.

Speleothem 1 is the most impressive column in Operation V. The column measures 5.5 meters in height and approximately 5 meters in circumference. The base of this speleothem is surrounded by a scatter of human skeletal material. Between the 2008
and 2009 field seasons additional bone material was discovered in this area which had previously been collected. Speculations among the crew were that the material may have come from the looter's pits by the terraces or was eroding out of the cave floor. No excavations were performed to confirm or refute these assumptions. Numerous cranial fragments, teeth and single long bone were recovered from this scatter of bone. Much of the rest of the skeletal material was severely damaged due to water erosion and trampling.

Speleothem 2 is located 2.2 meters west of the natural cave wall and near Speleothem 1. This speleothem is also located near the western entrance into Operation V , which is located along a ledge that overlooks Lot 7. Speleothem 2 is less impressive, measuring only 2.9 meters in height. Some charcoal was discovered between the speleothem and the cave wall, indicating this actively wet speleothem was a location of ritual activity. Human skeletal material was discovered between Speleothem 1 and 2, however the lack of skeletal material around Speleothem 2 indicates that this material is more associated with Speleothem 1.

Approximately 150 fragments were removed from this deposit. Calcium carbonate was present on some of the bones, but not all. The presence of two probable male juveniles (no older than nine years old) was determined based upon the size, morphology, and unfused distal epiphyses of two sets of humeri fragments. Much of the smaller bones in the deposit which include teeth, phalanges, metacarpals, metatarsals, shaft fragments, cranial fragments, vertebrae, and ribs belong to an older adult based upon the evidence for arthritis on one of the thoracic vertebrae.

## Summary for Operation V

While looting and trampling may have taken their toll on the lots and sublots of Operation V, incomplete recovery of individuals from the deposits may also be due to transportation of skeletal remains after decomposition. Evidence to support this argument includes the relatively minimal skeletal material recovered in Lots 6 and 7. These deposits also contained a higher than expected minimum number of individuals for the quantity of bones recovered. The abundant amount of smaller bones in these deposits also suggest that a focus was on removing larger bones from the area. In addition to this, the deliberate stacking of bones in Lot 1 further suggests a secondary placement with decomposition possibly occurring elsewhere.

## Operation VI

Operation VI is located north and east of Operation V, southeast of Operation IV, and south of Operation VIII. The main pathway in the cave travels through this Operation before dropping down into Operation V. Here the trail is approximately 50 centimeters wide and passes between two small stalagmites less than a meter tall. These speleothems appear to have been the focus of modest ritual activity based upon a scatter of charcoal, ceramic sherds, and a broken speleothem. After the trail passes between these formations, it widens to approximately a meter in width where it turns in a southwest direction prior to the entrance into the Chamber that contains Operation V.


Figure A.7. Operation VI indicated by darkened area. Map reproduced with permission from Nancy Pistole. Modified by C. L. Kieffer.

Operation VI Lot 1 Sublot A, B, and C
Operation VI Lot 1A consists of an east to west alcove with a niche located on its northern wall. The alcove measures 2.5 meters east to west and 1.8 meters north to south. The entrance to this alcove is located on the northern end and has a vertical restriction of 1.4 meters, which forces an individual to crouch down to enter. This ceiling height becomes even less further into the alcove until it eventually meets the floor on the southern end of the alcove. Water actively drips down into this sublot from a higher level that was void of cultural material, and the modified stalactites on the western boundary of the alcove are actively dripping.

In the northern corner of the alcove was a 74 centimeters tall and 32 centimeter wide stalactite and a ledge. This ledge is 25 centimeters off the floor and it measures 75 centimeters east to west and 50 centimeters north to south. The 25 centimeter diameter deposit of charcoal on the ledge indicates it was an area of intense burning. This deposit had been heavily disturbed by looters. The rest of the flat floor in this alcove is also
covered with deposits of charcoal, sherds, and human remains. The extent of burnings in this area is also apparent from the extensive fire-blackening of the ceiling. The southern boundary of the alcove also has a concentration of ceramic sherds, human remains, and charcoal, which may have been swept into this area in antiquity. A similar deposit of ceramics was noted in a deep crevice along the eastern section of the southern wall.

Operation VI Lot 1B consists of a small crawlspace located east and adjacent of Sublot A. This crawlspace measures 3.2 meters east to west and 2.5 m north to south. The crawlspace can be entered through an opening in the southern wall of Operation VI Lot 5 or via the actively wet eastern entrance from Sublot A which measures 70 centimeters wide and 64 centimeters high. The access to this area has been maintained through time by breaking formations in both of these access points. The crawlspace contains a scatter of human remains with appear to be a secondary deposit. Additional human remains and ceramic sherds were recovered from a passage below the crawlspace. Material in this passage appears to have possibly fallen in via one of the openings on the sloping floor of the crawlspace that runs parallel to it. The opening in the center of the crawlspace is 70 centimeters in diameter while the one located along the southern wall measures 50 centimeters east to west and 20 centimeters north to south. The majority of the bones in Sublot B were recovered beneath the entrance from MTC-VI-05, and it seems probable that much of this material washed or fell in from that lot.

Operation VI Lot 1C is a circular shaped leveled area along the western wall of the cave. Water actively drips down into this sublot from a higher level that was void of cultural material. This area takes advantage of naturally occurring flowstone curtain which undulates along the cave wall to create a sense of bound space. This bound space
measures one meter northeast to southwest and 83 centimeters northwest to southeast. The southern cave pathway, which was included in this sublot, makes the overall measurements of Sublot C 2.3 meters northeast to southwest and 1.5 meters northwest to southeast with a vertical restriction of 5.65 meters. Sublot C is accessible via the main cave pathway on the east or from a smaller pathway to the north.

Four broken speleothems half a meter in length were placed along the southern boundary to further create a sense of enclosed space. While, a larger 65 centimeters long speleothem was placed against a stalagmite in the center of the space. Around this central stalagmite numerous sherds, human remains, and charcoal were discovered. The southern portion of the undulating flowstone curtain was actively dripping when it was recorded. This flowstone formation includes a ledge 1.15 meters off the ground that measures 40 centimeters wide northwest to southeast and 68 centimeters long northeast to southwest. Much of the flowstone curtains in this area were fire-blackened, further indicating the area was used for burning related rituals.

Over 230 bone fragments were recovered from the sublots of Operation VI Lot 1. These remains account for two individuals. The adult was scattered throughout sublots A and B , but was probably originally a primary deposit due to the quantity of smaller bones present. The subadult in these sublots was rather underrepresented. This may be due to movement to or from another deposit or suggest they may have been secondary deposits. It is also possible that incomplete recovery of the area or taphonomic processes may be account for some of their skeletal elements being absent.

The subadult in this lot is approximately nine years of age based upon the incomplete fusion of the femoral head and greater trochater along with the incomplete
fusion of the distal epiphysis of the ulna. This individual has a perimortem cut mark on the lateral surface of their right tibia as well as cut marks on a frontal fragment near their orbital region. Due to the bones present in the deposit age could not accurately be determined. Due to the absence of any obvious degenerative and pathological conditions, it is assumed that the adult was young. Based upon morphological and metric analysis of the femora and humeri in the deposit one the adult was probably a female. Numerous cut marks were also found on the adult female's left femur, right below the greater trochanter.

## Operation VI Lot 2 Sublot A, B, and C

Lot 2 is comprised of multiple features along the main cave pathway to Operation V . The area of the entire lot measures four meters north to south and approximately 4.5 meters at its widest east to west. Sublot A is located along the north to south area of the cave path. This rectangular shaped area measures 2.5 meters north to south and 1.9 meters east to west. The eastern wall of this area has a looted charcoal deposit that measures 40 centimeters by 30 centimeters located near a speleothem that borders the northwest border of Lot 1 . Also along the eastern wall was a small niche which measured 25 centimeters east to west and 40 centimeters north to south. This niche contained a small deposit of child and adult human remains. The other deposit of bone recovered from this sublot was adjacent to this deposit located on the center of the cave path. Just west of this pathway was a large speleothem column with a naturally formed water feature at its base. Ceramic sherds and human remains were also recovered from the mud
in this area. North of this water feature was a pile of stone and speleothem fragments as well as a pile of ceramic sherds located slightly more northwest.

Sublot B is an alcove locates along the southern portion of the western cave wall, and curves behind the speleothem column in Sublot A. This alcove measures one meter wide east to west and 2.3 meters north to south with a vertical restriction of approximately three meters. Flowstone curtains within this area have evidence of breakage, and much of the western wall near a natural ledge along the alcove wall was fire blackened. The ledge is located 1.2 meters off the floor and measured one meter north to south and one meter east to west.

Two pits north of the alcove were included in this sublot. The first pit measured 1.2 meters east to west, one meter north to south, and 50 centimeters deep. The more northern pit, located 50 centimeters away from the first, measured one meter north to south, 75 centimeters east to west and 50 centimeters deep. These pits were full of loose rocks, speleothems, ceramic sherds, and human remains.

Sublot C is located in the most eastern portion of Lot 2. The sublot measures 2.6 meters east to west and 2.5 meters southeast to northwest and runs the entire length of the cave path. This sublot includes part of the cave path that dramatically slopes down from a northeast to southwest direction at a 30-45 degree angle. The eastern boundary of sublot is defined by a fallen cave formation that created an overhang. This overhang creates a 1.5 meter deep niche along the eastern wall that has a vertical restriction of 1.5 meters. At the base of this overhang, a scatter of charcoal, some small ceramic sherds, and a spirelopped jute were recovered.

Almost 520 bone fragments were recovered from the sublots of Operation VI Lot 2. Two individuals are distributed throughout these deposits, with a focus of skeletal material recovered from sublot $B$. The adult in the deposit appears to be a primary deposit due to the quantity and type of material recovered. Metric analysis of a femur diameter and scapular glenoid height produced inconclusive identification of sex. However the chin and mastoid process morphology indicates a probable male. Based upon the fused second and third cervical vertebrae and indication of spina bifida (Figure A.8), this individual probably suffered from Klippel-Feil Syndrome (Kieffer 2013). Additional abnormalities included slight porosity throughout the cranial bones and supernumerary incisors (Figure A.9). The second individual in this deposit was a juvenile around five to six years of age based upon the stage of fusion for the thoracic vertebrae and the size of the long bones present in the deposit. This juvenile had perimortem cut marks present on one of his or her humerus fragments.


Figure A. 8 (Right) VI-02B-125, sacral fragment with spina bifida. Photo taken by C. L. Kieffer.
Figure A. 9 (Left) VI-02B-36, maxillary fragment with evidence of supernumerary teeth. Photo taken by C. L. Kieffer.

## Operation VI Lot 3 Sublot D

The entrance to Lot 3 is located to the west of the entrance down to Operation V. The small triangular entrance to this lot measures approximately 50 centimeters high and 40 centimeters along the floor. Past this narrow entrance there was a meter in diameter tunnel passage (Sublot A) that extended in a north to south direct direction for 3.24 meters before turning in a more northwest to southeast direction and descends at a 45 degree angle for 1.84 meters. Along the northern walls of both of this passage was an alcove (Sublots B) approximately one square meter in size. This first passageway terminates at another restriction that measured 57 centimeters high and 42 centimeters wide. There was a second narrow tunnel passage (Sublot C) that extended another two meters at the same 45 degree angle. Along the northern walls of this passage was another alcove which was demarcated at Sublot D. This alcove measures 75 centimeters wide, 42 centimeters high, and extends west into the cave wall for almost one meter. Both of these alcoves had evidence of burning and ceramic sherds were recovered from these areas, however human skeletal material was only recovered from the muddy area of Sublot D.

Only 28 skeletal fragments were recovered from Sublot D. Most of these elements consisted of ribs and vertebrae. Perimortem cut marks were noted on a left femur and left radius fragment discovered in this sublot. These bones may represent a primary deposit or a secondary movement of material from another location. Due to the minimal material recovered, these skeletal elements will be included with the analysis of Sublot E, which is the closest area with skeletal material.

Operation VI Lot 3 Sublot E

After crawling through this continuous passageway, the room opens up to but the floor continues to slope at a steep angle for another 2.73 meters. The initial portion of this room is Sublot E. This room measures 3.18 meters north to south and 4.57 meters east to west. The southern extend of this room contains a hardened pool of calcium carbonate that measures three meters north to south and 2.49 meters east to west. Numerous bones (some of which could not be identified due to the thick layer of calcium carbonate) and ceramics (including a shoe pot vessel) were cemented into this now dry pool. Rim stone dams along the bank of this pool indicate previous seasonal changes in the water line may have occurred, and the room was actively dripping when recorded. Through exploration of Operation V during collection of this area, it was determined that this once wet area may have supplied water to the stream that washed into Operation V. Therefore it may be possible that skeletal material from this area may have washed into Operation 5.

Most of the bones from this sublot were collected on the bank of this pool, much of them appeared to be stained red. It is however important to note that much of the bone had been disturbed since the previous season when this deposit was initially discovered. Some of the bone in this deposit could not be removed, but smaller bones such as ribs and vertebrae suggest that a primary deposit may have occurred. In fact the ribs and vertebrae of one individual were still semi-articulated as though he had been washed down the initial slope in the room and cemented to the cave floor. At least four broken skulls coated in calcium carbonate were documented. However the calcium carbonate prevented accurate metric and morphological characteristics from being recorded. The only non ceramic cultural material recovered from this room included a shell pendent along the southeast deposit of the calcite pool.

One hundred fourteen bone fragments were recovered from Sublots D and E. The presence of three adults was indicated by the number of femora recovered from this deposit. The morphology on two left distal humeri indicates that two of these three individuals were males. Porosity was noted on at least one of the individual's cranial fragments that were recovered. Cut marks were noted on an adult left radius fragment, humerus shaft fragments, and a left femur fragment. It could not be determined if these cuts were sustained by the same individual or different individuals in the deposit. A subadult estimated to be around 15 years of age was also discovered in this deposit based upon the stage of femoral head and trochlear crest fusion. This brings the MNI for Sublot D and E to four individuals.

## Operation VI Lot 3 Sublot F

Sublot F is located along the northwest wall of Lot 3's main room, 93 centimeters from the entrance into to the room. This area is demarcated as an actively wet muddy depression that measured 99 centimeters east to west and 80 centimeters north to south. This muddy depression contains the remains of at least two infants. The only cultural material found with these children were fragments of a shell ring. The children were placed next to each other, one with its head toward the wall and the other away from the wall.

Most of the bones of the two infants could not be removed without damaging them. Two femurs (one from each child) was removed for possible future testing. Based upon the measurements of the infants long bones in situ and dental eruption, they were approximately six months old (+/- three months) at the time of death. Their discovery in a
primary deposit within a wet watery context is highly suggestive of sacrifice. The 10 fragments recovered from this deposit did not change the minimum number of individuals present.

## Operation VI Lot 3 Sublot G

The room designated as Lot 3 is divided by columns and stalagmite formations. These formations create the western boundary of the calcite pool described in Lot 3E. To the west of these formations is Sublot G. This area measured 4.13 meters northeast to southwest, 4.49 meters northwest to southeast with a 1.5 meter vertical restriction over the calcite pool in this area. Along the southwestern wall in this room was a niche that measured 80 centimeters with, 42 centimeters tall, and extends in a meter. Throughout this area there are numerous crushed fragments and adult long bones.

Inside the alcove, bones were visible but could not be removed due to the calcium carbonate. A total of six femurs (three left and three right) indicated the presence of at least 3 adults. In the southern portion of the calcite pool outside the alcove, an os coxae, vertebrae, skull fragments, and long bones (including the femora) were present. Morphology of the os coxae suggested the individual was a male. The number of small bones present in this sublot suggests that these individuals were primary deposits that may have been move via water and people prior to eventually becoming imbedded in the calcite. The total number of individuals in this deposit was four adults, one of which was probably male. Forty-one additional bone fragments were recovered from this sublot. Much of this material consisted of tarsals, phalanges, and ribs. None of this material changed the assessment of MNI, but did suggest a primary deposit.

## Operation VI Lot 4

This lot is an open space that includes a ledge and part of the main cave pathway that lead to the lower sections of the cave. The lot is oval in shape, measuring 6.12 meters north to south, 5.9 meters east to west, 4.9 meters northeast to southwest, 6.93 meters northwest to southeast, and has a high ceiling 15.34 meters above the cave floor. The southern boundary is demarcated by the sudden drop that leads to Operation VI Lot 2B. The northern boundary is defined by a flowstone formation that stands 4.35 meters tall. At the base of this is an alcove that measures 85 centimeters wide, 1.99 meters deep and 85 centimeters high. Along this northern wall there is a concentration of ceramic sherds. A looters' pit was noted in the center of this lot, measuring 87 centimeters deep. A scatter of ceramic sherds was found throughout the floor of the lot. While the extent of human remains were recovered in the southern portion of the lot which measured 2.4 meters north to south and 2.04 meters east to west. Due to the ledge at the southern boundary of the lot, it is possible that some of this human skeletal material may have fallen into Operation VI Lot 1B.

One hundred thirty-seven bone fragments were recovered from Lot 4. Eighty-five of these fragments were small and unidentifiable and another 20 of them were rib fragments. Material from this deposit was compared with material recovered from Operation VI Lot 1 B. Numerous factors determined that the adult in this deposit is distinct from the one in Lot1 B. First, all of the cervical vertebrae were accounted for the individual in Lot 1 B , and another cervical vertebra was discovered in Lot 4. Second, fragments of two distinct left femora were recovered (one from each deposit). Therefore
the fragments present in Lot 4 represent a distinct adult of unknown sex. No reliable morphological characteristic are present in the deposit that could aid in determining age.

## Operation VI Lot 6

This lot is located west of and 1.15 meters above Lot 4 in this Operation. Lot 6 measures 1.8 meters north to south and 1.7 meters east to west. The floor of the lot slopes down towards the southern boundary which is defined by a sudden drop. The western boundary is defined by a flowstone wall. The floor of this area is semi wet and muddy. A modified canine with the Ik motif was recovered from the center of the Lot. Ceramic sherds and two jute shells were also recovered from this Lot. A lack of any other skeletal material or notes of crushed bone, suggests that this tooth may have come from another deposit, and thus should not be used to determine the presence of another individual.

## Operation VI Lot 8

This lot is roughly rectangular in shape and consists of three tiers. The southern boundary of this lot is adjacent to Lot 7 and a ceramic laden path that leads to Lot 9 and the eastern boundary of the lot. The northern boundary is defined by four stalagmites roughly 3 meters in height. The western boundary of this lot is defined by shorter stalagmite formations that range between one to one and a half meters in height. These formations eventually run along the base of a much larger formation which defined the northwestern boundary of the lot. A majority of these speleothem boundaries were heavily fire-blackened, especially the western boundary. Many of these formations also contained modifications, including holes broken through curtains and notches.

The tiers in this lot are cultural modifications of the cave formed by broken speleothem formations, and by cutting, leveling and packing of the clay floor. The first, most southern tier, measures 1.85 meters east to west and ranged between 1.37 and 67 centimeters wide north to south. The western wall of this first tier is formed by a 60 centimeter tall stalagmite that was covered with a heavy deposit of charcoal and ceramics. Tier 1's floor was made of hard packed clay and covered with a scatter of charcoal and a few sherds.

The second tier is located 25 centimeters above and to the north of the first tier. The second tier measures four meters east to west and two meters north to south. This tier includes a niche in the western wall and an alter along the northern wall. The niche measures 58 centimeters deep east to west, 50 centimeters wide north to south, and has a 30 centimeter height restriction. This niche was heavily fire-blackened and contained charcoal and ceramic sherds. The altar, constructed of packed clay and broken speleothem fragments in a semi-circular formation, was 25 centimeters tall and measured 1.5 meters east to west by 80 centimeters north to south. This alter was also contained a heavy deposit of charcoal, ceramics, and faunal bones. To the west of the altar was a small looted pit 28 centimeters by 40 centimeters, south of this 23 spire-lopped jute were found under a speleothem fragment. Other material discovered on this step included a burned torch, and ceramic sherds.

The third tier is 50 centimeters above the second tier and is accessed via a one meter wide step on the eastern portion of the north wall along Tier 2. This tier measured 5.5 meters in length in a general northwest to southeast direction and varied in width between one and one and a half meters wide. This tier leads to Operation VII Lot 9, while
a tunnel (measuring 85 centimeters in height and one meter wide) is located in the northwest corner of the tier and leads to Operation VII Lot 10. The southeastern third of the tier is comprised of hard packed clay similar to the other tiers, while the other two thirds is comprised of broken speleothem formations. Much of this tier is covered with ceramic sherds and human remains were found along the western wall of the tier.

One hundred and five bone fragments were recovered from Lot 8,60 of which were too small to identify. At least one subadult individual is represented based upon a long bone fragment with an unfused epiphyseal end. No other epiphyses or age indicators were identifiable, partly due to the fragmentary nature of the deposit. Based upon the completely fused metatarsals in this deposit, the individual was at least 16-18 years old. Based upon known epiphyseal fusion of long bones, this individual was probably no older than 24 years of age. The only indicator of sex was the diameter of a radius head which indicated a probable female. The deposit most likely represents a primary deposit based upon the number of rib fragments and phalanges present. It is possible that much of the bones were too fragmentary to collect or were collected and re-used in other rituals.

## Operation VI Lot 9

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. Ten bone fragments, seven of which are os coxa fragments from an adult were recovered from Operation VI Lot 9. Morphology necessary to determine sex or more precise age on the os coxa fragments did not preserve. Based upon the few numbers of bones collected in this deposit, it seems likely that these bones are secondary placement.

## Operation VI Lot 11

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. Six bone fragments were recovered from Operation VI Lot 11. These four bones probably belonged to an adult female due to the small head diameter of the left radius fragment present in the deposit. No age indicators were present among the bones recovered. Based upon the few numbers of bones collected in this deposit, it seems likely that these bones are secondary placement.

## Operation VI Lot 12

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. Forty-two bone fragments were recovered from Operation VI Lot 12, 28 of which were unidentifiable fragments. The right ilium fragment found in this deposit had a large enough portion of the auricular surface to determine an age of 20-24 years old based upon the morphological traits. However, the os coxa was not complete enough to determine sex. Based upon the few numbers of bones collected in this deposit, it seems likely that these bones are secondary placement.

## Summary for Operation VI

Analysis based upon the discrete lots indicates the minimum number of individuals present in Operation VI is 19 individuals: 12 adults of undetermined age (two females, four males, and 6 undetermined sex), two young adults (one of which is female), three subadults (one approximately nine years of age, one approximately nine years old,
and the other between five to six years), and two infants six months old (+/- three months). Due to a lack of field notes for some deposits, this might be an inflated MNI.

## Operation VII

Operation VII is the large room located north of Operation VI and southwest of the majority of Operation VIII. A majority of this room appears to be a large modified plaza constructed of packed orange clay. This plaza is now scattered with large breakdown from the ceiling. It has been hypothesized that this break down may have occurred during an earthquake event.


Figure A.10. Operation VII indicated by darkened area. Map reproduced with permission from Nancy Pistole. Modified by C. L. Kieffer.

## Operation VII Lot 1

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. Over 560 bone fragments were recovered from Operation VII Lot 1. Many of the bones in these deposit were covered in carbon and/or some calcium carbonate, suggesting a watery sacrificial deposit. Three adult primary deposits are
suggested by the number and sides of metacarpals and metatarsals fragments. These adults range in level of completeness, with only one represented based upon lower limb bones, and two individuals represented based upon manual phalanges, rib, and vertebra fragments. This suggests possible movement, reuse, breakage, and/or lack of recovery for some of the skeletal material. Morphology and metrics from a mandible and humerus recovered from the deposit indicate one of the adults of unknown age is male. Gracile elements and a short glenoid height from a scapula present in the deposit suggest that another adult may be a young female. A heal clavicle fracture (Figure A.11) and arthritic vertebrae indicate that one of the individuals in the deposit was probably and older individual, however sex for this individual could not be determined. Three elements discovered in the deposit (a rib, a sternum, and two unfused vertebrae fragments) indicate the presence of a subadult between four to six years of age. Due to the minimal recovery of this individual, it is assumed that the rest of his or her remains are located in another deposit and thus will not be included in the MNI for this deposit.


Figure A.11. VII-01-57, a misaligned healed clavicle fracture from an adult. Photo taken by C. L. Kieffer.

## Operation VII Lot 2

Lot 2 is located in the eastern most portion of the flattened plaza area, north of Lot 12 . The northern and eastern boundaries of this lot are defined by the natural cave wall and mud covered formations, while the southern and western boundaries area defined by a fallen speleothem formations. The lot is triangular in shape with the east to west measurements ranging between 4.3 and 8.5 meters and the north to south measurements ranging between 2.5 to seven meters. The Lot is larger in the northwest, and tapers in size towards the south. The grandeur of this chamber is easily noticeable with the cathedral like ceiling located 24 meters above the leveled floor.

A scatter of ceramic sherds and charcoal was found throughout the lot, with the concentration focused along the walls and boundaries of the Lot. Human skeletal material was recovered at the base of a fallen speleothem in the western extent of this lot. An alcove was discovered along the eastern wall of this lot. The active dripping of water from the ceiling prevented complete removal of deteriorated ceramic material from water pools.

Twenty-nine bone fragments covered with calcite were recovered from around the speleothem, twenty five of which were unidentifiable. The remains present that were identifiable were from an adult of unknown age or sex. Based upon the few numbers of bones collected in this deposit and no notes of additional crushed bone in the deposit, it seems likely that these bones are secondary placement. More importantly these remains probably belong to an adult individual that has already been accounted for in another deposit.

## Operation VII Lot 11 Sublot C

## MTC-VII-11-niche

The niche from which a complete bowl (in fragments) was recovered measured 3.7 m in length and .5 m at its widest, though most of this was inaccessible as the roof sloped to the eastern wall. The niche had a roof clearance of 33 cm and a narrowest point of 25 cm . Due to these dimensions, one is only able to crawl into the space. Charcoal samples were also collected.

Five bone fragments were recovered from this deposit. Based upon the femoral head fragment recovered, the adult individual was probably a female of unknown age. Based upon the few numbers of bones collected in this deposit and no notes of additional crushed bone in the deposit, it seems likely that these bones are secondary placement. More importantly these remains probably belong to an adult individual that has already been accounted for in another deposit.

## Operation VII Lot 12

This lot is located along the eastern wall of the plaza in Operation VII. Lot 11 is located to the south, Lot 2 and fallen cave formations are located to the west, and the natural cave wall is located to the east. The northern extent of this Lot is defined by a constructed retaining wall that measures 2.6 meters east to west and stands half a meter high. Lot 12 measures 7 meters north to south and 2.6 meters east to west (tapering to 1 meter east to west at the southern boundary). A path leads through this lot from north to south, from Lot 2 and leads into Lot 11 . Most of this area has been heavily looted with two well defined looters pits both measuring approximately 1 meter in diameter and 75
centimeters deep. Human skeletal remains, chert flakes, ceramic sherds, and a chert biface fragment were recovered from this lot.

Eighty-seven bone fragments were recovered from this deposit, 62 of which were unidentifiable fragments. Two individuals are represented in the deposit, one adult and one child. The size of the child's radius and humerus and an incomplete fusion of a thoracic vertebra fragments gives this child an age range of five to nine years of age. The adult was probably 20-30 years of age based upon the sternal end morphology of one of the ribs recovered from the deposit. The adult and child may be a secondary deposit based upon the abundance of long bone fragments, and no notes about additional crushed bone were made. No skeletal elements for this subadult or adult that would give any indication of sex were recovered.

## Summary for Operation VII

Analysis based upon the discrete lots indicates the minimum number of individuals in operation VII is six individuals. Three of these individuals are young adult (one male, one female, and one undeterminable sex), one older adult, and two subadults. These subadults are estimated to be five to nine years old and the other four to six years old.

## Operation VIII

Operation VIII is the upper level of the cave. In order to access the lots in this area, one would need to free climb formations and cave wall along the northern boundary of Operation VII. At least two accessible paths were discovered leading up to Operation

VII, both required exposed ascending at least six to eight meters above the plaza floor in Operation VII. This physical challenge would have made carrying anything to these lots treacherous. Once in Operation VIII, a variety of public, semi-private, and private spaces were created using the natural rooms and formations in this area.


Figure A.12. Operation VIII indicated by darkened area. Map reproduced with permission from Nancy Pistole. Modified by C. L. Kieffer.

## Operation VIII Lot 1 Sublot A

Operation VIII Lots 1 through Lot 4 are located within one room that had on average a ceiling height of four meters. This room is accessible via a pathway that enters the southeast portion of the room. This pathway widens as it slopes steeply down into the room on a massive flowstone formation that extends into Sublots B and C. Sublot A is located southwest of these sublots and is contained to a rimstone pool dam that measures 1.14 meters northeast to southwest and 1.68 meters northwest to southeast. Multiple fire blackened formations compose the southwestern wall of this sublot. At the base of these formations was where the younger individuals and ceramic sherds in the deposit were recovered. One hundred sixty-four bone fragments were recovered from Operation VIII

Lot 1 Sublot A, most of which had a light coating of carbon and calcium carbonate. Due to the commingling with nearby sublots, the MNI was calculated at the lot level.

Operation VIII Lot 1 Sublot B
Sublot B is located northeast of Sublot A and southwest of Sublot C. This sublot is also a rimstone dam pool that measures 78 centimeters meters northeast to southwest and 1.37 meters northwest to southeast. Three hundred and fifty-one bone fragments were recovered from this sublot, most are covered in calcium carbonate. Due to the commingling with nearby sublots, the MNI was calculated at the lot level.

Operation VIII Lot 1 Sublot C
Sublot C is located northeast of Sublots A and B. It is the largest of the interconnecting rimstone dam pools, measuring 3.89 meters northeast to southwest and 2.06 meters northwest to southeast. Ceramic sherds were recovered along the northeastern boundary of this sublot. Four hundred thirty two skeletal elements were recovered from sublot C. Due to the commingling with nearby sublots, the MNI was calculated at the lot level.

## Operation VIII Lot 1 Sublot D

Field notes for this sublot were lost, and thus a contextual description of this deposit cannot be included. Fifty-three skeletal elements were recovered from this sublot, much of which is covered in calcium carbonate. Due to the commingling with nearby sublots, the MNI was calculated at the lot level.

## Summary for Operation VIII Lot 1

A total of 11 individuals are represented in the material scattered throughout the sublots in operation VIII lot 1. Based on numerous carpals and ulnae, there are five adults in the deposit. Four of the five adults were relatively complete, with enough smaller material available to interpret primary deposits for them. Of the five adults, three are possibly female, one is male, and one is indeterminate. The male adult was one of the least scattered individuals, with most of his remains contained to sublot A. He was determined male based upon distal humeri morphology, glenoid and humeri metrics. Dental wear and vertebral lipping discovered on fragments in sublot A suggest that this individual was older in age. Cut marks are also present on what is presumed to be this individual's distal femur.

The three females in the deposit were determined based upon similar sexing techniques as the male in this lot. The only difference is that a sciatic notch was also available to suggest the presence of a female. None of the three adult females show any signs of degenerative diseases. Therefore, it is presumed that they were all young adults. Dental eruption available for one of these females further indicates a young age (15-21 years) due to a third molar in the process of erupting. It is probable that she was on the higher end of that estimate because the dentition that belongs to a person on the younger end of that spectrum already accounts for the appropriate unfused skeletal elements in the deposit.

Tibiae development noted in the deposit as well as dental eruption aided in determining the minimum number of six subadults as well as their ages (with the
exception of the perinate). Tibiae development indicated that there were four subadults between the ages of five and nine years old, and one subadult between the ages of nine and 15. Dental eruption from 3 mandibles narrowed these ranges down a little. Mandibles suggested that one child was two to five years old, another was three to five years old, and the oldest was 15 years +/- 36 months. This leaves two of the children at three to five years of age based upon tibiae size and development. Much of the remains from these children was highly fragmentary. Although many smaller elements from these children were recovered, it cannot be determined with any degree of certainty which of these individuals were primary deposits, which may have undergone differential preservation, and which may have been secondary deposits.

## Operation VIII Lot 2

Lot 2 consists of the floor and watery feature to the northeast and adjacent of Lot 1C. The more eastern portion of this lot consists of a flat, dry, compacted area that measures 4.62 meters northeast to southwest and 1.41 meters southeast to northwest. To the west of this platform is a triangular shaped watery deposit which measures a little over one meter east to west and 3.31 meters north to south. Northeast of this watery feature was a small triangular shaped alcove that extended northeast into the wall 1.63 meters. This area alcove contained many broken formations, some of which were fire blackened. All of the skeletal material in this lot was recovered from the watery feature.

Six hundred and thirty bone fragments were recovered from this lot, much of this material was blackened due to previous fire in the area. At least four adults were discovered in this deposit based upon the second metacarpal, fifth metatarsal, patella, and
talus. Such small elements suggests primary deposit for these adults. Much more of the tarsals and carpals were present for two of the individuals, suggesting that preservation differentially affected some of the individuals. None of the material had any indication of degenerative diseases, suggesting that all of the individuals were young adults. Only two of these four adults could be sexed. Based upon the distal morphology of their humeri, one was probably female and the other was male.

Two subadults were noted in this deposit. The presence of one child age perinate to 1.5 years old was indicated based upon pelvis and neural arch development, metatarsals and metacarpal size. The other child was estimated to be five to eight years old based size and fusion of the pelvis, stage of long bone epiphyseal fusion and metacarpal and metatarsal development.

## Operation VIII Lot 3

Lot 3 is a natural semicircular shelf along the cave wall above the eastern boundary of Lot 2 . The general size of this lot measures 1.5 meters southwest to northeast and 1.04 meters east to west. Located along the southeastern portion of this lot, on the flowstone wall 1.77 meters above Lot 2, is a natural solution hole that has evidence of modification. This hole measures 63 centimeters in diameter northeast to southwest, 64 centimeters deep, and the vertical restriction is 2.62 meters. This feature is large enough to sit in, and all activity in the room would have been easily visible from this vantage point.

The shelf in Lot 3 slopes downward into Lot 2, so it is possible that skeletal material recovered from there may have originated in Lot 3. On this slope a male
individual was found in the prone position, with his legs spread wide apart. His torso was located within the confines of a rimstone dam pool, and the only cultural material recovered from this deposit were shell beads that appeared to have been tied around his wrist.

## Operation VIII Lot 4

Lot 4 is an alcove located northwest of Lot 1 . The alcove is surrounded by numerous fire blackened formations and soda straws. A 47 centimeter wide natural pathway leads into the alcove from Lot 1 . The alcove measures 1.79 meters north to south and 1.39 meters east to west. The floor of the alcove descends down 30 centimeters into a deposit of fire blackened formations. These formations appear to have come from the fire blackened ceiling above.

## Operation VIII Lot 5 Sublots $C, D$, and $E$

Field notes for these sublots were lost, and thus a contextual description of this deposit cannot be included. One hundred and fifty-four skeletal fragments were recovered from these three sublots. Based upon this minimal recovery and an assumed close association between the sublots, all three sublots were used to calculate an MNI. Two adult individuals were noted in this deposit. Both individuals were represented by numerous carpals, tarsals and long bones. This suggests that they were primary deposits with minimal natural or cultural movement post mortem. One individual is possibly a female based upon her radial head diameter. Sex for the other individual could not be determined. The only degenerative characteristic in this deposit was worn incisor, but
otherwise both individuals are presumed to be young adults. There was slight indication that at least one of the individuals had a slight case of porotic hyperostosis.

Operation VIII Lot 7 Sublot A
Lot 7 is a rectangular shaped lot, with a high ceiling, that extends in a general northeast to southwest direction. Access to this area can be achieved along the northern edge of the plaza in Operation VII. A single speleothem column measuring 10.5 meters tall is located in the center of the Lot.

Sublot A is located at the entrance of Lot 7. The entrance to this area measures 10.5 meters in width, however the overall area of Sublot A measures eight meters northeast to southwest and ranges between two to five meters wide in a northwest to southeast direction. The southeastern wall of this sublot is composed of curtains and flowstone formations that extend out onto the path. At the base of this wall numerous speleothem formations approximately one meter in length were found. The northwestern wall of this sublot is defined by two speleothem columns that join at the base. Human skeletal remains and speleothem fragments were found along the path of the sublot. Approximately a fifth of the skeletal material in this deposit could not be recovered because it was cemented in place along the southeastern wall. Evidence of burning was found in this area as well as along the northwest wall. Cultural material recovered in this Sublot also included incised ceramic sherds and a jute shell.

A little over 340 human bone fragments were recovered from Operation VIII Lot 7 Sublot A. Only limited quantities of calcite were noted on the bones from this deposit. Three individuals are present in this comingled deposit: one adult, one infant, and one
child. Both individuals were probably originally primary deposits based upon the quantity of ribs, phalanges, metatarsals, metacarpals, and neural arches recovered. Secondary movement after decomposition has caused these human skeletal remains to be scattered throughout the lot. The adult was determined female based upon the greater sciatic notch and the femoral head diameter because the cranium and pelvis were too fragmentary. She was determined to be a young adult (approximately 20-35 years of age) based upon the morphology of the acetabulum (Rougé-Maillart et al. 2007). Minimal wear with only one caries were noted from the adult teeth in this deposit, further suggesting a younger individual. A possible Ik design dental modification was also noted from a canine in this deposit. The infant in the deposit was determined to be 1 year 2 weeks to 1 year 2 months of age based upon the dental eruption. A few long bone fragments belonging to a child approximately two to four years of age were also discovered in this deposit.

## Operation VIII Lot 7 Sublot B

Sublot B is located to the northeast of Sublot A. This sublot follows the northwest wall of the cave for 12 meters and averages 3.5 meters wide, with a vertical restriction of 9.4 meters. The northern boundary of this sublot is defined by the large column speleothem in the center of Lot 7. The southwest boundary of the sublot is defined by a natural pit that measured 1.5 meters northeast to southwest, 74 centimeters northwest to southeast, and 80 centimeters deep. The trail that leads to this formation goes around it before branching into three different directions. These three trails lead to northeast to Sublot D, southeast to Sublot C, and north to Lot 8. A light scatter of ceramics and a
heavy concentration of crushed human skeletal material were noted throughout the entire path as well as the pit on the southwest boundary of the sublot.

Approximately 40 human bone fragments were recovered from Operation VIII Lot 7 Sublot B. Due to the proximity and elements present from this deposit, it is likely that they belong to the individuals recorded in Sublot A.

## Operation VIII Lot 7 Sublot C

This sublot is located southeast of Sublot B and Sublot D. Sublot C is rectangular in shape, measuring 11.2 meters northeast to southwest, 3.7 meters northwest to southeast, with a vertical restriction of 11 meters. A four meter tall stalagmite defines the northern boundary, while a curtain and flowstone formations define the southeastern and southwestern boundaries. Openings through these curtain formations on the southeast provide access to Operation VIII Lots 13, 14, and 15. At the base of these curtains were the remains of two fragmentary skulls.

The focal point of this sublot appears to be four stalagmites in the center of the sublot which range in height between two to three meters. Around these formations the floor is heavily coated with crushed bone, ceramic sherds, and carbon. The other human skeletal material recovered from this sublot was from a small cavity is the floor of the southern section of the sublot. This cavity measured 15 centimeters wide and 30 centimeters deep. Also recovered from this cavity were two earplugs with mosaic jade inlay, a shell pendant, and a chert flake.

Over four-hundred thirty skeletal fragments were recovered from Sublot C. Much of this material has varying amounts of calcium carbonate on the surface, and some is
blackened by fire. While individuals present in this deposit are also spread out through the rest of the lot, this sublot and Sublot D indicate the presence of a second adult individual. Based upon the number of quantity of smaller elements present in Sublots C and D , this individual was also probably a primary deposit with secondary movement contributing to the scattering of skeletal material throughout the lot. This second adult in the lot was determined to be a male, based upon the distal morphology of the humeri in Sublot C. Complete fusion of long bones, the presence of an unfused sphenocciptal suture in Sublot C and minimal wear on the teeth recovered from Sublots C and D indicate this male was probably in his early twenties at the time of death.

## Operation VIII Lot 7 Sublot D

Sublot D is oval shaped, extending five meters northeast to southwest and 2.5 meters northwest to southeast. The natural boundaries of the sublot are defined by the central speleothem formation of the lot to the southwest, the cave wall to the northeast, Sublot C to the southeast, Sublot B to the northwest, and a steep slope that defined the northwestern wall. The path in this sublot leads to an alcove that measures 2.2 meters northwest to southeast, two meters northeast to southwest, and 80 centimeters in height. Most of the skeletal material recovered from this sublot came from the floor of this alcove. The floor of the sublot also had a light scatter of crushed human skeletal remains, ceramic sherds and charcoal.

Over two hundred fifty skeletal fragments were recovered from Sublot D. Most of these remains belong to the child two to four years of age recorded in Sublot A and the male adult recorded in Sublot C. The quantity of child vertebrae and rib fragments in this
deposit suggests that this may have been the initial location of the child. These vertebrae also confirm the age estimate of 2-4 years of age based upon the stage of fusion. The minimal wear on the adult molars also support the you age of the male recorded from sublot D.

## Operation VIII Lot 8 Sublot A

Sublot A is located in the northwestern section of Lot 8. The sublot measures approximately 24 meters northeast to southwest and 6.5 meters northwest to southeast, with a vertical restriction that ranges in height between four to six meters. The western border is adjacent to Lot 5, the southern border is adjacent to Sublot B, and the northern wall is natural cave wall with an alcove that contained charcoal, sherds and some crushed human skeletal material. Much of this bone was not collected due to its state of preservation, and was photographed in situ. The previously wet nature of the alcove area is indicated by stalagmites overhead. Through the sublot is a walkway composed of stalagmites. Nooks and crannies throughout this walkway contained fragments of crushed bone and ceramic sherds.

One hundred and nine skeletal fragments were recovered from sublot A. Most of these remains belong to a subadult approximately five to nine years of age. The quantity of subadult metacarpals, metatarsals, phalanges, and epiphyses but absence of a majority of the long bones and cranium suggests a secondary movement of part of the subadult after decomposition. The other individual similarly has a large quantity of bones absent from this deposit. The presence of metacarpals, metatarsals, and numerous teeth suggest secondary movement of other skeletal material away from this location. This second
individual is an adult, probably male based on the morphology of the cranial fragments. A lack of degenerative conditions indicates that the individual may be a young adult. Operation VIII Lot 8 Sublot C

This sublot consists primarily of a path that ran northeast to southwest through Lot 8 . The southern boundary is adjacent to Lot 7B, the northwestern boundary is adjacent to Lot 8 Sublots A and B, and the northeastern boundary is natural cave wall. The overall length of the pathway is 15.86 meters in a general northeast to southwest direction. The path ranges in width between 3.7 meters at its widest, 25 centimeters at its narrowest, but maintains an approximately one meter wide width for most of the path. The floor is relatively flat, but slopes upward for 5.5 meters along the northeastern boundary of the sublot. Sherds and charcoal covered the entire floor of the sublot, while a majority of the human skeletal material recovered from this area was found in the northeastern half of the sublot.

Two hundred and nine skeletal fragments were recovered from sublot C. A majority of the elements present in this deposit probably belong to the two individuals recorded in sublot A. However, there are additional skeletal elements present in this deposit that represent a younger individual. Based on the neural arch development, this subadult was approximately two to four years of age. The presence of a secondary subadult is demonstrated by the quantity of phalanges, numerous long bones, and varying stages of neural arch development between the two deposits. The presence of another adult individual is also indicated based on numerous and hand foot elements present in this sublot that have already been accounted for the adult in sublot A. However, the
minimal adult material recovered from this deposit suggests that the rest of this adult is located elsewhere.

## Operation VIII Lot 10 Sublot A

Lot 10 is located southwest of the pathway that ends in Operation VIII Lot 11 sublot D . This pathway continues into Lot 10, after dropping down one meter right next to a large formation. Along this rimstone dam pathway, numerous bones were found cemented in place, including ribs, vertebrae and a possible long bone fragment belonging to a juvenile. Along the southern border of the flowstone pathway, there was a slot shaped passageway that measured 30 centimeters wide and 62 centimeters wide. The slot was too narrow to pass, however it appeared that this passage lead 4.24 meters down into a larger room that measured roughly a meter and a half north to south and a meter and a half east to west. Based upon the slope of the walkway and the scatter of bones, it seemed highly likely that skeletal material may have washed into this inaccessible area. Along the northern wall of this lot, there is a steep sloping flowstone formation that leads to a small shelf area, which is sublot B.

Only thirty-two skeletal elements were recovered from sublot A. Due to the minimal quantity of bones recovered in this sublot, condition of skeletal material in other areas of this lot, and proximity of the sublots, the calculation of minimum number of individuals will be based off of the assemblage from all of the sublots in this lot.

## Operation VIII Lot 10 Sublot B

The shelf that was designated sublot B measures 2.88 meters east to west, 2.26 meters north to south, with a vertical restriction of 1.68 meters. The southern boundary of this shelf has a stalagmite formation in the southwest corner and a large column in the southeast corner. Between these two formations was an opening 1.14 meters wide. This opening leads to sublot C . In the western area of this shelf was an opening in the cave wall located 1.23 meters off the floor. The opening measured 38 centimeters wide in a general northwest to southeast direction and had a vertical restriction of 1.05 meters. This opening leads to sublot E . Most of the skeletal material discovered in sublot B was discovered crushed and in the southwest corner of the sublot. Only 34 skeletal elements could be removed from this sublot.

## Operation VIII Lot 10 Sublot C

Once entering sublot C , the alcove opens up into an area that measures three meters north to south and 2.99 meters east to west. Much of the floors and walls within this alcove are fire blackened and was actively wet. No skeletal material was recovered from this sublot.

## Operation VIII Lot 10 Sublot D

At the western border of sublot A another pit feature was discovered, this pit was designated sublot D . This pit measured 4.48 meters deep, 6.12 meters east to west, and approximately three meters north to south. It appears that this sublot connects up with the slot drop in sublot A. However, this area was not explored to confirm this. No skeletal material was recovered from this sublot.

## Operation VIII Lot 10 Sublot E

This sublot is a small alcove located west of sublot B. This alcove measured 3.03 meters north to south, 1.21 meters east to west, with a vertical restriction of 1.29 meters. Much of the bone discovered in this alcove was not articulated and heavily focused in the southern portion of the alcove. Overhead, soda straw formations on the ceiling indicate the wet nature of the deposit. While fire blackening throughout the alcove indicated it was an area of ritual activity. An opening that measured 59 centimeters southeast to northwest and 1.33 meters high was located in the southern wall of this alcove. This opening opened up to the rest of Lot 10 . Fifty feet below this opening was a pit with the remains of at least one person in anatomical position. However, this area could not be easily accessed, so the remains were not collected.

Some of the skeletal material in this deposit could not be removed because it was cemented in place. Ninety-four skeletal elements could be removed. Based upon the 178 skeletal elements recovered and the material recovered and noted in situ throughout all of the sublots in lot 10, at least three individuals were indicated by the difference in ages represented by. In addition to the adult material that was found, numerous items represented a subadult two to four years of age and another that was five to nine years of age. Based upon duplicate adult metatarsals and metacarpals, two young adults were present in the deposit. The quantity of phalanges cemented to the calcium carbonate indicated that these individuals were a primary deposit. The more complete adult in the deposit was primarily recovered from the southern area of the alcove, with the exception of the hands and head. The northern half of the alcove was not as wet, so it consisted of
disturbed loose sediment. The loose sediment in this sublot may have been due to the looter's pits located in a niche in the northwest corner of the alcove. This looting activity may explain the absence of a majority of skeletal elements for the second adult.

## Operation VIII Lot 11 Sublot A

Sublot A is the area one enters when going into Lot 11 . This lot is divided from Lot 12 via a slot entrance in the cave wall that measures 30.7 centimeters wide and 3.4 meters tall. There are two stalagmites approximately 75 centimeters tall located to the east and west of this area. Much of the human remains recovered from this area were located in a niche located south of the western stalagmite. Only 19 skeletal elements were recovered from this sublot. It was determined that skeletal material from all sublots in this lot should be analyzed as an assemblage due to the proximity of sublots in lot 11 and obvious movement of material between sublots.

## Operation VIII Lot 11 Sublot B

This sublot's main area measures 1.44 meters southwest to northeast and 1.17 meters southeast to northwest. This sublot was designated to the semicircular area at the base of the column that is located somewhat in the center of Lot 11. This column is heavily blackened around the base and with less fire blackening extending up the column. On the eastern side of this column, there is a triangular shaped depression that was once a pool of water. This depression measures 25 centimeters east to west and 26 centimeters north to south. Much of the juvenile remains in this deposit were located within this depression, with more of the adult remains located to the north of the depression. Three
hundred and sixty-five skeletal fragments were recovered from this sublot. Obvious secondary placement of some of the skeletal material was noted, but it could not be determined if this was prehistoric or modern.

## Operation VIII Lot 11 Sublot C

Sublot C is located north of sublot B. These two sublots are divided by numerous stalagmites and a slope of while crystalline flowstone. Sublot C is located northeast and east of the primary column in the room that is described in Sublot B. This lot measures 2.2 meters east to west and 3.12 meters north to south. A tree shaped column with smaller formations around it was noted in the northeast section of this sublot. Much of this area was heavily fire blackened. Sublot C had the highest density of skeletal material recovered from this lot. A total of 303 skeletal elements, most of which were covered in calcium carbonate or badly deteriorated, were removed from this area. The possible primary position of one adult within this deposit was indicated by an articulated foot found in situ.

## Operation VIII Lot 11 Sublot D

Sublot D is located north of sublot C, and consists of a sloping walkway that goes uphill in a general east to west direction. This walkway measures 80 centimeters wide north to south, and 2.5 meters in length east to west. Much of this floor is heavily blackened and covered with crushed bone fragments. On the southern area of this walkway, located on 26 centimeters apart from each other, were a semi-articulated hand and a semi-articulated foot, indicating a primary deposit prior to disturbance of the rest of
the body. At the top of the sloping walkway was a room that measured 1.17 meters east to west and 2.32 meters north to south. Much of the skeletal material recovered from this sublot was discovered at the entrance area of this semi-private room as well as within it. A total of 228 skeletal elements were removed from this sublot, a majority of which was covered in calcite and carbon.

## Operation VIII Lot 11 Sublot E

Sublot E is located east of the semi-private room in sublot D . The entrance into sublot E is circular in shape measuring 85 centimeters tall and 69 centimeters wide. Upon entering the large dome shaped solution formation alcove, the floor immediately drops 1.2 meters. The alcove measures 1.96 meters east to west and 2.25 meters north to south with a vertical restriction of 2.25 meters. A looter's pit was discovered at the base of the alcove's eastern wall. A natural niche was discovered in the northwest corner of the alcove that measured 74 centimeters wide (in a general southwest to northeast direction) and 87 centimeters tall. The more intact skeletal material was discovered in this niche, with much of the rest coming from the looter's pit area. Only 24 skeletal elements were recovered from sublot E .

A total of 939 skeletal elements were recovered from all of the sublots in lot 11. The presence of at least four primary position adults are suggested by the quantity of proximal pedal and manual phalanges recovered. Much of the long bones and cranial fragments of these individuals were not present. It is possible that many of the larger skeletal elements from these individuals were destroyed or taken due to looting activity in the area. However, it cannot be determined how much skeletal material was looted versus
what may have been too badly deteriorated for removal and identification. At least two of these adults are males based upon cranial and distal humeral morphology. Femoral head measurements in the deposit further indicate the presence of at least one male and the possibility of two adult females.

None of the skeletal material belonging to these four adults shows signs of major degenerative changes due to age, suggesting that they were probably young adults. The only supporting evidence to this is an os coxa fragment with an auricular surface that has morphology consistent with an individual 30-39 years of age. The only other noteworthy distinctions can be made about these individuals is the fact that one of them probably suffered from porotic hyperostosis due to the pin prick porosity and varying thickness on some cranial elements. One of the other adults within this deposit also had significant calculus on their incisors, two of which were modified in the shape of an Ik.

At least four subadults are present based upon left femora in the deposit. A majority of the smaller elements for these individuals were not recovered. Lack of complete recovery and scattering of the remains prevent any determination of primary or secondary deposit from being made for these subadults. Dental development based on two different maxillae fragments indicates that one of these individuals was seven years +/- 24 months old and another was six to seven years +/-24 months. The two other subadults are significantly younger. One is approximately three to four years old based on neural arch development, while the other is no more than a year old based on the size of an ischium found in the deposit.

Operation VIII Lot 13

Lot 13 almost has a figure eight shape because it is composed of two interconnecting circular sections. The combination of these two areas measures roughly 2.79 meters north to south and almost five meters east to west. The walls of this lot are covered by once actively wet formations. Along the northern edge of this lot, the formations create alcoves along the floor. The more western alcove measured 1.24 meters wide, 2.37 meters high, and extended in 1.87 meters. This alcove contained human skeletal material scattered throughout the floor. More skeletal material was found throughout the floor of this lot; much had already been crushed into powder and thus could not be removed. Jade, a mandible, and numerous teeth were recovered (including some that had been modified) were recovered from the eastern section of this crushed bone material.

Due to the preservation conditions in this area only 562 of the 795 skeletal elements recovered from this deposit were identifiable. Much of the unidentifiable material included unidentifiable shaft fragments and cranial elements. The crushed and powdery remains documented in this deposit indicate incomplete recovery of individuals, however the recovery of numerous smaller elements suggest these individuals may have been primary deposits. At least five adults are present based upon numerous elements, including: metacarpals, metatarsals, multiple tarsals, and patellae. Adult phalanges and carpals are better preserved for at least three of these adult individuals. Based upon distal morphology of the humerus, at least one adult is male. Lack of degenerative disease suggests that all of these individuals were young adults. At least two subadults are present in this deposit. Dental development for one indicates an individual 6-7 years of age $+/-24$ months. This is supported by the neural arch fragments in the deposit. The
presence of a perinate is also indicated in this deposit based upon os coxa fragments, a clavicle, and neural arch development.

## Operation VIII Lot 14 Sublot A

The overall size of all of Lot 14 measures 3.72 meters north to south and 5.2 meters east to west, with a vertical restriction of 16 meters. Sublot A is restricted to a circular area near a pointy stalagmite which defines the northern boundary. The southern boundary of this sublot was the natural cave wall, while the east was defined by cemented fallen formations. The overall measurements of this sublot were 91 centimeters east to west and 1.09 meters north to south.

The removal of a large flat rock in the center of the sublot exposed a squished skull and teeth, along with a semi articulated foot. The infant bones collected from this sublot were mostly restricted to the area at the base of a stalagmite in the western extent of the sublot. Charcoal mixed in with the bones an torch marks about 15 centimeters above the floor indicate fire may have been associated with the ritual deposit of these remains. The wide degree of differential preservation of bones due to damp conditions in this area suggests that some of this material may have been moved around substantially or that numerous deposits took place over an extended period of time. The only other cultural material discovered in this sublot included a carved greed jade mosaic and an ear decoration. Two hundred and fifty-five skeletal elements were recovered from sublot A, a majority of the remains were from more than one subadult. However the few adult elements present as well as the proximity of other sublots in the lot suggested that this and other sublots in lot 14 should be analyzed together.

The boundaries of Sublot B are defined by large cave formation fragments to the north, sloping flowstone to the west, and flowstone wall to the south. The overall area of this sublot measured 1.7 meters north to south and 1.8 meters east to west. The floor of this sublot some ceramics and charcoal, with a discrete deposit of red pigment and a lithic fragment. Two hundred and thirteen skeletal elements were recovered from this sublot. Much of the skeletal material from this sublot was collected from the western extent, with teeth and foot bones preserving at a greater rate than other material. Also recovered in this area was an item of personal adornment, a shell tinkeler.

## Operation VIII Lot 14 Sublot C

This sublot measured approximately 1.5 meters north to south and 3 meters east to west, with the western boundary defined by a flowstone slope. This sublot is located in the northern section of Operation VII Lot 14, located north of Sublot A's pointy stalagmite, and near the more accessible climb down area between Operation VIII and the plaza area in Operation VII. Distinctive cultural material recovered in this Sublot included long red ovate beads and a tiny mask.

Much of the skeletal material in this sublot was crushed to a powder. Although these conditions were less than ideal, 272 skeletal elements were recovered for the purpose of laboratory analysis. Some of the poor preservation in this area was due to burning of the skeletal remains. An abundant amount of charcoal was present, intermingled with the skeletal remains. The discovery of burned copal in association with
a fallen formation suggests that this area was used for ritual and that the skeletal remains may have been burned in a ritual manner. Due to the distance and discreteness of deposits, it seems unlikely that this powder material is from the same individuals in Sublot A

## Operation VIII Lot 14 Sublot D

This sublot measures 2.14 meters northeast to southwest and 70 centimeters southeast to northwest, located Southeast of sublot C. The sublot extends down a corridor that consists of white flowstone to the east and south. The 35 skeletal elements recovered from this sublot was discovered in the southern corner. Much of this material, including a skull was heavily trampled and thus too fragmentary for collection. Most of the remains collected from this area consisted of teeth.

## Operation VIII Lot 14 Sublot E

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. Only 9 skeletal elements were recovered from sublot E, a majority of which were dental elements.

## Summary for Lot 14

At least five individuals are present among the 885 skeletal elements recovered from lot 14 . Three of these were adults with no indications of advanced age. The quantity of phalanges, carpals, and tarsals for the three individuals in the sublot suggest that these individuals were primary deposits. Almost all metric and morphological indicators for
sex were obliterated due to poor preservation in this area. One adult is possibly a male based upon the more roughed muscle attachments on one of the femora, while one is probably a female based upon the gracile nature of a femora and a small radial head diameter. Two subadults are also present in this deposit. One is estimated to be between two to four years old based upon multiple long bones, pelvis development, neural arches, and available metacarpals and metatarsals. The other subadult is more fragmentary with fewer small bones preserved. This subadult is estimated to be five to nine years old based upon femora, radii, fibulae, tibiae, and metatarsals development.

## Operation VIII Lot 15 Sublot A

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included Twenty-six skeletal elements were recovered from this sublot. Other than two tibiae fragments, a majority of this deposit is composted of hand, foot, and dental elements. Due to a lack of field notes for this sublot, it is assumed that the rest of this individual has been accounted for in the calculation of MNI for a different deposit.

## Operation VIII Lot 16

Access to this Lot is limited to a relatively exposed free climb up the northeaster cave wall in Operation VII. When standing in the southwestern portion of Lot 16, one can look down into the constructed plaza of Operation VII

Operation VIII Lot 16 Sublot A

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. Five hundred and sixty-one skeletal elements were recovered from sublot A. Due to the scarcity of field notes for Lot 16 , it was determined that it would be best to calculate the minimum number of individuals at the level of the lot rather than the individual sublots.

## Operation VIII Lot 16 Sublot B

Sublot B is an alcove located along the western wall of the drapery that divides sublots A and B. Leading up to the alcove, there is a natural flowstone walkway with small rimstone dams that measures 3.15 meters east to west and one meter wide extends away from Sublot A. The alcove has a horizontal restriction of the alcove at the entrance measures 47.3 centimeters and widens to 1.1 meters wide. In the center of the alcove was an actively wet and dripping column. Much of the entrance area and interior of the alcove is heavily blackened due to burning.

A majority of the 213 human skeletal elements in this sublot were recovered around the formation, with some of the vertebrae and other skeletal elements were semiarticulated. This indicates the individuals may have been placed in the alcove while still fleshed or partly fleshed. Due to the scarcity of field notes for Lot 16 , it was determined that it would be best to calculate the minimum number of individuals at the level of the lot rather than the individual sublots.

Operation VIII Lot 16 Sublot C

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. A total of 107 skeletal elements were recovered from this sublot. Due to the scarcity of field notes for Lot 16 , it was determined that it would be best to calculate the minimum number of individuals at the level of the lot rather than the individual sublots.

## Operation VIII Lot 16 Sublot D

Field notes for this lot were lost, and thus a contextual description of this deposit cannot be included. A total of 31 skeletal elements were recovered from sublot D. Due to the scarcity of field notes for Lot 16 , it was determined that it would be best to calculate the minimum number of individuals at the level of the lot rather than the individual sublots.

## Operation VIII Lot 16 Sublot E

Within this sublot, a number of platforms have been constructed from breakdown and smaller rocks. The first platform is located in the center of sublot E and is located just west of the walkway that extends in a north to south direction through the sublot. This first platform measures 1.3 meters east to west and 1.1 meters north to south and is relatively square in shape. The elevated walkway to the east and large boulders on the north and west that rise above the surface of the platform create a bound wall like structure around three edges of the platform.

The second platform is located 1.5 meters north of the first platform and is one meter west of the walkway. The dimensions of the platform are 1.5 meters east to west
and one meter north to south. This platform is elevated half a meter higher than the previous platform, which would have allowed for optimal viewing of what was occurring on the lower platform and not vise versa. This platform also allows for optimal viewing of the once watery area west of both of the platforms. Much of the platforms and area surrounding the platforms in this sublot are heavily blackened due to fire. Much of the skeletal material found in this sublot was recovered near the once actively wet pool with rimstone dams located to the west of the platforms.

A total of 92 skeletal elements were recovered from sublot E .

## Summary for Lot 16

Over 1,034 skeletal elements were recovered from Lot 16 . Due to the scarcity of field notes for Lot 16 , it was determined that it would be best to calculate the minimum number of individuals at the level of the lot rather than the individual sublots. A total of seven individuals are represented in these sublots. However one adult is only represented by two humeri fragments, so it seems likely one of these individuals may already be accounted for in another MNI count. Two of the remaining individuals are adults, while the other four are subadults. Both adults are males based upon distal humeri and cranial morphology. One of these two adults is probably older based upon the macroporosity, smorles nodes and syndesmophyte formations throughout his lumbar vertebrae. The other has no indication of advanced age. One of these two individuals also experienced probable porotic hyperostosis based upon pin prick porosity in numerous cranial fragments. Although parts of these individuals were very fragmentary, they were relatively fully recovered, indicating they were probably primary deposits.

Dental eruption provided ages for three of the four subadults. One mandible indicated a child three to six years of age, and another indicated an individual five years +/- 16 months. Pelvi fragments, humeri, radii, femora development confirmed the presence of two children of these ages in the deposit. The other individual with a dental development based age estimate was 15 years +/- 36 months due to the fact that their third molars had not yet erupted. Humeral and pelvis development noted on some fragments in this deposit and fully other more developed skeletal elements confirmed the presence of a teenager that was probably a primary deposit. Based upon cranial morphology, this teenager was possibly a male. The final subadult is estimated to be only two to three years of age based on femoral, humeri, radii, tibiae, ulna, neural arch, and calcaneus development and size.

## Special Deposit 4

Field notes were lost for this deposit, so it is unknown what Operation the deposit was located. Eighty-one bones belonging to an adult were recovered. The only indication of trauma for this individual was a cut was noted on a right humerus fragment. The only indication of health problems were arthritis on vertebrae and metacarpals as well as slight porotic hyperostosis on a cranial fragment. Without field notes it is unclear how this deposit relates to other deposits within the cave and whether or not this individual has already been accounted for in another deposit. For this reason, the MNI for Special Deposit 4 is listed as undetermined for the total count of the cave in Table A.1.

| Location | Width <br> (cm) | Floor |  |  |  |  | Instances <br> of <br> Trauma |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Length (cm) | Height (cm) | Space <br> (m2) | Volume (m3) | MNI |  |
| Op. III Lot 8 | 333 | 238 | 150 | 7.9254 | 11.8881 | 1 | 0 |
| Op. IV Lot 5 |  |  |  |  |  | secondary | 0 |
| Op. IV Lot 10 | 1125 | 523 |  | 58.8375 |  | 1 | 0 |
| Op. IV Lot 11C | 167 | 330 |  | 5.511 |  | secondary | 0 |
| Op. IV Special |  |  |  |  |  |  |  |
| Deposit 1 |  |  |  |  |  | secondary | 0 |
| Op. IV Special |  |  |  |  |  |  |  |
| Deposit 3 | 142 | 96 | 93 | 1.3632 | 1.267776 | 2 | 0 |
| Op. V Lot 1 C, E, G | 1470 | 592 | 150 | 87.024 | 130.536 | 17 | 9 |
| Op. V Lot 2 | 493 | 657 | 230 | 32.3901 | 74.49723 | 5 | 2 |
| Op. V Lot 3 | 370 | 380 | 370 | 14.06 | 52.022 | 1 | 0 |
| Op. V. Lot 4 | 950 | 780 | 235 | 74.1 | 174.135 | 2 | 0 |
| Op. V Lot 5 | 253 | 450 |  | 11.385 | 0 | 3 | 0 |
| Op. V Lot 6 | 1890 | 820 | 600 | 154.98 | 929.88 | 3 | 1 |
| Op. V Lot 7 | 1250 | 900 |  | 112.5 | 0 | 3 | 0 |
| Op. VI Lot 1 A, B, C | 800 | 580 | 565 | 46.4 | 262.16 | 2 | 3 |
| Op. VI Lot 2 A, B, C | 610 | 670 | 300 | 40.87 | 122.61 | 2 | 1 |
| Op. VI Lot 3 D, E |  |  |  |  |  | 4 | 3 |
| Op. VI Lot 3 F | 99 | 80 |  | 0.792 |  | 2 | 0 |
| Op. VI Lot 3 G | 4130 | 449 | 150 | 185.437 | 278.1555 | 4 | 1 |
| Op. VI Lot 4 | 612 | 590 | 1534 | 36.108 | 553.8967 | 1 | 0 |
| Op. VI Lot 6 | 180 | 170 |  | 3.06 |  | secondary | 0 |
| Op. VI Lot 8 | 550 | 235 |  | 12.925 |  | 2 | 0 |
| Op. VI Lot 9 |  |  |  |  |  | 1 | 0 |
| Op. VI Lot 11 |  |  |  |  |  | 1 | 0 |
| Op. VI Lot 12 |  |  |  |  |  | 1 | 0 |
| Op. VII Lot 1 |  |  |  |  |  | 4 | 0 |
| Op. VII Lot 2 | 850 | 700 | 240 | 59.5 | 142.8 | secondary | 0 |
| Op. VII Lot 11C | 370 | 50 | 33 | 1.85 | 0.6105 | secondary | 0 |
| Op. VII Lot 12 | 700 | 260 |  | 18.2 |  | 2 | 0 |
| Op. VIII Lot 1 |  |  |  |  |  |  |  |
| ABCD | 581 | 610 | 400 | 35.441 | 141.754 | 11 | 2 |
| Op. VIII Lot 2 | 370 | 100 |  | 3.7 |  | 5 | 0 |
| Op. VIII Lot 3 | 150 | 104 | 263 | 1.56 | 4.1028 | 1 | 0 |
| Op. VIII Lot 5 |  |  |  |  |  | 2 | 0 |
| Op. VIII Lot 7 |  |  |  |  |  |  |  |
| A,B,C,D | 910 | 342.5 | 1100 | 31.1675 | 342.8425 | 4 | 0 |
| Op. VIII Lot 8 A, C | 1993 | 510 | 600 | 101.643 | 609.858 | 4 | 0 |
| Op. VIII Lot 10 |  |  |  |  |  |  |  |
| A,B,D,E | 653 | 771 | 168 | 50.3463 | 84.58178 | 4 | 0 |
| Op. VIII Lot 11 A , |  |  |  |  |  |  |  |
| B, C, D, E | 677 | 886 | 340 | 59.9822 | 203.9395 | 8 | 1 |
| Op. VIII Lot 13 | 279 | 500 | 237 | 13.95 | 33.0615 | 3 | 1 |
| Op. VIII Lot 14 | 906 | 1070 | 1600 | 19.344 | 309.504 | 5 | 0 |
| Op. VIII Lot 15 A |  |  |  |  |  | secondary | 0 |
| Op. VIII Lot 16 |  |  |  |  |  | 6 | 3 |
| Special Deposit 4 |  |  |  |  |  | undetermined | 1 |

Table A.1. Estimated sizes of rooms and chambers within Midnight Terror Cave with number of bones and minimum number of individuals removed from them.

## APPENDIX B BONE SUMMARY

| Operation | Lot | Sublot | ID\# | Bone Element | Side | Pertinent Notes | Pertinent Measurements |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special Deposit | 1 |  | 1 | First Proximal Phalanx (foot) | Left | Found with jute cash | 2.9 cm |
| Special | 2 | a | (1) |  |  | Mainly the superior and lateral surfaces. Supraorbital margins are rounded. Slight skull modification with a very flat sloping frontal and a vertical flat occipital region. The right temporal is protruding from its natural flushness against the skull. Coronal, lambdoidal, squamosal, and sagittal sutures are not fused completely. The squamosal and lambdoidal sutures are the most open. Even on the interior surface they do not appear fused. |  |

very rugged. There is deteriorated bone that has collapsed from the inferior portion of the skull and has fallen into the cranium. Much of it has been calcified in place from the calcium carbonate from the nearby formation. This skull was found superior surface down.

| Special <br> Deposit |  | a | 3 | Femur fragments | Left | Proximal and distal fragments that mend. Trochanters, neck and head deteriorated. | 42.5 cm (aprox.) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 2 | B | 4 | Femur | Right | Proximal fragment in poor condition, greater trochater tubercle damaged. | 41.5 mm (head diameter), 27 cm (available) |


| Special <br> Deposit | 2 | B | 5 | Tibia | Left | Proximal fragment , in poor condition. Proximal phalanx was found imbedded in the distal portion. Numerous cracks down the shaft. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 2 | B | 6 | Radius | Right | Distal fragment | $\begin{gathered} 14.4 \mathrm{~cm} \\ \text { (available) } \end{gathered}$ |
| Special Deposit | 2 | a | 7 | Tibia fragment | Left | Distal fragment | $\begin{gathered} 13.4 \mathrm{~cm} \\ \text { (available) } \end{gathered}$ |
| Special <br> Deposit | 2 | B | 8 | Humerus | Left | Distal end broken. Olecranon fossa more triangular shaped, spool shaped, asymmetrical, level. | 41.87 mm (head diameter), 31.5 cm (aprox. Length) |
| Special Deposit | 2 | a | 9a | Skull Fragments |  |  |  |
| Special <br> Deposit | 2 | a | 9B | kull Fragment with Molar |  |  |  |
| Special Deposit | 2 | a | 9C | Molar |  |  |  |
| Special Deposit | 2 | a | 9D | Molar |  |  |  |
| Special <br> Deposit | 2 | a | 9E | Molar |  |  |  |
| Special <br> Deposit | 2 | a | 10 | Fibula fragments | Left | There is a distal fragment distal fragment and a shaft | 28.1 cm (together) |

fragment

| Special <br> Deposit | 2 | B | 11 | Tibia | Left | Distal fragment with shaft ( 17.2 cm ), proximal fragment ( 5.5 cm ), and numerous fragments. Epiphysis line is visible. | Width of distal end is 5 cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 2 | B | 12 | Os Coxae | Right | Calcium carbonate, which covers the auricular surface and pubic symphysis. Narrow notch, rim stage 1, apical activity 0.86 .58 mm x $100 / 50.9 \mathrm{~mm}$ |  |
| Special <br> Deposit | 2 | B | 13 | Femur fragments | Right | Proximal and shaft fragments | 40.34 mm head diameter, aprox. 30 cm (available) |
| Special <br> Deposit | 2 | B | 14 | Femur | Left | Complete | 40.58 mm head diameter, 40.8 cm length |
| Special <br> Deposit | 2 | B | 15 | Tibia | Possible Left | Epiphyses unfused. Between 2 and 5 years of age. | 15 cm length |
| Special <br> Deposit | 2 | B | 16 | Os Coxae | Right | Iliac crest, auricular surface and pubis are damaged. Porosity stage 2, acetabular | 18 cm (approximated length) |

$\left.\begin{array}{lccccccc} & & & & \begin{array}{c}\text { surface stage 2, rib } \\ \text { stage 1, apical } \\ \text { activity stage 1, }\end{array} \\ \text { intermediate notch. }\end{array}\right]$

| Special Deposit | 2 | B | 26 | Ulna | Left | Fused, broke in route. | 26.6 cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 2 | B | 27 | Femur | Right | Complete | 43.2 mm head diameter. 41.8 cm length |
| Special <br> Deposit | 2 | B | 28 | Os Coxae | Right | Pubis is missing. auricular surface is mostly covered with calcium carbonate, what remains has some billows (younger than 35, probably closer to mid to late 20s. <br> Porosity stage 1 , <br> Fossa stage 1, acetabular rim stage <br> 1 , apical activity stage 1. Iliac crest not fused. Narrow notch. | $\begin{aligned} & 17.8 \text { overall } \\ & \text { length } \end{aligned}$ |
| Special Deposit | 2 |  | 1 | rib fragments | Undetermined | 2 fragments |  |
| Special <br> Deposit | 3 |  |  | Maxilla Fragment | Left | Heavy calcium carbonate on all surfaces. Canine tooth present along with the first and second molar. Carry visible on the buccal surface of the first molar. |  |

Cusps are well worn.
Third molar erupted but not present. abscess on the anterior root section on the buccal side of the third molar.

| Special <br> Deposit | 3 | 2 | Scapula Fragment | Left | Lateral fragment with part of the spine and part of the glenoid fossa. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 3 | Mandible |  | Calcium carbonate on all surfaces. Damage to the condyle and coronoid process. <br> Major tooth reabsorption. Sockets still visible for some of the incisors. Wide chin. Probable male. |  |
| Special <br> Deposit | 3 | 4 | Calcaneus | Left | crushed in lateral surface probably occurred in the lab. Calcium carbonate on the medial and plantar surface | 6.45 cm length |
| Special <br> Deposit | 3 | 5 | Calcaneus | Right | Distal, medial and lateral surfaces badly deteriorated. Some holes on the medial |  |

surface (disease).

| Special <br> Deposit | 3 | 6 | Clavicle | Left | almost complete, damage to the medial and lateral ends. Somewhat gracile. Calcium carbonate on anterior and posterior surfaces. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 7 | Talus | Right | Calcium carbonate on the all surfaces. Some damage to the distal end. | 5.01 cm length |
| Special <br> Deposit | 3 | 8 | Sternum |  | Calcium carbonate on internal and external surfaces. Surface appears spongy (disease?). Based on the defined rib facets, probably younger individual. | 8.67 cm |
| Special <br> Deposit | 3 | 9 | Humerus Fragment | Left | Calcium carbonate on the on the anterior surface is thicker than the posterior surface. There appears to be two layers of calcium carbonate. The one closest to the bone | 3.90 cm head diameter |

has a grayish color, possibly indicating fire activity at the or near the time of deposit.

| Special <br> Deposit | 3 | 10 | Femur and First Metatarsal | Right (both) | Calcium carbonate on all surfaces. The flattened calcium carbonate on the posterior surface indicated that it was anterior side face up. Metatarsal is cemented to the lateral shaft portion. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 11 | Calcaneus | Left | Lateral surface damaged. Calcium carbonate on all surfaces. | 6.65 cm length |
| Special <br> Deposit | 3 | 12 | Radius | Left | Mostly complete, damage to the distal end. Calcium carbonate mostly on the anterior surface. Damage to the head prevents measurement of diameter. |  |

Calcium carbonate on all surfaces. It appears that there are two layers of calcium carbonate. The deeper layer has a grayish color possibly indicating fire activity.
Proximal fragment. Heavily calcium carbonate on all
surfaces. Two layers of calcium carbonate (one grey). Damage to the proximal surface. On the medial surface, something (possibly bone) was previously cemented but no
longer is. Distal fragment.
Calcium carbonate on all surfaces, two layers (one grey).
Some damage to the distal surface.

| Special <br> Deposit | 3 | 15 | Tibia Fragment | Right | Some damage to the <br> distal surface. |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Special |  |  |  |  | Calcium carbonate on <br> all surfaces (two <br> Deposit |

the medial surface.

| Special <br> Deposit | 3 | 17 | Radius | Left | Complete. Two layers of calcium carbonate on all surfaces. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 18 | Humeri Fragments | Both | Distal fragments calcium carbonate cemented together. <br> Two layers of calcium carbonate (one grey). The right one has more shaft. Oval shaped olecranon fossa, spool shaped trochlea, symmetrical, and angled medial condyle. |  |
| Special <br> Deposit | 3 | 19 | Frontal Fragment |  | Lacking supraorbital torus is lacking. <br> Orbital margin is not very rounded or sharp. Pitting on external surface (disease). Calcium carbonate on interior surface slightly. Possible female. |  |
| Special Deposit | 3 | 20 | Calcaneus | Right | Calcium carbonate on all surfaces. | 7.03 cm length |


| Special <br> Deposit | 3 | 21 | Humerus and Radius Fragments | Right | Calcium carbonate cemented the shafts together (two colors). Heads badly deteriorated. Break occurred in antiquity. Calcium carbonate on all surfaces. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 22 | Mandible Fragment | Left | Ramus fragment. Calcium carbonate on internal and external surface. |
| Special <br> Deposit | 3 | 23 | Mandible Fragment | Left | arc fragment. Canine tooth and first molar present. abscess second premolar. Cusps well worn. Second molar erupted. Calcium carbonate (both colors) on both surfaces. |
| Special <br> Deposit | 3 | 24 | Talus | Right | Badly deteriorated. Calcium carbonate on all surfaces. |
| Special <br> Deposit | 3 | 25 | Maxilla Fragment | Right | Calcium carbonate on all surfaces, some evidence of carbon. Three right molars present. |


| Special <br> Deposit | 3 | 26 | Scapula Fragment | Right | carbonate on all sides, thin bone cemented to the bone. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 27 | Intermediate Phalanx (Foot) |  | Complete. Very light calcium carbonate on all surfaces. Holes on the surface (disease). | 2.88 cm length |
| Special <br> Deposit | 3 | 28 | Cervical Vertebra |  | C1. Light to no calcium carbonate. Broken left transverse process. articulates with 29. |  |
| Special <br> Deposit | 3 | 29 | Cervical Vertebra |  | C2. Light to little calcium carbonate. articulates with 28 and 30 |  |
| Special <br> Deposit | 3 | 30 | Cervical Vertebra |  | C3. Light to little calcium carbonate. articulates with 29 and 31. |  |
| Special <br> Deposit | 3 | 31 | Cervical Vertebra |  | C4. Light to little calcium carbonate. articulates with 30 . Spinous process broken |  |
| Special <br> Deposit | 3 | 32 | Radius Fragment | Right | Distal fragment. Calcium carbonate on the lateral surface. |  |


| Special <br> Deposit | 3 | 33 | Cervical Vertebra |  | C2. Heavy calcium carbonate on all surfaces. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 34 | Scapula Fragment | Left | Lateral fragment with most of the glenoid and the coracoid. |
| Special Deposit | 3 | 35 | Clavicle Fragment | Left | Lateral fragment, most of the calcium carbonate is on the posterior surface, little on the anterior surface. |
| Special <br> Deposit | 3 | 36 | Ulna Fragment | Undetermined | Calcium carbonate on the entire surface. Broken in antiquity. Cannot side due to the amount of calcium carbonate. |
| Special <br> Deposit | 3 | 37 | Manubrium |  | Complete. Only light calcium carbonate on the superior and anterior surface. |
| Special <br> Deposit | 3 | 38 | Fibula Fragment | Left | Distal Fragment. Calcium carbonate on all surfaces. Broken in antiquity. |
| Special <br> Deposit | 3 | 39 | Cuboid | Left | Slightly deteriorated on all surfaces. Slight calcium carbonate on most surfaces. |


| Special <br> Deposit | 3 | 40 | Clavicle Fragment | Left | Medial fragment. Broken in antiquity. Two colors of calcium carbonate on all surfaces, a majority on the posterior surface. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 41 | Navicular | Left | Complete. Calcium carbonate on the facets. |  |
| Special <br> Deposit | 3 | 42 | Sacrum |  | Left ala badly deteriorated. Calcium carbonate on all surfaces. all the vertebrae are fused. Kind of broad and long. |  |
| Special <br> Deposit | 3 | 43 | Femur fragment | Right | Distal fragment of badly deteriorated condlyes. |  |
| Special <br> Deposit | 3 | 44 | Ulna Fragment | Right | Shaft fragment. Calcium carbonate (both colors) on all surfaces. Broken in antiquity. |  |
| Special Deposit | 3 | 45 | Intermediate Phalanges (Foot) (2) |  | Complete. Very little calcium carbonate. | $\begin{gathered} 2.78 \mathrm{~cm} .2 .71 \mathrm{~cm} \\ \text { lengths. } \\ \hline \end{gathered}$ |
| Special <br> Deposit | 3 | 46 | Intermediate Phalanges (Hand) (3) |  | Complete. <br> Deteriorated palmar surface of the | $2.09 \mathrm{~cm}, 2.35 \mathrm{~cm}$, 2.62 cm lengths. |


|  |  |  |  |  | smallest one. No significant calcium carbonate buildup. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 47 | Cuboid | Right | Slightly deteriorated, light calcium carbonate on the largest facet. |  |
| Special <br> Deposit | 3 | 48 | Navicular | Right | Deteriorated. Calcium carbonate on the facets. |  |
| Special <br> Deposit | 3 | 49 | Parietal Fragment | Undetermined | Calcium carbonate on the internal and external surfaces. Pitting on both surfaces, but more extent on the interior surface (disease). |  |
| Special Deposit | 3 | 50 | First Metacarpal | Left | Complete, light calcium carbonate. | 4.23 cm length |
| Special <br> Deposit | 3 | 51 | Scapula Fragment | Right | Fragment of the spine, broken in antiquity, two colors of calcium carbonate heavy in the supraspinous area and on the spine. |  |
| Special <br> Deposit | 3 | 52 | Fibula Fragment | Right | Distal Fragment. Some calcium carbonate around the shaft. Damage to the |  |

posterior surface.

| Special <br> Deposit | 3 | 53 | Intermediate Phalanges <br> (Hand) (5) | Undetermined | The shortest one has a broken distal end. Calcium carbonate on all surfaces. | $3.81 \mathrm{~cm}, 4.08 \mathrm{~cm}$, <br> 4.18 cm , and 4.33 cm lengths |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 54 | Scapula Fragment | Undetermined | Spine fragment, calcium carbonate on all surfaces. |  |
| Special <br> Deposit | 3 | 55 | Humerus Fragment | Left | Distal fragment of the trochlea. Symmetrical and spool like. |  |
| Special <br> Deposit | 3 | 56 | Fourth Metacarpal | Left | Complete. Calcium carbonate on all surfaces, a majority on the medial surface. | 5.36 cm length |
| Special <br> Deposit | 3 | 57 | Fifth Metacarpal | Left | Complete. Calcium carbonate on all surfaces. | 4.96 cm length |
| Special <br> Deposit | 3 | 58 | Second Metacarpal | Left | Complete. Calcium carbonate on all surfaces. | 6.37 cm length |
| Special Deposit | 3 | 59 | Metacarpal Fragment | Undetermined | Distal fragment |  |
| Special Deposit | 3 | 60 | Third Metatarsal | Right | Complete. Calcium carbonate on all surfaces | 5.84 cm length |
| Special <br> Deposit | 3 | 61 | Second Metacarpal | Right | Proximal fragment. Calcium carbonate on |  |

all surfaces.

| Special <br> Deposit | 3 | 62 | Third Metacarpal | Right | Complete. Calcium carbonate on all surfaces. | 6.20 cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 63 | Second Metacarpal | Right | Complete, calcium carbonate on all surfaces. |  |
| Special <br> Deposit | 3 | 64 | Metatarsal Fragment | Undetermined | Proximal fragment. Second or third, |  |
| Special Deposit | 3 | 65 | Unidentifiable Fragments (3) | Undetermined | Shaft Fragments. |  |
| Special <br> Deposit | 3 | 66 | Radius Fragment | Right | Distal Fragment, Calcium carbonate on all surfaces. |  |
| Special <br> Deposit | 3 | 67 | Rib Fragments (14) | Left | Vertebral and Shaft fragments. Calcium carbonate on all surfaces. |  |
| Special <br> Deposit | 3 | 68 | Rib Fragments (10) | Right | Two vertebral ends, the rest are shaft fragments. Calcium carbonate on all surfaces. |  |
| Special <br> Deposit | 3 | 69 | Rib Fragments (7) | Undetermined | Shaft fragments. Calcium carbonate on all surfaces. |  |
| Special <br> Deposit | 3 | 70 | Pubis Fragment | Left | Calcium carbonate on the interior surface. Pubic face has some |  |


|  |  |  |  |  | undulations but otherwise badly deteriorated. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 71 | Maxilla Fragment | Left | Part of the maxillary sinus and the orbital surface are visible. |  |
| Special <br> Deposit | 3 | 72 | Ulna Fragment | Left | Proximal fragment. <br> Damage to the proximal and distal ends in antiquity. <br> Thick calcium carbonate on all surfaces. |  |
| Special <br> Deposit | 3 | 73 | Thoracic Vertebra Fragments |  | Posterior fragments from two separate vertebra. One is a low vertebra and one is high. Calcium carbonate on the surfaces. |  |
| Special <br> Deposit | 3 | 74 | Unidentifiable <br> Fragments (2) |  |  |  |
| Special <br> Deposit | 3 | 75 | Os Coxae | Left | Pubis absent. Calcium carbonate on all surfaces. acetabulum rim stage is a 3 . Greater sciatic notch appears narrow but it is distorted from the calcium carbonate. | 4.13 cm acetabular diameter |

This appears to be the mate for 76 .

|  |  |  | Damage to the pubis <br> and to the ilium. Two <br> colors of calcium <br> carbonate. Greater <br> sciatic notch is more <br> rounded, acetabular <br> rim is stage 3. This <br> appears to be a mate <br> for 75. |
| :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | Os Coxae | Right |

Probably T2-T6.
Calcium carbonate is
on all surfaces, there

| Special <br> Deposit | 3 | 80 | Thoracic Vertebra | is damage to the body. |
| :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 81 | Thoracic Vertebra | Probably T2-6. <br> Calcium carbonate on most surfaces. Right superior articular facet is broken along with the spinous process. |
| Special <br> Deposit | 3 | 82 | Thoracic Vertebra | Probably T2-6. Calcium carbonate on most surfaces. Broken right transverse process and left superior articular facet. Deteriorated body on the superior and inferior surfaces. |
| Special <br> Deposit | 3 | 83 | Thoracic Vertebra | Probably T2-6. Calcium carbonate on most surfaces. Broken left transverse process. Deteriorated body. |
| Special <br> Deposit | 3 | 84 | Thoracic Vertebra | Probably T2-6. Calcium carbonate on most surfaces. Broken left transverse |


|  |  |  |  | process. Deteriorated body. |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 85 | Lumbar Vertebra | L5. articulates with 86. Damage to both the transverse processes. Major lipping and arthritis on the body. Body also appears crushed. |  |
| Special <br> Deposit | 3 | 86 | Lumbar Vertebra | L4. articulates with 85 and 87. Damage to the body and transverse processes. Lipping and arthritis is evident on the body. |  |
| Special <br> Deposit | 3 | 87 | Lumbar Vertebra | L3. articulates with 86. Some damage to the left transverse process |  |
| Special <br> Deposit | 3 | 88 | Lumbar Vertebra | L1. articulates with 89. Damage to the transverse processes. Body slightly deteriorated. | $\begin{gathered} 2.37 \mathrm{~cm} \text { body } \\ \text { height } \\ \hline \end{gathered}$ |
| Special <br> Deposit | 3 | 89 | Lumbar Vertebra | L2. articulates with 88 and 90. Some calcium carbonate. Holes forming on the |  |

> body (disease).

| Special <br> Deposit | 3 | 90 | Lumbar Vertebra | L3. articulates with 89. Some calcium carbonate. Holes forming in body (disease), some lipping. | $\begin{gathered} 2.36 \mathrm{~cm} \text { body } \\ \text { height } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 | 91 | Thoracic Vertebra | Probably T12. Calcium carbonate all over and deteriorated. articulates with 92 |  |
| Special <br> Deposit | 3 | 92 | Thoracic Vertebra | Probably T11. Calcium carbonate all over and deteriorated. articulates with 93 and 91. |  |
| Special <br> Deposit | 3 | 93 | Thoracic Vertebra | Probably T10. Calcium carbonate all over and deteriorated. articulates with 92 and 94 |  |
| Special <br> Deposit | 3 | 94 | Thoracic Vertebra | Probably T9. Calcium carbonate all over and deteriorated. articulates with 93 and 95 |  |
| Special Deposit | 3 | 95 | Thoracic Vertebra | Probably T8. Calcium carbonate all over and |  |


|  |  |  | deteriorated. <br> articulates with 96 <br> and 94 |
| :---: | :---: | :---: | :---: |
| Special <br> Deposit | 3 |  |  |
|  |  |  | Probably T7. Calcium <br> carbonate all over and <br> deteriorated. |
| Special |  |  |  |
| Deposit | 3 |  | Thoracic Vertebra |


| Special <br> Deposit | 4 | a | 1 | radius | right | proximal fragment | head diameter is 19.51 mm , available length 11.2 cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 4 | a | 2 | proximal pedal phalanx |  |  | 12.63 mm length |
| Special <br> Deposit | 4 | a | 3 | first metatarsal | left | distal fragment, distal head has post mortem damage and arthritis |  |
| Special <br> Deposit | 4 | a | 4 | 3rd cuneiform | left |  |  |
| Special <br> Deposit | 4 | a | 5 | cuboid | left | some post-mortem damage |  |
| Special <br> Deposit | 4 | a | 6 | talus | left | some post mortem damage, rather small and gracile | $\begin{gathered} \text { length } 47.41 \mathrm{~mm}, \\ \text { width } 38.14 \\ \hline \end{gathered}$ |
| Special <br> Deposit | 4 | a | 7 | third metacarpal | left | proximal fragment, all but head present, defined muscle attachment on posterior side, northern hand |  |
| Special <br> Deposit | 4 | a | 8 | first metacarpal | left | northern hand | 43.27 mm length |
| Special <br> Deposit | 4 | a | 9 | second metacarpal | left | slight arthritis in the distal head northern hand | 60.83 mm length |
| Special <br> Deposit | 4 | a | 10 | fourth metacarpal | left | proximal fragment, head missing |  |


| Special <br> Deposit | 4 | a | 11 | fifth metacarpal | left | distal fragment, distal head has post mortem damage and arthritis |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special Deposit | 4 | a | 12 | proximal manual phalanx |  |  | 35.37 mm length |
| Special <br> Deposit | 4 | a | 13 | proximal manual phalanx |  | possible arthritic damage on proximal and distal ends | 40.39 mm |
| Special <br> Deposit | 4 | a | 14 | intermediate manual phalanx |  |  | 26.43 mm length |
| Special <br> Deposit | 4 | a | 15 | intermediate manual phalanx |  |  | 26.05 mm length |
| Special <br> Deposit | 4 | a | 16 | intermediate manual phalanx |  |  | 16.95 mm length |
| Special <br> Deposit | 4 | a | 17 | hamate | left |  |  |
| Special Deposit | 4 | a | 18 | capitate | left | slight red coloration |  |
| Special <br> Deposit | 4 | a | 19 | scaphoid | left |  |  |
| Special <br> Deposit | 4 | a | 20 | lunate | left |  |  |
| Special <br> Deposit | 4 | a | 21 | triquetral | left | irregular in size and shape, somewhat flattened |  |
| Special <br> Deposit | 4 | a | 22 | first distal manual phalanx |  | some damage to the proximal end | 21.08 mm length |
| Special <br> Deposit | 4 | a | 23 | distal manual phalanx |  |  | 16.04 mm |


| Special <br> Deposit | 4 | a | 24 | distal manual phalanx |  |  | 15.91 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special Deposit | 4 | a | 25 | distal manual phalanx |  |  | 13.91 mm |
| Special Deposit | 4 | a | 26 | fifth metatarsal | left | calcite on pedal surface near head | 61.24 mm |
| Special <br> Deposit | 4 | a | 27 | third metatarsal | left | fragment, head absent, ring of calcite around base, above facets |  |
| Special Deposit | 4 | a | 28 | second metatarsal | left | damage to proximal surface | 66.06 mm |
| Special Deposit | 4 | a | 29 | fourth metatarsal | left | damage to proximal surface and distal |  |
| Special <br> Deposit | 4 | a | 30 | first proximal pedal $\qquad$ |  |  | 28.05 mm |
| Special Deposit | 4 | a | 31 | first intermediate pedal phalanx |  | some proximal post mortem damage | 27.38 mm |
| Special Deposit | 4 | a | 32 | first distal pedal phalanx |  |  | 21.99 mm |
| Special <br> Deposit | 4 | a | 33 | humerus fragment | right | poor preservation compared to the left, but morphologically the same |  |
| Special <br> Deposit | 4 | a | 34 | talus | left | poor preservation | 65.78 mm in length |
| Special <br> Deposit | 4 | a | 35 | radius fragments | $?$ | distal end |  |

$\left.\begin{array}{lccccccc}\begin{array}{c}\text { Special } \\ \text { Deposit }\end{array} & 4 & \text { a } & 36 & \begin{array}{c}\text { first proximal phalanx } \\ \text { pulled for testing }\end{array} & & \\ \hline & & & & & & \begin{array}{c}\text { adult, from lateral } \\ \text { incisor to half of third } \\ \text { molar. all teeth lost } \\ \text { post mortem, except } \\ \text { for possibly the } \\ \text { second and third } \\ \text { molar, probable }\end{array} \\ \text { abscess on labial and } \\ \text { posterior surface of } \\ \text { second molar }\end{array}\right]$

| Special <br> Deposit | 4 | E | 8 | humerus fragment | left | distal fragment, the trochlear notch is not that deep, fossa is ovate in the deeper section, but extends up in a triangular fashion, spool shaped, probable male |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 4 | E | 9 | femur fragments | right | distal fragment, badly deteriorated with cracks and bowing, treated with b-72 |  |
| Special <br> Deposit | 4 | E | 10 | radius fragments | left | four large fragments and a few smaller ones | 15.17 mm mid shaft estimation |
| Special <br> Deposit | 4 | E | 11 | frontal fragments | more right | no morphological characteristics |  |
| Special <br> Deposit | 4 | E | 12 | thoracic vertebra fragment |  | fragment with a superior articular facet and a lateral process with a facet on it |  |
| Special Deposit | 4 | E | 13 | humerus fragments | right | shaft and part of the distal portion | 22.45 mm mid shaft diameter |
| Special <br> Deposit | 4 | E | 14 | femur fragments |  | shaft fragments, badly deteriorated with taphonomic cracking | mid shaft diameter 29.71 mm |
| Special Deposit | 4 | E | 15 | parietal fragment |  |  |  |

$\left.\begin{array}{lcccccc}\begin{array}{c}\text { Special } \\ \text { Deposit }\end{array} & 4 & \text { E } & 16 & \text { parietal fragment } & & \text { slight lytic activity } \\ \hline & & & & & \text { pin pick porosity, } \\ \text { Special } \\ \text { deposit with evidence } \\ \text { of healing } \sim 4 m m \text { in } \\ \text { diameter }\end{array}\right]$

| Special Deposit | 4 | E | 27 | ulna fragment | left | distal fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 4 | E | 28 | rib fragment | right | $\begin{gathered} \text { neck and shaft } \\ \text { fragment, probably } \\ \text { rib 3-6 } \end{gathered}$ |  |
| Special <br> Deposit | 4 | E | 29 | radius fragment | right | distal fragments, 8 cm long when cross mended, post mortem breaking |  |
| Special <br> Deposit | 4 | E | 30 | third metacarpal fragments | right | cross mend to form a complete bone, badly damages |  |
| Special <br> Deposit | 4 | E | 31 | thoracic vertebra fragment |  | lamina fragment with right lateral process and superior and inferior facets |  |
| Special <br> Deposit | 4 | E | 32 | proximal manual phalanx |  | slight damage to proximal surface | 41.46 mm |
| Special Deposit | 4 | E | 33 | intermediate manual phalanx |  |  | 29.36 mm |
| Special Deposit | 4 | E | 34 | intermediate manual phalanx |  |  | 28.57 mm |
| Special <br> Deposit | 4 | E | 35 | rib fragments | probable right | upper rib probably 36 |  |
| Special Deposit | 4 | E | 36 | greater multangular | right |  |  |


| Special <br> Deposit | 4 | E | 37 | femur fragments | right | adult, fragment of neck and trochlear region, badly deteriorated. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Special <br> Deposit | 4 | E | 38 | clavicle fragment | left | lateral fragment with conoid tubercle |  |
| Special <br> Deposit | 4 | E | 39 | metacarpal fragment | unknown | shaft fragment |  |
| Special Deposit | 4 | E | 40 | metacarpal fragment | unknown | shaft fragment |  |
| Special Deposit | 4 | E | 41 | rib fragment | right | neck fragment |  |
| Special <br> Deposit | 4 | E | 42 | radius fragment | unknown | shaft fragment | $\sim 1 \mathrm{~cm}$ in length |
| Special <br> Deposit | 4 | E | 43 | metacarpal fragment | unknown | shaft fragment |  |
| Special <br> Deposit | 4 | E | 44 | cranial fragment | unknown | thin, sinus of some type visible |  |
| Special <br> Deposit | 4 | E | 45 | 6 unidentifiable long bone fragments | unknown |  |  |
| III | 8 |  | 1 | long bone fragment | undetermined | bones from sherd |  |
| III | 8 |  | 2 | rib fragments | undetermined | bones from sherd |  |
| III | 5 | a | 1 | radius fragments | undetermined |  |  |
| III | 5 | a | 2 | fibula fragment | undetermined |  |  |
| III | 5 | a | 3 | metacarpal fragment | undetermined |  |  |
| III | 5 | a | 4 | proximal manual phalanx | undetermined |  |  |
| III | 5 | a | 5 | metatarsal fragment | undetermined |  |  |


| III | 5 | a | 6 | metatarsal fragment | undetermined |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| III | 5 | a | 7 | second metacarpal fragment | undetermined |  |
| IV | 5 |  | 1 | incisor | right | deciduous second incisor. |
| IV | 10 |  |  | humerus fragments | undetermined | 3 fragments, two are shaft, one is the distal portion above the fossa, covered in carbon, size is small and gracile |
| IV | 10 |  | 2 | rib fragment | undetermined | shaft fragment, adult, covered in carbon and has some mold on it |
| IV | 10 |  | 3 | rib fragment | undetermined | shaft fragment, adult, covered in carbon and has some mold on it |
| IV | 10 |  | 4 | rib fragment | left | neck fragment with some of the shaft, covered in carbon and has some mold on it |
| IV | 10 |  | 5 | rib fragment | undetermined | shaft fragment, adult, covered in carbon and has some mold on it |
| IV | 10 |  | 6 | rib fragment | undetermined | shaft fragment, adult, covered in carbon and has some mold on it |
| IV | 10 |  | 7 | cervical vertebra fragment |  | left fragment with inferior and superior articular facet, adult, |

some carbon on it

| IV | 10 |  | 8 | femur fragment | undetermined | condyle fragment, slightly carbon covered |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| IV | 10 |  | 9 | vertebra fragment |  | body fragment, lipping and spondylophytes, carbon covered, probably lumbar vertebra |
| IV | 10 |  | 10 | 2 long bone fragments | undetermined | probably belonging to a humerus |
| IV | 10 |  | 11 | 34 unidentified fragments | undetermined |  |
| IV | 11 |  | 1 | cranial fragment | undetermined |  |
| V | 1 | C | 1 | temporal | right | fragment appears to follow sutures. Other skull bones recovered from the same grid square will be reconstructed and consolidated with B72. |

3 pieces. Maxillae, Frontal, Nasals, Ethmoid, Sphenoid, Zygomatic, Palatines, Volmer, Lacrimals, and Inferior Nasal Conchae. Two frontal bone fragments articulate. Sphenoid and Zygomatics are only partials. Other skull bones recovered from the same grid square will be reconstructed and
consolidated with B-
72. Brow ridges: one
absent, right side
noticeable along
midline. Supraorbital margin is rounded.
Teeth Present: right and left first molars, two left premolars, left canine. Sockets between these show no sign of reabsorption. Third molars are partly present with evidence of partial reabsorption
on the second molars.
(Removed for testing:
Upper left canine, and
right upper 1st molar)

| V | 1 | C | 2B | molar |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 2 C | canine |  |  |  |
| V | 1 | C | 3 | temporal | left | fragment appears to follow sutures. Other skull bones recovered from the same grid square will be reconstructed and consolidated with B72 | $\begin{aligned} & 25.03 \mathrm{~mm} \\ & \text { mastoid length } \\ & \text { Distal end } \\ & \text { broken. } \end{aligned}$ |


| V | 1 | C | 4 | parietals; occipital | Both | The left side of the parietal is mostly complete with menengial grooves present. Part of the right parietal and occipital are present. The left side of the Other skull bones recovered from the same grid square will be reconstructed and consolidated with B72. Wormian, some sutures appear mostly fused see pictures. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 5 | cranial fragments |  | 10 count. Occipital fragment has occipital condyles present. Three of the other fragments are parietals. Other skull bones recovered from the same grid square will be reconstructed and consolidated with B-72. |  |
| V | 1 | C | 6 | femur fragment | right | Proximal fragment in relatively good condition. Multiple post mortem fractures | 39.3 cm when articulated, 39.3 mm head diameter |



## Probable Female.

| V | 1 | C | 10 | Radius | right | Complete. Distal epiphysis is fused but line is very visible. R2 in the sketch. Posterior proximal and distal surfaces have some calcium carbonate. | 2.05 cm head diameter, 22.9 cm overall length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V |  | C | 11 | Femur fragment | left | Proximal fragment. Calcium carbonate on the posterior, medial, and medial/anterior surface. Slight red staining on the posterior surface of the shaft. | 3.78 cm head diameter |


| V | 1 | C | 12 | Tibia fragment | left | Shaft fragment. Damage to the midshaft area, calcium carbonate on the posterior surface. Slight reddish brown staining all over in circular blotches. Slight calcium carbonate and carbon on the anterior surface, heavier calcium carbonate on the posterior surface. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 13 | Tibia fragment | left | Distal fragment. |
| V | 1 | C | 14 | Humerus fragment | left | Distal and shaft fragment. H4 on sketch. Calcium carbonate on the anterior/lateral surface on the upper shaft and on the distal portion. Medial condyle is broken. Olecranon fossa is more triangular, trochlea is asymmetrical and less spool shaped. Probable male. |


| V | 1 | C | 15 | Femur fragment | left | Distal portion of the condlyes. Calcium carbonate on the posterior surface leading onto the medial and then part of the anterior surface. Possible shell fragment imbedded in the calcium carbonate. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 16 | Femur fragment | right | Distal fragment. Possible cut mark on the medial surface. Possible red staining on the condlyes. The popliteal surface has many holes possible disease. Medial surface of the condyle is badly deteriorated. |
| V | 1 | C | 17 | Tibia fragment | right | Shaft fragment. Most of the calcium carbonate is on the posterior surface but there is some on the lateral and anterior (distal) surface |


| V | 1 | C | 18 | Femur fragment | right | Distal shaft fragment. Probable cut marks on the lateral surface. Calcium carbonate on the lateral, medial and slight amounts on the posterior surface. Carbon on Posterior surface. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 19 | Humerus | right | Complete. H5 on sketch. Calcium carbonate and carbon on the anterior surface. Olecranon fossa triangular shaped, trochlea is asymmetrical and less spool like, medial condyle is straight. | 4.29 cm head diameter, 29.1 cm overall length |
| V | 1 | C | 20 | Clavicle | left | Complete. Calcium carbonate on all surfaces. Medial epiphysis is fused but line is slightly visible. | 14 cm length |
| V | 1 | C | 21 | Calcaneus | left | Complete, Calcium carbonate mostly on the anterior surface. | 7.48 cm length |


| V | 1 | C | 22 | Humerus | left | Complete. Calcium carbonate mainly on the posterior surface. <br> Olecranon Fossa more oval, Trochlea is spool like and symmetrical. Medial Condyle is angled up. Probable Female. | 3.89 cm head diameter, 27.2 cm overall length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 23 | Ulna | right | almost Complete, just missing the distal head and process. U2 on sketch. Little to no calcium carbonate. Muscle attachments are well developed. |  |
| V | 1 | C | 24 | Tibia fragments | left | almost complete, missing some small fragments. Calcium carbonate on all surfaces. T1 on sketch? |  |
| V | 1 | C | 25 | Femur fragment | right | Proximal fragment. Greater and lesser trochanter and the femoral head have not yet fused. Less than 6-9 years old. |  |

$\left.\begin{array}{lllll} & \begin{array}{c}\text { Proximal and shaft } \\ \text { fragment, rather on } \\ \text { the small side. } \\ \text { anterior and lateral } \\ \text { surfaces around the } \\ \text { proximal end are } \\ \text { deteriorated. Cut } \\ \text { mark on the lateral }\end{array} \\ \text { surface about } 8.5 \mathrm{~cm} \\ \text { from the proximal } \\ \text { end. Calcium }\end{array}\right]$

| V | 1 | C | 29 | Frontal fragment |  | Mostly the right side. Obvious skull modification (frontal flattening/elongating). Possible cut mark in orbital area (more evident from the internal surface). <br> Calcium carbonate on the interior and exterior surface. Supraorbital torus is pronounced, but the margin is blunt. Probable male. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 30 | Femur fragments | right | Proximal fragment and shaft fragment. Calcium carbonate on the posterior surface. <br> Damage to the trochanter crest. Post depositional <br> longitudinal cracking. | 3.90 cm head diameter |
| V | 1 | C | 31 | Humerus fragment | left | Distal fragment. Calcium carbonate and carbon on the posterior and anterior surface. Olecranon fossa more triangular shaped, asymmetrical trochlea, less spool |  |

shaped, medial condyle is straight.

Probable male.

| V | 1 | C | 32 | Femur fragment | left | Distal fragment. Epiphysis not fused, probably 5 years of age. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 33 | Tibia fragment | left | Distal fragment. Epiphyseal line still visible. Damage to the anterior surface near the epiphysis. |
| V | 3 | C | 34 | Femur fragment | left | Distal fragment of the condyles and part of the shaft. Calcium carbonate on the posterior shaft portion. Lateral and medial surfaces deteriorated. Holes on the popliteal surface (disease?) |


| V | 1 | C | 35 | Humerus fragments | left | Proximal head with a large portion of shaft and many shaft fragments that shattered when they were picked up in the lab. Calcium carbonate on anterior surface and holes near the head (disease?) H 1 on sketch. | 3.76 cm head diameter. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 36 | Calcaneus | left | Complete. Calcium carbonate mainly on the medial surface. | 7.05 cm length |
| V | 1 | C | 37 | Scapula | right | Lateral fragment, Spine broken, glenoid fossa present. | $\begin{gathered} 3.56 \mathrm{~cm} \text { fossa } \\ \text { height, } 2.42 \text { fossa } \\ \text { width } \\ \hline \end{gathered}$ |
| V | 1 | C | 38 | Femur fragment | Undetermined | Shaft fragment. Calcium carbonate on posterior surface. |  |
| V | 1 | C | 39 | Radius fragment | left | Distal fragment with shaft. Epiphysis unfused, but styloid process visible. Between 10 and 14 probably. |  |
| V | 1 | C | 40 | Femur fragment | left | Proximal fragment. Damage to the trochater crest. <br> Calcium carbonate on posterior surface. On | 3.80 cm head diameter |


|  |  |  |  |  |  | the small size, probable adolescent/young adult. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 41 | Radius fragment | left | Distal fragment. Calcium carbonate on all surfaces. another bone fragment is cemented to the anterior surface that cannot be identified. |  |
| V | 1 | C | 41 | First Metatarsal | left | Complete. Calcium carbonate on medial and dorsal surfaces. | 5.55 cm length |
| v | 1 | C | 42 | Mandible |  | Complete. Calcium carbonate on all surfaces. all six molars are present and the second left incisor and the left canine. abscess developing on the first left molar's anterior buccal root, left right canine, left second premolar and left first molar. Broad Chin, probable male. |  |


| V | 1 | C | 43 | Thoracic Vertebra | Probably T2-T6. Most of the posterior Surface except for the superior articular facets are missing. Severe lipping on the body. Epiphyses fused, line not visible. Some holes on the body (disease) | 1.57 cm body height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 44 | Lumbar Vertebra | Probably L3. Damage to the posterior area and transverse processes. Epiphyses fused and extreme lipping/arthritis on the superior/anterior surface. | $\begin{gathered} 2.35 \mathrm{~cm} \text { body } \\ \text { height } \end{gathered}$ |
| V | 1 | C | 45 | Lumbar Vertebra fragment | anterior body fragment. Epiphyses fused but line is visible. Holes in the body (disease) | 2.74 cm body height |
| V | 1 | C | 46 | Lumbar Vertebra | Probably L3 or L4. Damage to the superior surface of the body. Transverse processes absent, inferior articular facets absent. <br> Epiphyses fused, but | 2.83 cm body height |

$\left.\begin{array}{ccccc} & \begin{array}{c}\text { line is still present. } \\ \text { Slight reddish }\end{array} \\ \text { discoloration on the } \\ \text { inferior anterior } \\ \text { portion of the body. }\end{array}\right]$

|  |  |  | transverse process, <br> and the left transverse <br> foramen. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V |  |  |  | Possible cut marks?? <br> Holes visible on the <br> posterior surface <br> (disease) |


| V | 1 | C | 55 | Ilium | right | Calcium carbonate on lateral and medial surfaces. Iliac crest is heavily developed. Narrow greater sciatic notch. Probably male. Superior epiphysis is fused but the line is visible. The lunate surface appears relatively smooth. acetabular notch is barely visible. The rim stage is $3 / 4$. The auricular surface is covered with calcium carbonate. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 56 | Thoracic Vertebra |  | Probably T10. Spinous process broken. Epiphyses fused but line is visible. Slight lipping on the body. a few holes developing on the body (disease) | $\begin{gathered} 1.97 \mathrm{~cm} \text { body } \\ \text { height } \\ \hline \end{gathered}$ |


| V | , | C | 57 | Ischium | left | Not fused with the other bones of the os coxae. Probably less than 4-8 years of age. Calcium carbonate is mainly on the lateral surface inferior to the acetabulum, but there is more on the medial surface. Belongs to the same Individual as 59. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 58 | Thoracic Vertebra |  | Probably T2-T6. <br> Damage to the body's anterior and lateral sides | 1.15 cm body height |
| V | 1 | C | 59 | Pubis | left | Probably less than 4-8 years of age. Belongs to the same Individual as 57. More calcium carbonate on the medial than lateral surface. More bleached in color than 57. |  |
| V | 1 | C | 60 | Fibula fragment | right | Shaft fragment. Calcium carbonate light on all surfaces. |  |


| V | 1 | C | 61 | Lumbar Vertebra |  | L2. Damage to the body and left transverse process. Epiphysis sealed but the line is still visible. Calcium carbonate on all surfaces. Holes forming on the body (disease) | $\begin{gathered} 2.55 \mathrm{~cm} \text { body } \\ \text { height } \\ \hline \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 62 | Ischium | right | Has part of the acetabulum, but not enough for a diameter measurement. Small juvenile. Ischial tuberosity is not fully developed. |  |
| V | 1 | C | 63 | Parietal fragment | Undetermined | Thick mud covered by calcium carbonate on the interior surface, calcium carbonate on the exterior as well. Thinness and size suggests young individual. Cranial suture clearly defined and had probably not fused yet. Pitting developing. |  |

Part of the acetabulum is present.
Part of the Iliac crest
does not appear fused. There are holes on the lateral surface (disease). The acetabulum appears small. Yet the Rim appears slightly worn acetabulum and the lunate surface diameter is 3.87

| V | 1 | C | 64 | Ilium fragment | Undetermined | is slightly porous. | cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V |  | C | 65 | Sacral Vertebrae |  | S1 and S2, partly fused together, but not complete. The superior epiphysis for S 1 has not fused. The auricular surface is not fused either. Evidence of insect activity and damage to the posterior surface. | S1 aprox. 2.18 body height, S2 aprox. 1.95 cm body height. |
| V | 1 | C | 66 | Thoracic Vertebra |  | Probably T10. Damage to the anterior surface of the body. Calcium carbonate on the posterior surface. | 2.05 cm body height |


| V | 1 | C | 67 | Ischium | right | Lateral surface has some calcium carbonate. Unfused. Perinate to 1 year aprox. See 68. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 68 | Ilium | left | Calcium carbonate on lateral surface. Perinate - 1 year aprox. See 67. |
| V | 1 | C | 69 | rib fragments (2) | right | Two shaft fragments from two separate rib bones. Calcium carbonate on both anterior and posterior surfaces. |
| V | 1 | C | 70 | Unidentified fragment | Undetermined | Possibly skull or os coxae fragment. Calcium carbonate on all surfaces. |
| V | 1 | C | 71a | Skull fragments | Undetermined | One parietal fragment with calcium carbonate on both surfaces. The other is a frontal fragment of the left orbital margin, which is rounded. Probable male. |

abnormal, thick piece
with irregular
thinning. Pitting
forming on the
interior surface. Most
of the calcium
carbonate is on the
exterior with little on

| V | C | C | 71B | molar | Undetermined | the inside |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 72 | Skull fragment | Undetermined | Unidentifiable <br> fragment. Calcium <br> carbonate on both <br> surfaces. |
| V | 1 | C | 73 | Skull fragment | Undetermined | Calcium carbonate on <br> all surfaces. |
| V |  |  |  |  |  | Calcium carbonate on <br> most of the exterior <br> with little on the <br> interior surface. |
| C |  |  |  |  |  | Slight pitting on the <br> interior surface <br> (disease) |

first molar present.
Heavy calcium
carbonate on all
surfaces.

| V | 1 | C | 76 | Maxilla fragments |  | Both right incisors and the first left incisor is missing, other than that up to the first premolar is still in the socket. right lower first molar has a carry developing on the lingual surface. right Second first molar has a carry developing on the buccal side (center). left first molar has a huge chunk missing from lingual surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 77a | Mandible fragment | Undetermined | Thick mud covered by calcium carbonate on the interior surface, calcium carbonate on the exterior as well. <br> Thinness and size |

# suggests young 

 individual. Cranial suture clearly defined and had probably not fused yet.$\left.\begin{array}{cccccc}\hline & & & & \begin{array}{c}\text { Young child. Calcium } \\ \text { carbonate and mud on } \\ \text { the interior surface. } \\ \text { Light white circular } \\ \text { deposit on the } \\ \text { exterior, probably }\end{array} \\ \text { where the head was in } \\ \text { contact with the } \\ \text { ground. }\end{array}\right\}$

|  |  |  |  |  |  | erupted along with left canine and premolars. No absorption |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 85 | Femur fragments |  | Distal condyle fragments. It may be possible that one is left and one is right. |  |
| V | 1 | C | 86 | Humerus fragment | Unknown | head only | 38.83 mm head diameter |
| V | 1 | C | 87 | Cervical vertebra |  | C 2 , lamina missing, no significant lipping. |  |
| V | 1 | C | 88 | Talus | left | Complete. Calcium carbonate on the plantar surface larger facet. |  |
| V | 1 | C | 89 | rib fragments | Unknown | 4 shaft fragments some taphonomic breakage |  |
| V | 1 | C | 90 | rib | right | Middle rib |  |
| V | 1 | C | 91 | Femur fragment | left | Greater trochanter broken off, head and neck absent. <br> Relatively gracile. Calcium carbonate on the anterior surface. |  |
| V | 1 | C | 92 | Sacrum fragments |  | S3-5 present and fused together. Coccyx is not present nor was it fused |  |


| V | 1 | C | 93 | Femur fragment | left | fragment from the neck to below the greater trochanter. Head and trochanters are not yet fused, 9 or younger. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | C | 94 | Femur head fragment | Unknown | Only part of the head with the fovea capitis. |  |
| V | 1 1 | C | 95 | Scapula fragment | right | Medial border of the scapula from the inferior part of the glenoid to most of the way to the apex. |  |
| V | 1 | C | 96 | rib 1 | left | Possibly from the same person as 81 |  |
| V | 1 | C | 97 | Ischium | right | Part of the acetabulum and most of the Ischial tuberosity. |  |
| V | 1 | C | 98 | Medial Phalanx |  |  |  |
| V | 1 | C | 99 | 4th Metacarpal | left | Complete. | 58.15 mm |
| V | 1 | C | 100 | 5th Metacarpal | left | Complete | 51.58 mm |
| V | 1 | C | 101 | 4th Metatarsal | left | Head missing |  |
| V | 1 | C | 102 | 2 unidentified fragments. |  |  |  |
| V | 1 | E | 1 | clavicle |  |  |  |
| V | 1 | E | 2 | humerus |  |  |  |
| V | 1 | E | 3 | parietal |  |  |  |
| V | 1 | E | 4 | humerus |  |  |  |


| V | 1 | E | 5 | Maxilla |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 6 | Maxillae; nasals; etc. |
| V | 1 | E | 7 | tibia \& fragments |
|  |  |  |  | crushed bone S.E. |
| V | 1 | E | 8 | corner |
| V | 1 | E | 9 | Crushed Bones |
| V | 1 | E | 10 | Crushed Bones |
| V | 1 | E | 11 | Crushed Bones |
| V | 1 | E | 12 | tibia |
| V | 1 | E | 13 | clavicle |
| V | 1 | E | 14 | rib (1st) |
| V | 1 | E | 15 | vertebra fragment |
| V | 1 | E | 16 | metacarpal (3rd) |
| V | 1 | E | 17 | tibia |
| V | 1 | E | 18 | tibia fragment |
| V | 1 | E | 19 | Humerus fragment |
| V | 1 | E | 20 | thoracic vertebra |
| V | 1 | E | 21 | lumbar vertebra |
| V | 1 | E | 22 | Iliac fragment |
| V | 1 | E | 23 | sternum |
| V | 1 | E | 24 | radius |
| V | 1 | E | 25 | clavicle |
| V | 1 | E | 26 | Thoracic vertebra |
| V | 1 | E | 27 | Crushed Bones |
| V | 1 | E | 27 | Fifth Metatarsal |
| V | 1 | E | 27 | Fifth Metatarsal |
| V | 1 | E | 28 | Thoracic Vertebra 10 |


| V | 1 | E | 29 | clavicle |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 30 | lumbar vertebra |
| V | 1 | E | 31 | rib fragment |
| V | 1 | E | 32 | Fourth metacarpal |
| V | 1 | E | 33 | Vertebra fragment |
| V | 1 | E | 34 | thoracic lumbar |
|  |  |  |  |  |
| V | 1 | E | 35 | Misc Bones (classified) |
|  |  |  |  | Thoracic Vertebra |
| V | 1 | E | 36 | fragment |
| V | 1 | E | 37 |  |
| V | 1 | E | 38 |  |
| V | 1 | E | 39 | lumbar vertebra |
| V | 1 | E | 40 | lumbar vertebra |
| V | 1 | E | 41 | rib fragment |
| V | 1 | E | 42 | Fifth Metatarsal |
| V | 1 | E | 43 | Fourth Metatarsal |
| V | 1 | E | 44 | Third Metatarsal |
| V | 1 | E | 45 | Second metatarsal |
| V | 1 | E | 46 | Second Cuneiform |
| V | 1 | E | 47 | Navicular |
| V | 1 | E | 48 | Third Cuneiform |
| V | 1 | E | 49 | Cuboid |
| V | 1 | E | 50 | Parietal |
| V | 1 | E | 51 | tibia |
| V | 1 | E | 52 | lumbar vertebra |
| V | 1 | E | 53 | Proximal Phalanx |
|  |  |  |  |  |


| V | 1 | E | 54 | ulna |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 55 | rib fragment |
| V | 1 | E | 56 | tibia |
| V | 1 | E | 57 | humerus |
| V | 1 | E | 58 | rib fragment |
| V | 1 | E | 59 | Calcaneus |
| V | 1 | E | 60 | Proximal Phalanx <br> (Foot) Probably 2nd |
| V | 1 | E | 61 | Distal Phalanx 1 |
| V | 1 | E | 62 | Proximal Phalanx |
| (Foot) |  |  |  |  |


| V | 1 | E | 77 | long bone fragment |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 78 | femur fragment |
| V | 1 | E | 79 | femur fragment |
| V | 1 | E | 80 | humerus fragment |
| V | 1 | E | 81 | humerus fragment |
| V | 1 | E | 82 | femur fragment |
| V | 1 | E | 83 | sacrum |
| V | 1 | E | 84 | metatarsal (2nd) |
| V | 1 | E | 85 | thoracic vertebra |
|  |  |  |  | proximal phalanx |
| V | 1 | E | 86 | (2nd)(hand) |
|  |  |  |  | proximal phalanx |
| V | 1 | E | 87 | (hand) |
| V | 1 | E | 88 |  |
| V | 1 | E | 89 | humerus fragment |
| V | 1 | E | 90 | sacrum fragment |
| V | 1 | E | 91 | ulna |
| V | 1 | E | 92 a | mandible |
| V | 1 | E | $92 B$ | molar |
| V | 1 | E | 92 C | molar |
| V | 1 | E | 93 | fibula |
| V | 1 | E | 94 | long bone fragment |
| V | 1 | E | 95 | Mandible fragments |
| V | 1 | E | 96 | scapula |
| V | 1 | E | 97 | rib fragment |
| V | 1 | E | 98 | mandible |
| V | 1 | E | 99 | radius ? |
|  |  |  |  |  |


| V | 1 | E | 100 | manubrium |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 101 | Femur fragment |
| V | 1 | E | 102 | mandible |
| V | 1 | E | 103 | Cervical vertebra |
| V | 1 | E | 104 | rib 1 |
| V | 1 | E | 105 | Vertebra |
| V | 1 | E | 106 | rib fragment |
| V | 1 | E | 107 | Thoracic vertebra 10 |
| V | 1 | E | 108 |  |
| V | 1 | E | 109 | radius |
| V | 1 | E | 110 | talus |
| V | 1 | E | 111 | rib fragment |
| V | 1 | E | 112 | fragment |
| V | 1 | E | 113 | Os Coxae |
| V | 1 | E | 114 | Parietal |
| V | 1 | E | 115 | Radius |
| V | 1 | E | 116 | Occipital |
| V | 1 | E | 117 | Fourth Metacarpal |
| V | 1 | E | 118 | Cervical vertebra <br> fragments |
| V | 1 | E | 119 | Proximal Phalanx |
| V | 1 | E | 120 | Proximal Metatarsal |
| Probably 2nd |  |  |  |  |


| V | 1 | E | 124 | Parietal |  |
| :--- | :--- | :--- | :--- | :---: | :---: |
| V | 1 | E | 125 | Occipital fragment |  |
| V | 1 | E | 126 | Occipital fragment |  |
| V | 1 | E | 127 | Radius fragment |  |
| V | 1 | E | 128 | Parietal |  |
| V | 1 | E | 129 | Femur fragment |  |
| V | 1 | E | 130 | Humerus fragment |  |
| V | 1 | E | 131 | Vertebra |  |
| V | 1 | E | 132 | Femur fragment |  |
| V | 1 | E | 133 | Humerus fragment |  |
| V | 1 | E | 134 | Radius fragment |  |
| V | 1 | E | 135 | Femur fragment |  |
| V | 1 | E | 136 | Femur |  |
| V | 1 | E | 137 | Vertebra fragment |  |
| V | 1 | E | 138 | Os Coxae fragment |  |
| V | 1 | E | 139 | Parietal fragment |  |
| V | 1 | E | 140 | Temporal |  |
| V | 1 | E | 141 | Tibia fragment |  |
| V | 1 | E | 142 | Humerus fragment |  |
| V | 1 | E | 143 | Ulna fragment |  |
|  |  |  | Os Coxae fragment |  |  |
| V | 1 | E | 144 | (probable) |  |
| V | 1 | E | 145 | Tibia |  |
| V | 1 | E | 146 | Femur fragment |  |
| V | 1 | E | 147 | Long bone fragment |  |
| V | 1 | E | 148 | Scapula |  |
| V | 1 | E | 149 | Lumbar Vertebra 3 |  |


| V | 1 | E | 150 |  |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 151 | Os Coxae fragments |
| V | 1 | E | 152 | Thoracic vertebra |
| V | 1 | E | 153 | Thoracic vertebra |
| V | 1 | E | 154 | fragment |
| V | 1 | E | 155 | Vertebra |
| V | 1 | E | 156 | rib fragment |
| V | 1 | E | 157 | Parietal fragments |
| V | 1 | E | 158 | Femur fragment |
| V | 1 | E | 159 | Patella |
| V | 1 | E | 160 |  |
| V | 1 | E | 161 |  |
| V | 1 | E | 162 | Third metacarpal |
| V | 1 | E | 163 | Temporal |
| V | 1 | E | 164 | Frontal fragments |
| V | 1 | E | 165 | Scapula fragment |
| V | 1 | E | 166 | rib fragment |
| V | 1 | E | 167 | Radius |
| V | 1 | E | 168 | Os Coxae fragment |
| V | 1 | E | 169 | First metatarsal |
| V | 1 | E | 170 | Humerus fragment |
| V | 1 | E | 171 | Long bone fragment |
| V | 1 | E | 172 | Manubrium and Talus |
| V | 1 | E | 173 | Os Coxae |
| V | 1 | E | 174 | Humerus |
| V | 1 | E | 175 | Humerus |
| V | 1 | E | 176 | Ulna fragment |
|  |  |  |  |  |


| V | 1 | E | 177 | Femur fragment |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 178 | Ulna fragment |
| V | 1 | E | 179 | Vertebra fragment |
| V | 1 | E | 180 | Maxilla |
| V | 1 | E | 181 | Parietal |
| V | 1 | E | 182 | Humerus fragment |
| V | 1 | E | 183 | Humerus fragment |
| V | 1 | E | 184 | Fibula fragment |
| V | 1 | E | 185 | Clavicle |
| V | 1 | E | 186 | Femur fragment |
| V | 1 | E | 187 | Femur fragment |
| V | 1 | E | 188 | Frontal |
| V | 1 | E | 189 | Tibia fragment |
| V | 1 | E | 190 | Femur fragment |
| V | 1 | E | 191 | ulna |
| V | 1 | E | 192 | humerus |
| V | 1 | E | 193 | Maxilla fragments |
| V | 1 | E | 194 | Ilium |
| V | 1 | E | 195 | clavicle |
| V | 1 | E | 196 | mandible |
| V | 1 | E | 197 | tibia |
| V | 1 | E | 198 | femur fragment |
| V | 1 | E | 199 | Talus |
| V | 1 | E | 200 | Femur fragment |
| V | 1 | E | 201 | Tibia |
| V | 1 | E | 202 | Scapula fragment |
| V | 1 | E | 203 | Vertebra fragment |
|  |  |  |  |  |


| V | 1 | E | 204 | rib fragments |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 205 | Vertebra fragment |
| V | 1 | E | 206 | Humerus (probable) |
|  |  |  |  | Tibia fragment |
| V | 1 | E | 206 | (probable) |
| V | 1 | E | 207 | rib fragment |
| V | 1 | E | 208 | Os Coxae |
| V | 1 | E | 209 | Mandible fragment |
| V | 1 | E | 210 | Femur fragment |
| V | 1 | E | 211 | Humerus fragment |
| V | 1 | E | 212 | Os Coxae fragment |
| V | 1 | E | 213 | Patella |
| V | 1 | E | 214 | Fifth Metatarsal |
| V | 1 | E | 215 | Fibula fragment |
| V | 1 | E | 216 | fragment |
| V | 1 | E | 217 | Pubic Symphysis |
| V | 1 | E | 217 | rib fragment |
| V | 1 | E | 218 | Tibia |
| V | 1 | E | 219 | Vertebra fragment |
| V | 1 | E | 220 | Tibia fragment |
| V | 1 | E | 221 | Tibia |
| V | 1 | E | 222 | Femur fragment |
| V | 1 | E | 223 | Tibia |
| V | 1 | E | 224 | Humerus fragment |
| V | 1 | E | 225 | Thoracic vertebra |
| V | 1 | E | 226 | Humerus fragment |
| V | 1 | E | 227 | Third metacarpal |
|  |  |  |  |  |


| V | 1 | E | 228 | Femur |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 229 | Tibia |
| V | 1 | E | 230 | Humerus fragment |
| V | 1 | E | 231 | Occipital fragment |
| V | 1 | E | 232 | Vertebra fragment |
| V | 1 | E | 233 | Ischium |
| V | 1 | E | 234 | Tibia fragment |
| V | 1 | E | 235 | Fibula fragment |
| V | 1 | E | 236 | humerus fragment |
| V | 1 | E | 237 | Pubic Symphysis |
| V | 1 | E | 238 | Os Coxae fragments |
| V | 1 | E | 239 | Lumbar Vertebra |
| V | 1 | E | 240 | Vertebral fragments |
| V | 1 | E | 241 | Lumbar 5 vertebra |
| V fragment |  |  |  |  |
| V | 1 | E | 242 | ilium |
|  | 1 | E | 243 | Cervical vertebra 7 |
| V | 1 | E | 244 | Clavicle fragment |
| V | 1 | E | 245 | Femur fragments |
| V | 1 | E | 246 | Humerus |
| V | 1 | E | 247 | Tibia fragment |
| V | 1 | E | 248 | Femur fragment |
| V | 1 | E | 249 | Femur fragment |
| V | 1 | E | 250 | Os Coxae fragments |
| V | 1 | E | 251 | Calcaneus |
| V | 1 | E | 252 | Calcaneus |


| V | 1 | E | 253 | Third Metatarsal |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 254 | Proximal Phalanx (foot) |
| V | 1 | E | 255 | Lumbar Vertebra |
| V | 1 | E | 256 | Lumbar 3 vertebra |
| V | 1 | E | 257 | Tibia |
| V | 1 | E | 258 | Talus |
| V | 1 | E | 259 | Fourth metacarpal |
| V | 1 | E | 259 | Radius |
| V | 1 | E | 260 | Humerus |
| V | 1 | E | 261 | Ulna |
| V | 1 | E | 262 | Os Coxae fragment |
| V | 1 | E | 263 | Scapula fragment |
| V | 1 | E | 264 | Third metacarpal |
| V | 1 | E | 265 | Third Metatarsal |
| V | 1 | E | 266 | First metatarsal |
| V | 1 | E | 267 | Fifth Metatarsal |
| V | 1 | E | 268 | Third Metatarsal |
| V | 1 | E | 269 | Third Metatarsal |
| V | 1 | E | 270 | First Proximal Phalanx |
| V | 1 | E | 271 | foot |
| V | 1 | E | 272 | Talus |
| V | 1 | E | 273 | Tibia fragment |
| V | 1 | E | 274 | Fifth Metatarsal |
| V | 1 | E | 275 | Proximal Phalanx (foot) |


| V | 1 | E | 276 | Proximal Phalanx (foot) |
| :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 277 | Proximal Phalanx (foot) |
| V | 1 | E | 278 | Intermediate Phalanx <br> (foot) |
| V | 1 | E | 279 | Distal Phalanx 1 (foot) |
| V | 1 | E | 280 | Proximal Phalanx (foot) |
| V | 1 | E | 281 | Humerus fragments |
| V | 1 | E | 282 | Cuboid |
| V | 1 | E | 283 | Thoracic Vertebra |
| V | 1 | E | 284 | Third Cuneiform |
| V | 1 | E | 285 | Second metatarsal |
| V | 1 | E | 286 | Fourth metatarsal |
| V | 1 | E | 287 | Ulna? |
| V | 1 | E | 288 | Radius fragment |
| V | 1 | E | 289 | Shaft fragment with |
| interosseous border |  |  |  |  |
| V | 1 | E | 290 | Patella |
| V | 1 | E | 291 | Femur fragment |
| V | 1 | E | 292 | Humerus |
| V | 1 | E | 292 | Humerus |
| V | 1 | E | 293 | Third Metatarsal |
| V | 1 | E | 294 | rib fragments |
| V | 1 | E | 296 | incisor |
| V | 1 | E | 297 | incisor |


| V | 1 | E | 298 | Parietal |
| :--- | :--- | :--- | :--- | :---: |
| V | 1 | E | 299 | Mandible |
| V | 1 | E | 300 | Tibia fragment |
| V | 1 | E | 301 | Humerus |
| V | 1 | E | 302 | Humerus fragment |
| V | 1 | E | 303 | Radius |
| V | 1 | E | 304 | Clavicle |
| V | 1 | E | 305 | Humerus fragments |
| V | 1 | E | 306 | Humerus fragment |
| V | 1 | E | 307 | Tibia fragment |
| V | 1 | E | 308 | Humerus fragments |
| V | 1 | E | 309 | Humerus fragment |
| V | 1 | E | 310 | Femur fragment |
| V | 1 | E | 311 | Humerus |
| V | 1 | E | 312 | Femur |
| V | 1 | E | 313 | Femur fragment |
| V | 1 | E | 314 | Femur fragments |
| V | 1 | E | 315 | Humerus fragment |
| V | 1 | E | 316 | Femur fragment |
| V | 1 | E | 317 | Femur fragment |
| V | 1 | E | 318 | Mandible |
| V | 1 | E | 319 | Femur fragment |
| V | 1 | E | 320 | Manubrium |
| V | 1 | E | 321 | Humerus fragment |
| V | 1 | E | 322 | Ilium |
| V | 1 | E | 323 | Tibia fragment |
| V | 1 | E | 324 | Calcaneus |


| V | 1 | E | 325 | Tibia |
| :--- | :--- | :--- | :--- | :--- |
| V | 1 | E | 326 | Frontal |
| V | 1 | E | 327 | Maxilla fragments |
| V | 1 | E | 328 | Ilium |
| V | 1 | E | 329 | Humerus |
| V | 1 | E | 330 | rib |
| V | 1 | E | 331 | Femur fragment |
| V | 1 | E | 332 | Tibia fragment |
| V | 1 | E | 333 | Tibia |
| V | 1 | E | 334 | Tibia |
| V | 1 | E | 335 | Femur fragment |
| V | 1 | E | 336 | Sacrum |
| V | 1 | E | 337 | Ilium fragment |
| V | 1 | E | 338 | Femur fragments |
| V | 1 | E | 339 | Humerus fragments |
| V | 1 | E | 340 | Femur |
| V | 1 | E | 341 | Tibia fragments |
| V | 1 | E | 342 | Femur fragment |
| V | 1 | E | 344 | Tibia |
| V | 1 | E | 345 | Mandible |
| V | 1 | E | 347 | Humerus fragment |
| V | 1 | E | 348 | Radius |
| V | 1 | E | 349 | Mandible fragment |
| V | 1 | E | 350 | Mandible |
| V | 1 | E | 351 | Temporal fragment |
| V | 1 | E | 352 | 3rd Metacarpal? |
| V | 1 | E | 353 | 3rd Metacarpal |


| V | 1 | E | 354 | 2nd Metacarpal | Possible left | Head absent, distal end deteriorated |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 355 | Proximal Phalanx |  | Probable Hand | 68.6 mm |
| V | 1 | E | 356 | Proximal Phalanx |  |  | 43.84 mm |
| V | 1 | E | 357 | 5th metacarpal | left |  | 60.68 mm |
| V | 1 | E | 358 | Metatarsal fragment | Undetermined | Head and part of shaft, may be metacarpal |  |
| V | 1 | E | 359 | Proximal Phalanx |  |  | 30.24 mm |
| V | 1 | E | 360 | Proximal Phalanx |  |  | 28.58 mm |
| V | 1 | E | 361 | 5th metacarpal | right |  | 64.84 mm |
| V | 1 | E | 362 | Proximal Phalanx |  |  | 26.39 mm |
| V | 1 | E | 363 | Proximal Phalanx |  |  | 43.49 mm |
| V | 1 | E | 364 | 4th Metatarsal | right |  | 60.88 mm |
| V | 1 | E | 365 | Medial Phalanx |  |  | 26.9 mm |
| V | 1 | E | 366 | 5th Metatarsal | right |  | 59.3 mm |
| V | 1 | E | 367 | 1st Metatarsal | right |  | 58.48 mm |
| V | 1 | E | 368 | 3rd Metatarsal | right |  | 61.89 mm |
| V | 1 | E | 369 | 2nd Metatarsal | right |  | 60.99 mm |
| V | 1 | E | 370 | Proximal Phalanx |  | probable foot | 27.08 mm |
| V | 1 | E | 371 | Radius fragment | Probable left | Head and tuberosity | 19.75 mm head diameter, 70.85 mm available length |
| V | 1 | E | 372 | Ulna fragment | right | Distal Fragment with part of the shaft | 118.54 mm |
| V | 1 | E | 373 | Ulna fragment | right | Proximal fragment | 69.05 mm |
| V | 1 | E | 374 | Talus | right |  | 50.06 mm length |


| V | 1 | E | 375 | Calcaneus | right |  | 68.72 mm length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 376 | Clavicle | right | Lateral fragment, slightly over 5 years | 41.01 mm available |
| V | 1 | E | 377 | Ulna fragment | right | Proximal fragment with most of shaft , slightly over 5 years | 85.15 mm available |
| V | 1 | E | 378 | Ulna | left | Complete, little over 5 years of age | 111.89 mm |
| V | 1 | E | 379 | Radius | Probable right | Complete unfused, slightly over 5 years | 122.63 mm |
| V | 1 | E | 380 | Fibula | ? |  |  |
| V | 1 | E | 381 | Fibula | ? | One end slightly broken |  |
| V | 1 | E | 382 | Tibia | left | Cortical layer is absent in many areas |  |
| V | 1 | E | 383 | Tibia | right | Cortical layer is absent in many areas |  |
| V | 1 | E | 384 | Proximal Femur head epiphysis |  |  |  |
| V | 1 | E | 385 | Proximal Humerus epiphysis |  |  |  |
| V | 1 | E | 386 | Femur | left | Slightly more than 5 years of age. |  |
| V | 1 | E | 387 | 9 Vertebra Bodies |  | Unfused |  |
| V | 1 | E | 388 | Os Coxa | left |  |  |
| V | 1 | E | 389 | Os Coxa | right |  |  |
| V | 1 | E | 390 | Parietal | right | More adult, thicker |  |
| V | 1 | E | 391 | Parietal |  | Juvenile |  |
| V | 1 | E | 392 | Parietal |  | Juvenile |  |


| V | 1 | E | 393 | Maxilla fragment | left | premolars and three molars present, post mortem loss of canine and incisors. Possible abscess over incisor. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V |  | E | 394 | Maxilla fragment | right | Two molars present, a molar in the process of eruption and an incisor in the process of eruption. $\sim 4$ years of age. |
| V | 1 | E | 395 | rib 1 | left | Some blackening, calcium carbonate on the inferior surface |
| V | 1 | E | 396 | rib | left | Middle rib, some blackening |
| V | 1 | E | 397 | rib fragment | right | Shaft fragment with angle, some blackening |
| V | 1 | E | 398 | Probable 2nd metacarpal | right | Head is unfused, the proximal end is not fully formed, some fire blackening |
| V | 1 | E | 399 | Scapula fragment | left | Spine fragment, some fire blackening |
| V | 1 | E | 400 | Clavicle | left | Fire blackening, Probably five or so. |
| V | 1 | E | 401 | 1st Cuneiform | right | Complete |
| V | 1 | E | 402 | Ischium | left | Child complete |
| V | 1 | E | 403 | rib | right | Child complete |


| V | 1 | E | 404 | Mandible fragment | left | Ramus fragment of an adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 405 | Mandible fragment | right | Ramus fragment of an adult |  |
| V | 1 | E | 406 | Ulna fragment | Probable left | Distal Fragment with part of the shaft |  |
| V | 1 | E | 407 | Navicular | right | Complete adult |  |
| V | 1 | E | 408 | Scapula fragment | left | Glenoid and part of spine | Height 33.68 mm , width 25.57 mm |
| V | 1 | E | 409 | Cervical Vertebra |  | Young individual |  |
| V | 1 | E | 410 | Mandible fragment | left | Ramus with left side, molars are erupted |  |
| V | 1 | E | 411 | Vertebra fragment |  | Lamina fragment unfused of a young child, possible thoracic |  |
| V | 1 | E | 412 | Vertebra fragment |  | Lamina fragment unfused of a young child, possible lumbar |  |
| V | 1 | E | 413 | 3rd Cuneiform | right | complete from an adult. |  |
| V | 1 | E | 414 | Tibia fragment | left | Shaft fragment, gracile, probably a young individual, taphonomic cracking, calcium carbonate on the posterior surface. | 176 mm available |
| V | 1 | E | 415 | Tibia fragment | left | Shaft fragment, more proximal shaft fragment, but |  |


|  |  |  |  |  |  | possibly the same as 414. Cut Marks located by the number |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 416 | Scapula fragment | left | Glenoid and part of the medial and superior border. Some fire blackening | glenoid height $33.45 \mathrm{~mm}, 23.15$ mm width |
| V | 1 | E | 417 | Temporal | right | mostly complete with zygomatic process |  |
| V | 1 | E | 418 | Thoracic Vertebra |  | No lipping fusion incomplete, younger adult. Damage to the lamina, spine missing |  |
| V | 1 | E | 419 | Thoracic Vertebra |  | No lipping fusion incomplete, younger adult. |  |
| V | 1 | E | 420 | Manubrium |  | Complete, adult |  |
| V | 1 | E | 421 | Tibia fragment | right | Proximal fragment, unfused epiphysis, cortical layer is abnormal, possibly 5 years of age. |  |
| V | 1 | E | 422 | Proximal Phalanx |  | Complete, lytic on posterior proximal area near facet. | 42.8 mm |
| V | 1 | E | 423 | Pubic |  | Under 8 years of age, probably closer to 5 |  |
| V | 1 | E | 424 | Humerus fragment | right | Distal fragment, minimal shaft. Probably close to 5 |  |

years of age.

| V | 1 | E | 425 | 4th Metacarpal | right | Head absent, distal end deteriorated |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 426 | Scapula fragment | Undetermined | Coracoid process only |
| V | 1 | E | 427 | Vertebra fragment |  | Lamina only, unfused, child, probably thoracic |
| V | 1 | E | 428 | Vertebra fragment |  | Lamina fragment, unfused, child probable lumbar |
| V |  | E | 429 | Occipital fragment |  | Somewhat thin, possibly a younger individual. Cortical layer on the exterior is somewhat damaged, interior cannot be completely viewed due to clay and calcium carbonate. |
| V | 1 | E | 430 | Occipital fragment |  | adult, lytic activity on the interior. Diploë is irregular and thickened in some area, sample was taken for porotic hyperostosis. |

$\left.\begin{array}{cccccccc} & & & & & & & \begin{array}{c}\text { M1 10.23 labial- } \\ \text { lingual, 10.39 }\end{array} \\ \text { anterior-posterior } \\ \text { M2 9.9 lingual- } \\ \text { labial, 10.22mm } \\ \text { anterior-posterior }\end{array}\right]$

| V | 1 | E | 440 | Talus | left | Complete, small possible young adult of juvenile | 38.32 mm length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 441 | Clavicle | left | Damage to the medial and lateral edge, probably the same individual as 442 . adult | 144mm available |
| V | 1 | E | 442 | Clavicle | right | Damage to medial and lateral edges, probably same individual as 441 . adult. | 116.5 mm available |
| V | 1 | E | 443 | Talus | right | adult complete | 53.17 mm length |
| V | 1 | E | 444 | Probable Humerus fragment | Undetermined | Juvenile. Proximal end with unfused epiphysis |  |
| V | 1 | E | 445 | Vertebra fragment |  | Body fragment, probably a thoracic from an adult |  |
| V | 1 | E | 446 | 1st Proximal Metatarsal |  | adult complete. Lytic on superior proximal surface. | 31.39 mm |
| V | 1 | E | 447 | 2nd cuneiform | right | Complete adult |  |
| V | 1 | E | 448 | Probable Ulna fragment | Undetermined | Calcium carbonate on surface. Child greater than 5, distal fragment with most of the shaft. | $\begin{gathered} 103.85 \mathrm{~mm} \\ \text { available } \end{gathered}$ |


| V | 1 | E | 449 | Probable Ulna fragment | Undetermined | Child greater than 5 , distal fragment with most of the shaft. | 77.73 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 450 | Proximal Phalanx |  | Foot, adult | 26.8 mm |
| V | 1 | E | 451 | 4th Metatarsal | left | Fire blackening on lateral surface, calcium carbonate on medial surface, adult | 58.68 mm |
| V | 1 | E | 452 | 3rd Metacarpal | left | complete, adult Calcium carbonate on the medial surface, some fire blackening | 58.59 mm |
| V | 1 | E | 453 | 3rd Metacarpal | right | Fire blackening adult complete, same individual as 452 | 61.46 mm |
| V | 1 | E | 454 | 2nd Metacarpal | left | Light fire blackening, complete, adult | 61.8 mm |
| V | 1 | E | 455 | 3rd cuneiform | left | complete, adult, calcium carbonate on surface with larger facet |  |
| V | 1 | E | 456 | Cranial fragment | Undetermined |  |  |
| V | 1 | E | 457 | Cranial (anterior majority) |  | Part of the left frontal, maxillae, palatines, part of the sphenoid, and all the bones between. Resorption of molars, only premolars are present, one fell out post |  |

mortem. Possible
male.

| V | 1 | E | 458 | Ulna fragment | right | ```proximal fragment. Young individual with proximal epiphysis unfused``` |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 459 | Radius fragment | right | shaft fragment with radial tuberosity and a majority of the shaft |  |
| V | 1 | E | 460 | Ulna fragment | right | Proximal fragment with part of the shaft |  |
| V | 1 | E | 461 | Humerus fragment | Undetermined | Shaft fragment, fire blackening, cut mark on shaft. |  |
| V | 1 | E | 462 | Scapula fragment | right | Glenoid with base of acromion and spine. | 35.01 mm glenoid height, 24.25 mm glenoid width |
| V | 1 | E | 463 | Vertebra fragment |  | lamina fragment with a bifurcated spine |  |
| V | 1 | E | 464 | Calcaneus | right | Complete, adult, fire blackening, | 75.71 mm length |
| V | 1 | E | 465 | 1st Proximal Metatarsal |  | calcium carbonate on the superior surface. Fire blackening on superior surface | 27.38 mm |
| V | 1 | E | 466 | Medial Phalanx |  | foot, adult | 20 mm |


| V | 1 | E | 467 | Medial Phalanx |  | foot, adult | 24.9 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 468 | Medial Phalanx |  | foot, adult, calcium carbonate on superior | 26.43 mm |
| V | 1 | E | 469 | Medial Phalanx |  | hand, adult | 29.51 mm |
| V | 1 | E | 470 | Medial Phalanx? |  | hand, adult, may be proximal 1st. | 26.74 mm |
| V | 1 | E | 471 | Medial Phalanx |  | hand, adult, fire blackened, calcium carbonate on posterior surface |  |
| V | 1 | E | 472 | Pubis | left | child complete, fire blackened, little calcium carbonate on the interior superior surface |  |
| V | 1 | E | 473 | Pubis | right | child, complete, smaller than 472 , calcium carbonate on the anterior surface. |  |
| V | 1 | E | 474 | Fibula fragment | Probable right | epiphysis line visible but fused. |  |
| V | 1 | E | 475 | 5th metacarpal fragment | left | Proximal fragment, lytic around proximal facet |  |
| V | 1 | E | 476 | Navicular | right | complete adult, fire blackened |  |
| V | 1 | E | 477 | Navicular | right | complete, adult fire blackened, lytic |  |
| V | 1 | E | 478 | 3rd cuneiform | right | Complete, adult, fire blackening, |  |


| V | 1 | E | 479 | Talus | right | complete adult, fire blackened | 49.02 mm long |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 481 | metacarpal fragment |  | head fragment, extremely lytic, possibly arthritic |  |
| V | 1 | E | 480 | Femur fragment | left | distal fragment consisting of the condyles, some lytic activity on the lateral condyle |  |
| V | 1 | E | 482 | Femur fragment | left | distal fragment consisting of condyles and some of the shaft, larger than 480, vascularization of the anterior surface around the popliteal surface. |  |
| V | 1 | E | 483 | rib fragment | left | vertebral and shaft fragment, child rib, mid area, some fire blackening |  |
| V | 1 | E | 484 | rib fragment | left | vertebral fragment, fire blackening, calcium carbonate at the interior surface near the vertebral end. |  |
| V | 1 | E | 485 | Radius fragment | right | Calcium carbonate on the posterior surface, some fire blackening |  |

Calcium carbonate on

| V | 1 | E | 486 | Radius fragment | Undetermined | some fire blackening |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 487 | Ulna fragment | Probably left | Fire blackening |  |
| V | 1 | E | 488 | Ulna fragment | Probably right | Fire blackening, cortical layer is disturbed. |  |
| V | 1 | E | 489 | 1st rib | right | child, fire blackening, calcium carbonate on the inferior surface near the vertebral end |  |
| V | 1 | E | 490 | rib fragment | Probable right | Shaft fragment, fire blackening, adult, probably a third or fourth rib. |  |
| V | 1 | E | 491 | rib fragment | right | Lower rib, probably 11 or 12 |  |
| V | 1 | E | 492 | rib fragment | right | Child, most of the rib, fire blackened, probably rib 4-6 |  |
| V | 1 | E | 493 | rib fragment | Undetermined | Shaft fragment, slight staining, adult middle rib |  |
| V | 1 | E | 494 | Vertebra fragment |  | spinous process |  |
| V | 1 | E | 495 | Temporal fragment | left | Petrous portion with mastoid, large mastoid, possible male. |  |
| V | 1 | E | 496 | Femur fragment | right | Proximal fragment, with head and neck, | 38.36 mm head diameter |

trochanters absent

| V | 1 | E | 497 | metacarpal fragment | Undetermined | distal fragment of head and part of shaft |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 498 | Tibia fragment | left | Distal fragment, fire blackening, adult |  |
| V | 1 | E | 499 | Navicular | left | adult, surface with multiple faceted facet is badly damaged, fire blackened |  |
| V | 1 | E | 500 | Vertebra fragment |  | transverse process of an adult, probably from a sacrum |  |
| V | 1 | E | 501 | Medial Phalanx | Undetermined | adult foot, fire blackened | 25.85 mm |
| V | 1 | E | 502 | Ischium fragment | Undetermined | possible child part of the lunate surface is intact |  |
| V | 1 | E | 503 | Cranial fragment |  | pin prick porosity on exterior, possible porotic hyperostosis, adult, fire blackening |  |
| V | 1 | E | 504 | Cranial fragment |  | Probable child based on thinness, calcium carbonate on the exterior |  |
| V | 1 | E | 505 | Temporal fragment | left | Petrous portion with mastoid, possible female?, fire blackened |  |

V

| V | 1 | E | 515 | Patella | right | Complete adult, | 38.11 mm length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 516 | Patella | left | Medial side is damaged, adult, fire blackened | 34.09 mm |
| V | 1 | E | 517 | Patella | right | adult, complete, fire blackened, some lytic activity on proximal and distal surfaces | 34.36 mm |
| V | 1 | E | 518 | Patella | right | adult, fire blackened, some lytic activity on the distal end. | 34.51 mm |
| V | 1 | E | 519 | Patella | right | adult, fire blackened, some damage on the proximal and distal end. | 39.96 mm length |
| V | 1 | E | 520 | Humerus fragment | right | Child, distal end, epiphysis not fused | estimated distal width 32.71 mm |
| V | 1 | E | 521 | Ulna fragment | right | Child, epiphysis unfused, proximal fragment, 1.5-5 years of age, probably closer to 3 years. |  |
| V | 1 | E | 522 | Radius fragment | right | adult, distal and shaft fragment, taphonomic cracking, cortical destruction at distal end, very slight fire blackening at distal end | 97.22 mm available |


| V | 1 | E | 523 | Radius fragment | Undetermined | Shaft fragment, covered completely in calcium carbonate, taphonomic cracking |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 524 | rib fragment | left | Child, shaft with angle, fire blackening, middle rib. |  |
| V | 1 | E | 525 | Radius fragment | Undetermined | Proximal head fragment, adult |  |
| V | 1 | E | 526 | Vertebra fragment |  | child, body not present because it is not fused, fire blackened, calcium carbonate on the posterior and anterior of the lamina, lower lumbar most likely. |  |
| V | 1 | E | 527 | 2nd Metatarsal | left | adult, calcium carbonate on the shaft, fire blackening | 67.73 mm |
| V | 1 | E | 528 | rib fragment | left | vertebral end fragment, adult, fire blackening |  |
| V | 1 | E | 529 | Vertebra fragment |  | Child, body epiphysis unfused and body is undulated, fire blackening, left pedicle and superior articular facet present |  |


| V | 1 | E | 530 | Tibia fragment | left | Distal fragment, adult, slight vascularization and some cortical damage |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 531 | Thoracic Vertebra |  | Only the left transverse process and spine are damaged, line not visible on the epiphysis, lytic cavities on the body, higher thoracic vertebra, only one facet on the body |  |
| V |  | E | 532 | Thoracic Vertebra |  | left transverse process and spine damaged, epiphysis line visible, lytic body, fire blackening, calcium carbonate on posterior |  |
| V | 1 | E | 533 | Scapula fragment | right | Glenoid with coracoid and part of the lateral border, calcium carbonate on anterior and posterior, fire blackening, adult, | $\begin{gathered} \text { glenoid height } \\ 31.50 \text {, width } \\ 22.11 \\ \hline \end{gathered}$ |



| V | 1 | E | 542 | Manubrium |  | Damage to all edges, fire blackening, calcium carbonate on anterior, adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 543 | Thoracic Vertebra |  | damage to the spine and transverse processes, middle thoracic region, demi facets are small |  |
| V | 1 | E | 544 | Calcaneus | left | Child, covered in calcium carbonate, unfused epiphyses, 23 years of age | 34.7 mm length |
| V | 1 | E | 545 | Thoracic Vertebra |  | damage throughout, fire blackening, adult, lower probably 11th |  |
| V | 1 | E | 546 | Vertebra fragment |  | Child, body unfused, based on size probably lumbar or sacrum |  |
| V | 1 | E | 547 | Vertebra fragment |  | Child, 546 fits well under it, lumbar probably 5, fused pedicle, damage to right transverse process |  |
| V | 1 | E | 548 | Cervical Vertebra fragment |  | Child, cervical, unfused lamina and pedicle |  |

adult, damage to the transverse process, higher up due to positioning of the superior articular facet.
Proximal fragment, fire blackened, mud on posterior could not

| V | 1 | E | 550 | Tibia fragment | Probable right |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 551 | Lumbar Vertebra | right | Young child, possible <br> lumbar of thoracic. <br> Pedicle unfused to <br> body, lamina is not <br> fused to the other <br> lamina, fire blackened |
| V | 1 | E | 552 | Ilium | right | Young child |
| V | 1 | E | 553 | Scapula fragment | Probable left | Lateral border, <br> calcium carbonate on <br> the anterior surface |
| V | 1 | E | 554 | Parietal fragment | Undetermined | Child, calcium <br> carbonate and mud on <br> the interior prevent <br> siding, slight fire <br> blackening |
| V | 1 | E | 555 | Distal phalanx | possible left | 1st phalanx, adult, <br> foot |
| V | 1 | E | 556 | Frontal fragment | right | adult, probably <br> belongs to 457 face, <br> possible male due to |


|  |  |  |  |  |  | rounding of the margin. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 557 | Temporal fragment | right | Petrous portion, relatively small mastoid |  |
| V | 1 | E | 558 | Vertebra fragment |  | adult, lytic body, Probable thoracic, but no demi facets |  |
| V | 1 | E | 559 | Cervical Vertebra fragment | left portion | Lamina and facets of an adult 1st cervical |  |
| V | 1 | E | 560 | Sacral Vertebra |  | Child, probably lower sacral. |  |
| V | 1 | E | 561 | Metacarpal? |  | Child Metacarpal, unfused head, possibly the 5th |  |
| V | 1 | E | 562 | Tibia fragment | right | Distal adult |  |
| V | 1 | E | 563 | Humerus fragment | Undetermined | Child proximal fragment, unfused epiphysis. | diameter at epiphysis is 30.02 mm |
| V | 1 | E | 564 | Pelvis fragment | right | Ilium, acetabulum, ischium | acetabulum rim diameter 49.89 |
| V | 1 | E | 565 | Sacrum |  | Complete adult, short broad, lytic, mud covering the anterior surface |  |
| V | 1 | E | 566 | Vertebra fragment |  | Child, lamina and transverse processes with pedicle, but no body, probably thoracic |  |

V

| V | 1 | E | 573 | Vertebra fragment |  | Epiphysis line visible but fused, possible Schmorl's node, lower cervical or upper thoracic |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 574 | Ischium | right | Young child, unfused |  |
| V | 1 | E | 575 | Calcaneus | right | adult complete fire blackening, cortical layer is slightly worn away in some areas | 65.81 mm length |
| V | 1 | E | 576 | 2nd Cuneiform | left | adult, complete, slight fire blackening |  |
| V | 1 | E | 577 | Intermediate Phalanx |  | Foot, adult, complete, 4th or 5th, fire blackening, and calcium carbonate on the posterior surface. |  |
| V | 1 | E | 578 | Intermediate Phalanx |  | Foot adult, complete, 2nd or 3rd, fire blackening, and calcium carbonate on the posterior surface |  |
| V | 1 | E | 579 | Temporal fragment | left | Petrous portion, small mastoid, possible female |  |
| V | 1 | E | 580 | 1st proximal Metatarsal? |  | Head is unfused, child, fore blackened |  |
| V | 1 | E | 581 | Cranial fragment |  | Fire blackening, uneven diploë |  |

Inferior articular facet, spine, adult, possible lumbar Child, probably 1 newborn
Body, line of fusion between the body and the pedicle is visible but fused, taphonomic damage to the lamina. Demi facets visible adult, complete, foot, fire blackened, calcium carbonate on the plantar surface molars and premolars erupted and lost post

| V | 1 | E | 586 | Mandible fragment | right | mortem |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 587 | Femur fragment | Probable right | Medial distal condyle <br> of an adult, mud <br> could not be removed <br> easily |  |
| V | 1 | E | 588 | Radius fragment | Undetermined | Head only, adult | 19.86 mm head <br> diameter |
| V | 1 | E | 589 | Epiphysis | Undetermined | Probable femur <br> epiphysis |  |
| V | 1 | E | 590 | 1st cuneiform | right | adult, complete, fire <br> blackening |  |
| V | 1 | E | 591 | Medial Phalanx |  | adult, foot, complete, |  |
| fire blackening, and |  |  |  |  |  |  |  |

calcium carbonate on all surfaces.

| V | 1 | E | 592 | Thoracic Vertebra | Relatively complete, full facet on top of body (lower), |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 593 | Lumbar Vertebra | taphonomic breakage to body, transverse processes broken |  |
| V | 1 | E | 594 | Lumbar Vertebra | child, body epiphysis unfused |  |
| V | 1 | E | 595 | Thoracic Vertebra | adult, fire blackening, body epiphysis line visible, inferior body destroyed |  |
| V | 1 | E | 596 | Thoracic Vertebra fragment | adult, epiphysis line still visible, calcium carbonate on the anterior body, body fragment |  |
| V | 1 | E | 597 | Vertebra fragment | Body with pedicle and part of transverse process, child. |  |
| V | 1 | E | 598 | Calcaneus fragment | Proximal fragment |  |
| V | 1 | E | 599 | Cervical Vertebra fragment | C2, adult, fragment consists of the dens and the superior articular facets |  |
| V | 1 | E | 600 | Epiphysis | Child, distal femur? |  |
| V | 1 | E | 601 | Femur epiphysis | Child, head epiphysis | $\begin{gathered} 26.65 \text { head } \\ \text { diameter } \end{gathered}$ |


| V | 1 | E | 602 | Vertebra fragment |  | Lamina of probably a sacral vertebra, child, spine is bifurcated, some calcium carbonate on the articular facets |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 603 | Tibia Epiphysis | right | Proximal epiphysis | 29.56 mm width |
| V | 1 | E | 604 | Scapula fragment |  | coracoid of an adult |  |
| V | 1 | E | 605 | Vertebra fragment |  |  |  |
| V | 1 | E | 606 | fragment |  | Calcium carbonate and fire blackened |  |
| V | 1 | E | 607 | Vertebra fragment |  | Spinous process of an adult lumbar |  |
| V | 1 | E | 608 | Vertebra fragment |  | Body of a child, not yet fused to the pedicle, fire blackened with calcium carbonate |  |
| V | 1 | E | 609 | Vertebra fragment |  | transverse process of an adult |  |
| V | 1 | E | 610 | Cervical Vertebra fragment |  | transverse foramen and articular facet present |  |
| V | 1 | E | 611 | Cervical Vertebra fragment |  | Child, lamina fused, right pedicle is not fused to the body |  |
| V | 1 | E | 612 | Vertebra fragment |  | spinous process |  |
| V | 1 | E | 613 | Radius Epiphysis |  | Head epiphysis | 15.26 mm |
| V | 1 | E | 614 | Medial Phalanx |  | Child, unfused head and proximal portion, |  |

probably hand

| V | 1 | E | 615 | Vertebra fragment |  | Fire blackened |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 616 | Skull fragment |  |  |
| V | 1 | E | 617 | Shaft fragment |  |  |
| V | 1 | E | 618 | Sphenoid fragment |  | adult, part of the wings |
| V | 1 | E | 619 | Possible Triquetral | Undetermined | Fire blackened |
| V | 1 | E | 620 | fragment |  |  |
| V | 1 | E | 621 | Lumbar vertebra |  | adult, severe arthritis with lipping and syndesmophyte formation on the inferior margin, lytic body. |
| V | 1 | E | 622 | Thoracic Vertebra fragment |  | Body fragment with fire blackening |
| V | 1 | E | 623 | 21 fragments |  |  |
| V | 1 | E | 624 | 6 cranial fragment with calcium carbonate |  |  |
| V | 1 | E | 625 | Thoracic Vertebra |  | adult, Middle thoracic, demi facets are roughly the same size |
| V | 1 | E | 626 | Temporal fragment | right | adult, damage to the mastoid process, petrous process |


| V | 1 | E | 627 | Cervical Vertebra fragment |  | Body, adult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 628 | Proximal Phalanx |  | adult, foot |
| V | 1 | E | 629 | Proximal Phalanx |  | adult, foot |
| V | 1 | E | 630 | Lumbar Vertebra |  |  |
| V | 1 | E | 631 | rib fragment |  | Child, sternal fragment |
| V | 1 | E | 632 | rib fragment |  | Vertebral end, possible child or young adult |
| V | 1 | E | 633 | Thoracic Vertebra fragment |  | Lamina and left transverse process fragment |
| V | 1 | E | 634 | Temporal fragment | left | Mud and calcium carbonate on interior and exterior |
| V | 1 | E | 635 | 1st Cuneiform | left | Taphonomic damage, adult |
| V | 1 | E | 636 | Vertebra fragment | anterior portion | Possible lumbar |
| V | 1 | E | 637 | rib fragment | Possible right | adult, lower 6, fire blackened |
| V | 1 | E | 638 | Thoracic Vertebra fragment |  | Child, lamina, articular facets, and pedicle, not yet fused to the body |
| V | 1 | E | 639 | Thoracic Vertebra fragment |  | Child, lamina, articular facets, and pedicle, not yet fused to the body |


| V | 1 | E | 640 | Tibia fragment | Possible right | Proximal fragment, unfused, fragmentary |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 641 | Vertebra |  | right transverse process is broken, some damage to the spine and body, adult, lower thoracic vertebra |
| V | 1 | E | 642 | Cranial fragment |  | Too much mud that could not be removed from the interior prevents further siding |
| V | 1 | E | 643 | Maxilla fragment |  | Small fragment with only two intact root sockets, possible first premolar in socket, the cusps are covered by calcium carbonate |
| V | 1 | E | 644 | Temporal fragment | right | Mud and calcium carbonate on interior and exterior |
| V | 1 | E | 645 | Radius fragment | left | Distal fragment, adult |
| V | 1 | E | 646 | rib fragment |  | Shaft fragment, adult, upper 6 |
| V | 1 | E | 647 | Thoracic Vertebra fragment |  | Lamina, transverse process, and articular facet fragment, adult |
| V | 1 | E | 648 | Cervical Vertebra fragment |  | adult, body fragment with right articular |

facet, lower cervical

|  |  |  |  |  | adult, Middle <br> thoracic, demi facets <br> are roughly the same |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 649 | Thoracic Vertebra | adult |
| V | 1 | E | 650 | Parietal fragment | adult, calcium <br> carbonate and mud <br> prevents further <br> analysis |
| V | 1 | E | 651 | Occipital/Parietal <br> fragment | rib fragment |


|  |  |  | with a chopping <br> trauma. Near the cut <br> mark there is <br> evidence of healing, <br> possibly of a lesion <br> from blunt force <br> trauma |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | E |  |  | adult, calcium <br> carbonate and mud <br> prevents further <br> analysis |  |
| V | 1 | E | 657 | Clavicle fragment | Parietal fragment |


| V | 1 | E | 663 | Lumbar Vertebra fragment |  | Body fragment, slight syndesmophyte formation, arthritis |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 664 | Probable Humerus fragment |  | Head fragment |  |
| V | 1 | E | 665 | Tibia fragment | right | Proximal fragment, perinate |  |
| V | 1 | G | 1 | probable humerus | Undeterminable | Very badly deteriorated. <br> Midsection of shaft. | 11.62 cm |
| V | 1 | G | 2 | tibia | Undeterminable | Badly deteriorated. Midsection of shaft. | $\begin{gathered} 85.28 \mathrm{~mm} \\ \text { (available length) } \end{gathered}$ |
| V | 1 | G | 3 | femur | left | Very badly deteriorated. Primarily in 6 fragments (proximal end, long shaft, small shaft fragment. distal end, and the condyles are each a fragment). appears to be an adult. Estimated shaft length 23 cm . Estimated overall length 38 cm . | 23 cm (est. shaft), 38 cm (est. overall), <br> 44.12 mm head diameter. |
| V | 1 | G | 4 | humerus | left | Both the proximal and distal ends are deteriorated. Large deltoid tuberosity. Multiple post mortem | $\begin{gathered} 23.8 \mathrm{~cm} \\ \text { (available) } \end{gathered}$ |

factures down the shaft.

| V | 1 | G | 5 | long bone fragment | Undeterminable | Possible humerus Badly deteriorate, post mortem damage. Rodent gnaw marks. | 10 cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | G | 6 | Thoracic vertebra (probably age 2-7) |  | Spinous process and left transverse process absent. V-01 g-0048 discovered between the inferior articular facets and the body. Epiphyseal union is stage $1 / 2$ | 19.61 mm body height |
| V | 1 | G | 7 | femur fragment | right (probable) | Multiple fragments (including: shaft, head, and 6 other fragments). The bone is slightly deformed due to post mortem pressure and moisture due to mud. Shaft length approximately 26 cm . | 26 cm shaft aprox., 46.65 mm head diameter. |
| V | 1 | G | 8 | Lumbar vertebra (1 or 2) |  | Transverse processes absent. Epiphyseal union at stage 1 | 23.24 mm body height |


| V | 1 | G | 9 | radius | right | Distal and proximal ends deteriorated. Radial tuberosity is partly present. Shaft is missing about half of the posterior surface. | 21 cm available |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | G | 10 | Tibia | left | Slightly deformed with post mortem fractures running down the length of the shaft. Distal and proximal ends broken. Distal fragment and six shaft fragments were recovered and are included with this number. Shaft fragment measures 21.9 cm . Distal fragment 4.8 cm . fragments range from 3 to 6 cm in length. | See notes |
| V | 1 | G | 11 | Os Coxae fragments |  | Five large fragments and numerous small ones, porosity stagel, acetabular fossa stage 1 , rim stage 2 |  |


| V | 1 | G | 12 | Lumbar vertebra (probably age 3 ) |  | The right superior facet is broken but present. Spinous process, and the transverse processes are absent. Body is in excellent condition. Epiphyseal union at stage 2 | 27.74 mm body height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | G | 13 | ulna | right | Distal end absent. Most mortem fractures caused by weight and wetness of mud. | $\begin{gathered} 18.1 \mathrm{~cm} \\ \text { (available) } \end{gathered}$ |
| V | 1 | G | 14 | calcaneus | left | anterior facet and most of the anterior end is absent. Dorsal superior edge is badly deteriorated. | 77.64 mm (available) |
| V | 1 | G | 15 | metacarpal | (4th) | Proximal medial end is damaged. | 67.61 mm |
| V | 1 | G | 16 | fragments |  | Misc fragments, including: a few skull fragments, shaft fragments, a child's distal humerus fragment (right probable male) |  |


| V | 1 | G | 17 | fragments | Undetermined | Misc small fragments that are unidentifiable, unwashed due to brittle nature. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | G | 18 | long bone | Undeterminable | Undeterminable shaft fragment. | 13 cm |
| V | 1 | G | 19 | Os coxa | right (probable) | fragment of the greater sciatic notch region, narrow notch |  |
| V | 1 | G | 20 | Lunate | right | V-01g-0046 is probably the pair to this one. Excellent condition. | 35.22 mm |
| V | 1 | G | 21 | long bone fragment | Undeterminable | Shaft fragment with an interosseous border | $\begin{gathered} 62.3 \mathrm{~mm} \\ \text { (available) } \\ \hline \end{gathered}$ |
| V | 1 | G | 22 | molar/1st lower | left | Cusps in excellent condition. |  |
| V | 1 | G | 23 | Long bone fragments |  | Mainly shaft fragments, one fragment has an interosseous border and is either from an ulna or radius. |  |
| V | 1 | G | 24 | fragments | Undetermined | Unidentifiable 3 fragments |  |
| V | 1 | G | 25 | Vertebra |  | Body fragment, probably thoracic of cervical. | 17.49 mm body height |


| V | 1 | G | 26 | fragments | Undetermined | Unidentifiable 12 frags |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | G | 27 | missing |  |  |  |
| V |  | G | 28 | Scapula fragment | right | fragment is of the infraspinous fossa with the lateral border, and a few centimeters of the supraspinous fossa. |  |
| V | 1 | G | 29 | ulna | left | Distal end is absent. Post mortem fractures down the length of the shaft due to pressure and wetness of mud. Possibly the same person as V -01g-0043. | $\begin{gathered} 12.8 \mathrm{~cm} \\ \text { (available) } \end{gathered}$ |
| V | 1 | G | 30 | fragments |  | Unidentifiable 5 fragments |  |
| V | 1 | G | 31 | fragments | (Will be in two locations) | Mostly unidentifiable fragments. a fragment of a right temporal, and a molar which has been placed with other teeth. |  |
| V | 1 | G | 32 | humerus | left | Distal fragment, trochlear outline spooled, symmetrical trochlear, olecranon fossa oval, medial | $\begin{gathered} 99.65 \mathrm{~cm} \\ \text { (available) } \end{gathered}$ |

epicondyle angled.

| V | 1 | G | 33 | scapula | left | fragment with only the glenoid cavity and 5 cm of the lateral border. | 33.88 mm glenoid height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | G | 34 | rib fragments | Undetermined | 10 count, Eight of the fragments are shaft fragments ranging from 3.36 cm to 7.4 cm in length. Two of the smaller fragments appear to possibly be vertebral ends | See notes |
| V | 1 | G | 35 | humerus fragments | right | Two fragments (a distal and proximal end) broken below midshaft. The two bones do not mend perfectly and will probably not be consolidated back together. The distal end is damaged below the medial supracondylar ridge. Trochlea is absent. | 30.4 cm (aprox.), 38.40 mm head diameter |
| V | 1 | G | 36 | skull |  |  |  |

$\left.\begin{array}{lllllll} & & & \begin{array}{c}\text { fragment of a right } \\ \text { rib, scapula fragment } \\ \text { of the spine, and a } \\ \text { child left parietal with } \\ \text { other unidentifiable }\end{array} \\ \text { V fragments. }\end{array}\right]$

| V | 1 | G | 40 | ulna | left (probable) | The proximal end is absent. There appears to be a deformity at the distal end. The bone curves about 3.5 cm from the styloid process. Epiphysis fused | $\begin{gathered} 17.3 \mathrm{~cm} \\ \text { (available) } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | G | 41 | fragments | Undetermined | Misc small fragments that are unidentifiable, unwashed due to brittle nature. |  |
| V | 1 | G | 42 | long bone fragment |  | Midsection shaft fragment. Post mortem damage. | $\begin{gathered} 14.6 \\ \mathrm{~cm} \text { (available) } \\ \hline \end{gathered}$ |
| V | 1 | G | 43 | ulna fragment | right | Distal end and olecranon are absent. Post mortem fractures down the length of the shaft due to pressure and wetness of mud. Possibly the same person as V -01g-0029. | $\begin{gathered} 9.13 \mathrm{~cm} \\ \text { (available) } \end{gathered}$ |
| V | 1 | G | 44 | ? |  |  |  |

Two fragments of a mandible. They were together when discovered but fractured below the right canine when excavated. right condyle neck and head are also broken. Four incisors and two canines are absent but the sockets are not reabsorbed. The socket for the left third molar is open, but no tooth visible No such socket. on
the right. This indicates eruption was to occur soon.

| V | 1 | G | 45 | mandible |  | Chin broad |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | G | 46 | navicular | left | excellent condition | 42.48 mm |
|  |  |  |  |  |  | Misc small fragments |  |
| V | 1 | G | 47 | fragments | Undetermined | that are unidentifiable |  |
| V | 1 | G | 48 | First metatarsal <br> fragment |  | distal fragment |  |
| V | 1 | G | 49 | molar |  |  |  |


| V | 2 | 1 | humerus | right | broken shaft fragments (2) mid shaft fragment possibly from excavation, head fragments and smaller fragments. Slight calcium carbonate on the lateral mid section. Olecranon fossa more oval, possible female | shaft <br> approximately 22 cm, distal fragment aprox. 14 cm , proximal aprox. 11 cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 2 | tibia | right | two fragments one shaft and the other proximal. Calcium carbonate present on the medial and posterior surfaces of the proximal end and the shaft fragment. <br> The proximal condyles are badly deteriorated. | fragment 11 cm , proximal tibia 11.3 cm |
| V | 2 | 3 | calcaneus | right | dorsal posterior surface is badly deteriorated, with only slight damage to superior surface. | 6.9 cm in length |


| V | 2 | 4 | parietal | right | parietal fragment, wormian sutures, irregular holes (not all the way through?) calcium carbonate on the exterior surface. Probable adult. | aprox. $9 \times 7 \mathrm{~cm}$ fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 5 | parietal | undetermined | calcium carbonate is thick on internal and exterior surfaces, makes the meningeal grooves difficult to use for siding. | aprox. $7 \times 6 \mathrm{~cm}$ fragment |
| V | 2 | 6 | thoracic vertebrae |  | body fragment probably T 5-9 | 1.87 cm body height |
| V | 2 | 7 | maxilla | right | has two molars and first molar still in the socket. all sides covered in calcium carbonate. |  |
| V | 2 | 8 | humerus | left | 5 fragment some calcium carbonate. | largest distal fragment is 11.6 cm others range from 3 to 7 cm |
| V | 2 | 9 | rib fragment | undetermined | sternal fragment is badly destroyed and not useful for aging | 3.27 cm |
| V | 2 | 10 | phalanx (foot) | left | excellent condition | 3.72 cm |

calcium carbonate on both surfaces, shaft fragment, calcium
carbonate on anterior surface indicates anterior side was against the ground

| V | 2 | 11 | rib fragment | undetermined | (face down) | 4.6 cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 12 | skull fragments |  |  |  |
| V | 2 | 13 | tibia fragment | left | proximal fragment, calcium carbonate on posterior surface and tibial tuberosity. approximately 5 years of age or slightly older based on size. Hole on lateral surface. |  |
| V | 2 | 14 | femur fragments | right | three shaft fragments and the distal condlyes. Heavy calcium carbonate on all surfaces. adult |  |
| V | 2 | 15 | humerus fragments | right | shaft fragments and a distal fragment. Olecranon fossa indicates possible female. Calcium carbonate on all surfaces but thicker deposit on the |  |

anterior surface.

| V | 2 | 16 | humerus fragment | undetermined | shaft fragment with calcium carbonate on all surfaces. Probable juvenile due to circumference. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 17 | tibia fragments | left | shaft fragments, the larger one has the beginning of the flaring of the proximal end. <br> Calcium carbonate is slightly on the anterior surface with more on the posterior side. |
| V | 2 | 18 | occipital fragments |  | three larger pieces and numerous small ones, heavy calcium carbonate deposits on interior and posterior surfaces. Some parietal present. Sutures are not fully fused, there may be some skull modification pre or |

> post mortem preventing the ability
> to piece the parts together.
$\left.\begin{array}{cccc}\hline & & \begin{array}{c}\text { shaft fragment, } \\ \text { longitudinal cracking, } \\ \text { base of trochanters } \\ \text { and crest present, }\end{array} \\ \text { calcium carbonate on } \\ \text { posterior surface with } \\ \text { some dripping onto } \\ \text { the anterior surface. } \\ \text { Probable adult. Same } \\ \text { individual as 20. }\end{array}\right]$

| V | 2 | 21 | ulna fragment | left | proximal fragment, calcium carbonate on the medial and anterior surfaces. Olecranon badly damaged, and appears to not have been completely fused. Over 5 years of age. Has 007 pink flagging tag with it. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 22 | tibia fragments | left | mostly shaft <br> fragments, most of the calcium carbonate is on the posterior surface, with some also on the medial surface. |
| V | 2 | 23 | femur fragment | left | distal fragment consisting of the condlyes and the popliteal surface. Cemented in a chunk of calcium carbonate with posterior surface facing up. |


| V | 2 | 24 | tibia fragments | right | distal and most of the shaft fragments, longitudinal cracking. Calcium carbonate mostly on medial surface with some on anterior and posterior. Has pink tagging tape that reads 015 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 25 | tibia fragments | undetermined | shaft fragments, one has a heavy deposit of calcium carbonate/cave formation on the posterior side. The other fragment is badly deteriorated and crushed on one side. |  |
| V | 2 | 25 | calcaneus | right | not yet fused |  |
| V | 2 | 10 | Cervical Vertebra |  | possible child | $\begin{gathered} 1.14 \mathrm{~cm} \text { body } \\ \text { height } \end{gathered}$ |
| V | 2 | 9 | Femur fragment |  | Proximal fragment of the head area with an unfused epiphysis, about 6 years of age. |  |
| V | 2 | 22 | fibula? |  | shaft fragment. about 1 year? |  |
| V | 2 | 3 | Fifth metacarpal | right | Proximal fragment | 51.76 mm available length |


| V | 2 | 18 | fragments |  | that mend. Either the ulna or radius |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 26 | fragments |  | 8 unidentifiable fragments |  |
| V | 2 | 5 | Intermediate Phalanx (hand) |  |  | 28.25 mm long |
| V | 2 | 6 | Intermediate Phalanx $\qquad$ |  |  | 24.22 mm long |
| V | 2 | 11 | Intermediate Phalanx (hand) |  | fragment proximal end | 23.29 mm |
| V | 2 | 24 | mandible fragment? |  | head? |  |
| V | 2 | 14 | Metacarpal | ? | Both ends deteriorated |  |
| V | 2 | 27 | molar and two pre molars |  | in DNA box |  |
| V | 2 | 12 | Navicular (foot) | right | Slightly deteriorated |  |
| V | 2 | 8 | Proximal epiphysis |  | approximately 6 years of age | 4.46 cm wide, 1.1 cm tall |
| V | 2 | 4 | Proximal phalanx (hand) |  |  | 46.3 mm long |
| V | 2 | 7 | Proximal phalanx (hand) |  | distal fragment | 33.41 mm long |
| V | 2 | 21 | Radius fragment | right | proximal fragment between 1 and 6 years of age |  |
| V | 2 | 20 | rib fragment | left | Possibly rib 2 or 3, child |  |
| V | 2 | 13 | Second Cuneiform | left |  |  |


| V | 2 | 1 | Third Metacarpal | right |  | 68.66 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 16 | Third Metacarpal | left | proximal fragment | 5.28 cm |
| V | 2 | 17 | Third Metatarsal? | right? | proximal fragment | 5.11 cm |
| V | 2 |  |  |  | Tibia fragment | right? |


|  |  |  |  | carbonate on the dorsal surface of the distal end and onto the medial side. |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 2 | 58 | Fourth Metatarsal | left | abnormal bone growth on the lateral/posterior area. Calcium carbonate on the proximal area (light). Some damage to the distal head. | 7.74 cm |
| V | 2 | 59 | Tibia | left | Proximal fragment. 34 years of age. Shaft fragment with proximal epiphysis unfused. Possible cut marks on the posterior surface | 7.44 cm long fragment. 1.38 cm width at proximal epiphysis |
| V | 2 | 60 | Proximal phalanx (hand) | undetermined | Probably 5th phalanx, calcium carbonate on the dorsal proximal surface. | 3.62 cm |
| V | 2 | 61 | cranial fragments | undetermined | One is a parietal and the other cannot be identified. Calcium carbonate on interior and outer surfaces. <br> More calcium carbonate is on the exterior of the parietal |  |

and more one the interior of the undetermined fragment.


| V | 2 | 65 | Teeth |  | one molar, one premolar | Not <br> Photographed |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 3 | 1 | cervical vertebra |  | probably 4 or 5, only one inferior facet is visible |  |
| V | 3 | 2 | intermediate phalanx (foot) | undetermined | irregular dorsal side | 1.97 cm |
| V | 3 | 3 | proximal first phalanx (right) | undeterminable | juvenile or child | $\begin{gathered} 2.1 \mathrm{~cm} \text { long, } 0.9 \\ \mathrm{~cm} \text { wide } \\ \hline \end{gathered}$ |
| V | 3 | 4 | tibia fragment | left | shaft fragment, calcium carbonate on medial surface, anterior surface, most of posterior surface, and part of the lateral surface. Juvenile |  |
| V | 3 | 5 | femur fragment | left | all of the shaft and part of the proximal end, calcium carbonate heavily deposited on the posterior surface. Probable juvenile or teen. |  |
| V | 3 | 6 | scapula fragment | left | inferior angle |  |
| V | 3 | 7 | shaft fragments | undeterminable | over 15 fragments |  |
| V | 3 | 8 | femur fragment | undetermined | Femoral head fragment, badly deteriorated |  |

$\left.\begin{array}{cccccc} & & \begin{array}{c}\text { Shaft fragment with } \\ \text { part of the greater } \\ \text { trochanter. 6-10 years } \\ \text { of age due to size, }\end{array} \\ \text { calcium carbonate on } \\ \text { the anterior surface. }\end{array}\right]$

| V | 4 | 2 | thoracic vertebra |  | mid thoracic vertebra. Less than 6 years of age, body fused, but line is still visible. Some damage to body, spinous process broken. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 4 | 3 | sacral vertebra, first |  | part of the right ala is present, majority is in horrible condition. |
| V | 4 | 4 | calcaneus | left | posterior and dorsal surface badly deteriorated |
| V | 4 | 5 | femur fragment | right | distal fragment with only the condyles and part of the popliteal surface, anterior surface badly deteriorated. |
| V | 4 | 6 | shaft fragments |  | 10 shaft fragments, insect activity on half. Some insect holes are bored all the way through. |
| V | 4 | 7 | humerus fragment | indeterminable | shaft fragment, badly deteriorated, irregular discoloration |
| V | 4 | 8 | tibia fragment | undeterminable | shaft fragment, nutrient foramen |


| V | 4 | 9 | rib fragment | undeterminable | shaft fragment, interior surface has two scratches that are too small to be rodent. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 4 | 10 | radius fragment | probable right | over 5 years of age, proximal fragment |
| V | 4 | 11 | talus fragment | right | distal end is badly deteriorated and the plantar side |
| V | 4 | 12 | scapula fragment | left | lateral fragment with part of the base for the scapular spine, acromion, glenoid fossa, and coracoid absent. |
| V | 4 | 13 | rib fragments undeterminable |  | three shaft fragments |
| V | 4 | 14 | shaft fragments | undeterminable | over 20 bone fragments. |
| V | 4 | 15 | tibia fragment | right? | shaft fragment, calcium carbonate on medial and posterior surface, cracking at the distal portion of the shaft fragment, small faunal bone fused to the calcium carbonate (probable |

$\left.\begin{array}{ccccc}\hline & & & \begin{array}{c}\text { two distal fragments, } \\ \text { one shaft fragment } \\ \text { and a proximal } \\ \text { fragment, trochlea } \\ \text { spool shaped, medial } \\ \text { condyle angled }\end{array} \\ \text { upward. Large deltoid } \\ \text { tubercle, but distal } \\ \text { morphology suggest } \\ \text { woman }\end{array}\right]$
lipping on L-1. right ala, L-1, and two other fragments.

| V | 4 | 20 | skull fragment | undetermined | possible frontal fragment. Calcium carbonate on internal and external surface. Thinness indicative of a younger juvenile or teen. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 4 | 21 | Tibia fragments | right | Two shaft fragments, broken in excavation. Calcium carbonate on the anterior and lateral surface. Juvenile over 5, but probably under 10 . |
| V | 4 | 22 | radius fragments | right | Two fragments, one shaft and the other proximal with the tibial tuberosity but lacking the head. Calcium carbonate on the anterior surface. |
| V | 4 | 23 | humerus fragment | undetermined | shaft fragment. Probable juvenile due to size. Heavy calcium carbonate on |


| V | 4 | 24 | ischium | left | Not fused to ilium or pubis. Younger than 4-8 years. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 4 | 25 | Tibia fragments | left | Two larger shaft fragments and many smaller ones. Insect damage. Juvenile. |
| V | 4 | 26 | femur fragment | undetermined | Distal fragment of one of the condlyes. |
| V | 4 | 27 | Tibia fragment | Possible right | Proximal shaft fragment with just the tibial tuberosity |
| V | 4 | 28 | skull fragments | undetermined | two skull fragments, probable frontal. Suture visible on larger fragment looks like it was not completely fused, and the exterior of that piece is badly damaged post mortem. Both pieces badly cracked. |
| V | 4 | 29 | rib fragment | undetermined | Cemented into a fragment of calcium carbonate. Possible juvenile or young |

adult.

| V | 4 | 30 | Tibia fragments | undetermined | One fragment is an articular facet, one complete diameter shaft fragment and numerous <br> longitudinal shaft fragments. Thick calcium carbonate on the lateral surface of the full diameter fragment. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 4 | 31 | fragments | undetermined | Small fragments, morphologically looks like condlyes or heads, but much smaller than expected. |
| V | 4 | 32 | molar |  | 9 molars, 4 premolars, multiple root fragments |
| V | 4 | 33 | molar |  |  |
| V | 4 | 34 | molar |  |  |
| V | 4 | 35 | molar |  |  |
| V | 4 | 36 | molar |  |  |
| V | 4 | 37 | molar |  |  |
| V | 4 | 38 | molar |  |  |
| V | 4 | 39 | molar |  |  |
| V | 4 | 40 | molar |  |  |



| V | 5 | 7 | unidentifiable fragments |  | 50+ nondiagnostic fragments, many from long bones |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 5 | 8 | Femur fragments | left | Head fragment and a proximal fragment with a very deteriorated intertrochanteric ridge and greater and lesser trochanter. Epiphysis around the head is fused but the line is still viable. The head is slightly damaged. | 4.39 cm head diameter |
| V | 5 | 9 | fragments | undetermined | 20+ nondiagnostic fragments, many of them are shaft fragments. |  |
| V | 5 | 10 | teeth |  | 16 molars, 3 canines, 12 incisors (some modified), 9 premolars |  |
| V | 5 | 11 | molars |  | 1 canine (modified), 1 premolar, 1 molar |  |
| V | 5 | 12 | molars |  | left upper first molar |  |
| V | 5 | 13 | molars |  | left lower first molar |  |
| V | 5 | 14 | molars |  | left upper first molar |  |
| V | 5 | 15 | molars |  | left upper second molar |  |
| V | 5 | 16 | molars |  | left upper first molar |  |


| V | 5 | 17 | molars | right lower third molar |
| :---: | :---: | :---: | :---: | :---: |
| V | 5 | 18 | molars |  |
| V | 5 | 19 | molars | right upper first or second molar |
| V | 5 | 20 | molars | right lower first molar |
| V | 5 | 21 | molars |  |
| V | 5 | 22 | molars |  |
| V | 5 | 23 | molars | left lower third molar |
| V | 5 | 24 | molars | left lower third molar |
| V | 5 | 25 | molars | right upper second molar |
| V | 5 | 26 | molars | left upper first molar |
| V | 5 | 27 | canine | right upper first molar |
| V | 5 | 28 | canine |  |
| V | 5 | 29 | canine |  |
| V | 5 | 30 | canine |  |
| V | 5 | 31 | canine |  |
| V | 5 | 32 | premolar |  |
| V | 5 | 33 | premolar |  |
| V | 5 | 34 | premolar |  |
| V | 5 | 35 | premolar |  |
| V | 5 | 36 | premolar |  |
| V | 5 | 37 | premolar |  |
| V | 5 | 38 | premolar |  |
| V | 5 | 39 | incisor |  |
| V | 5 | 40 | incisor |  |
| V | 5 | 41 | incisor |  |



| V | 6 | 9 | metacarpal fragment | undeterminable | distal fragment |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 6 | 10 | shaft fragments | undeterminable | over 20 bones |
| V | 6 | 11 | femur figments | right | shaft fragment and proximal fragment, epiphyses not completely fused, beginning of the lesser trochanter suggest 7-12 years of age. |
| V | 6 | 12 | radius fragment | possible left | shaft fragment with the radial tuberosity |
| V | 6 | 13 | rib fragment | undetermined | 12 rib fragments, mostly shafts, one vertebral end |
| V | 6 | 14 | metacarpal fragment | undetermined | mostly shaft fragment with some of the distal portion |
| V | 6 | 15 | vertebra fragments |  | two transverse processes, possibly not belonging to the same vertebra |
| V | 6 | 16 | cervical vertebra fragment |  | C-2. Body present and part of the dens. |
| V | 6 | 17 | phalanx (hand) | undetermined | Mostly shaft fragment with deteriorated distal end. Cut on |


|  |  |  |  |  | dorsal side, possible defense wound. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 6 | 18 | phalanges (hand) | undetermined | distal fragments of two phalanges, longitudinal cracking on both. |
| V | 6 | 19 | vertebra fragment |  | body, badly deteriorated |
| V | 6 | 20 | metacarpal fragment | undetermined | distal fragment, hole on dorsal side |
| V | 6 | 21 | unidentifiable fragments | undetermined | 50+ nondiagnostic small fragments |
| V | 6 | 22 | fragments | undetermined | 10+ nondiagnostic small fragments |
| V | 6 | 23 | Tibia fragments | possible left | Shaft and proximal fragments that can be mended, calcium carbonate on all surfaces. |
| V | 6 | 24 | rib fragments | one right, others undetermined | 6 rib fragments, two sternal ends, rest shaft. |
| V | 6 | 25 | Tibia fragments | undetermined | 5 shaft fragments, and two proximal tubercular fragments |
| V | 6 | 26 | Second rib fragments | right | One fragment has the superior groove, the other piece barely mends |


| V | 6 | 27 | scapula fragments | right | glenoid fossa and coracoid fragments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 6 | 28 | proximal phalanx (hand) | undetermined | Proximal end badly deteriorated |
| V | 6 | 29 | intermediate phalanx (hand) | undetermined | fits well with 28 |
| V | 6 | 30 | talus | right | badly deteriorated inferior, posterior and anterior surfaces. |
| V | 6 | 31 | talus | left | even smaller superior surface than 30 , but appears to be the same individual. |
| V | 6 | 32 | Third Metacarpal | left | Distal end in missing. Medial proximal facets are missing, sided by the proximal facet shape. |
| V | 6 | 33 | Fourth Metacarpal | left | distal and proximal ends badly deteriorated, sided by medial facet. |
| V | 6 | 34 | Fourth Metacarpal | right | head missing proximal lateral surface deteriorated, sided based on proximal facet and medial facet |

V

this may be caused by the damage/cracking.

| V | 7 | 8 | fifth metacarpal | right | complete, calcium carbonate on dorsal surface, ridges are abnormally defined. | 4.75 cm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 9 | proximal phalanx (hand) | undetermined | calcium carbonate on dorsal surface, possibly 2,3 , or 4 . | 4.23 cm |
| V | 7 | 10 | proximal phalanx <br> (hand) | undetermined | calcium carbonate on dorsal surface, possibly 2 or 4 . Slight damage to the proximal area. |  |
| V | 7 | 11 | proximal phalanx (foot) | undetermined | probably 1st phalanx | 2.6 cm |
| V | 7 | 12 | second metacarpal fragment | right | proximal fragment wit most of the shaft, ridges overly defined. |  |
| V | 7 | 13 | fifth metatarsal | left |  | 6.2 cm |
| V | 7 | 14 | first metacarpal |  | damage to the proximal and distal end is slight | 4.76 cm |
| V | 7 | 15 | third metacarpal fragment |  | proximal fragment with most of the shaft very gracile, defined ridges, some damage at the proximal end as |  |

well.

| V | 7 | 16 | rib fragment | undetermined | shaft fragment with calcium carbonate on the anterior surface. Damage to the inferior margin. | 5 cm fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 17 | proximal phalanx (foot) | undetermined | damage to the proximal end | 2.3 cm |
| V | 7 | 18 | proximal phalanx (foot) | undetermined | damage to the proximal end, abnormal extra bone formation on dorsal surface | 2.65 cm |
| V | 7 | 19 | proximal phalanx (foot) fragment | undetermined | dorsal fragment with proximal end absent. |  |
| V | 7 | 20 | metacarpal fragment |  | shaft fragment |  |
| V | 7 | 21 | metacarpal fragment |  | shaft fragment |  |
| V | 7 | 22 | clavicle fragments | left | lateral fragment, gracile and rather flat. Shaft fragment is also small. Probable adolescent. Similar in size to right clavicle 26 | medial fragment 5.4 cm long, 1.85 cm wide |
| V | 7 | 23 | metacarpal fragment | undeterminable | distal fragment calcium carbonate on one lateral surface and half the dorsal |  |

and palmar side.

| V | 7 | 24 | fifth metacarpal fragment | left | proximal fragment wit most of the shaft, ridges overly defined. Damage to the proximal end. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 25 | ulna fragment | right | shaft fragment, calcium carbonate on the medial surface | 9.2 cm fragment |
| V | 7 | 26 | clavicle | right | damage to the lateral edge, sternal epiphysis is present but not completely fused. Similar in size to left clavicle 22 |  |
| V | 7 | 27 | metacarpal fragment | undeterminable | shaft fragment |  |
| V | 7 | 28 | ulna fragments | left | Proximal end is badly damaged. Shaft fragment has pronator ridge is large. External surface has some insect damage. |  |
| V | 7 | 29 | zygomatic | left | part of the zygomatic process of the temporal bone is attached but the suture is still visible |  |

and not perfectly
aligned.

| V | 7 | 30 | ulna fragments | left | lateral surface covered with calcium carbonate | 10.8 cm present |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 31 | ulna fragment | possible left | shaft fragment with calcium carbonate on the medial surface. |  |
| V | 7 | 32 | radius fragments | undeterminable | shaft fragment, calcium carbonate on one surface. |  |
| V | 7 | 33 | humerus fragments | left | three fragments (attempts will be made to mend with b72). Two shaft fragments and a distal fragment. Calcium carbonate on posterior surface. Possible juvenile. | distal fragment estimated width at condyle 3.53 cm |
| V | 7 | 34 | shaft fragments | undeterminable | two flat surface shaft fragments with calcium carbonate. |  |
| V | 7 | 35a | maxillary fragments |  | well worn third premolar included, but not in socket |  |
| V | 7 | 35B | premolar |  |  |  |
| V | 7 | 36 | metacarpal fragment | undetermined | shaft fragment, calcium carbonate on |  |


|  |  |  | one of the lateral <br> edges |
| :---: | :---: | :---: | :---: |
| V |  |  |  |
| V |  |  | scratches on the <br> internal surface of the <br> occipital bone are <br> probably from <br> excavation, many <br> parietal fragments as <br> well. attempts will be <br> made to piece back <br> together. Possible <br> insect activity and <br> disease. |
| V | 7 | 37 | skull fragments |


| V | 7 | 45 | Femur fragment | undetermined | shaft fragment with calcium carbonate on all surfaces. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 46 | fragments | undetermined | $20+$ nondiagnostic fragments |  |
| V | 7 | 47 | humerus fragment | right | distal fragment. Calcium carbonate on the entire anterior surface, and on posterior distal portion. Olecranon fossa is triangular is shape, juvenile or young adult. | 7.23 cm body height, 2.11 cm body width |
| V | 7 | 48 | vertebra fragment |  | body fragment, unfused. 2-4 years of age |  |
| V | 7 | 49 | calcaneus fragment | left | superior and anterior portion of the bone is badly deteriorated, crushing on plantar surface. |  |
| V | 7 | 50 | phalanx (foot) | undetermined | distal portion of a phalanx |  |
| V | 7 | 51 | First proximal phalanx (foot) | undetermined | deterioration on the proximal end. abnormal bone growth on the anterior surface proximal end. |  |
| V | 7 | 52 | rib fragments | left | 4 left shaft fragments, all different |  |


| V | 7 | 53 | rib fragments | right | 2 right shaft fragments, both different |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 54 | vertebra fragment |  | lumbar body fragment broken in half, no body height measurement taken because incomplete. |
| V | 7 | 55 | humerus fragment | undetermined | head fragment, pair to 56 |
| V | 7 | 56 | humerus fragment | undetermined | head fragment, pair to 55 |
| V | 7 | 57 | radius fragment | left | Shaft fragment. Calcium carbonate on the posterior surface. |
| V | 7 | 58 | frontal fragment |  | frontal crest present, indication of disease, possible skull modification, calcium carbonate on interior surface |
| V | 7 | 59 | frontal fragment |  | frontal crest present, possible skull modification, smaller than 58 |
| V | 7 | 60 | parietal fragments | undetermined | 10+ parietal fragments. Interior surface is very irregular (undulations)on one fragment. |


| V | 7 | 61 | vertebra fragment |  | spinous process probably from a thoracic vertebra |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 62 | ulna fragment | right | anterior surface covered with calcium carbonate | 2.94 cm anterior to posterior |
| V | 7 | 63 | tibia fragments | right | shaft fragments with thick calcium carbonate on lateral surface. Young adult probably due to size |  |
| V | 7 | 64 | rib fragments | undetermined | 4 shaft fragments, and one sternal fragment. Calcium carbonate on the posterior surface |  |
| V | 7 | 65 | skull fragments | undetermined | 4 nondiagnostic skull fragments |  |
| V | 7 | 66 | vertebra fragment |  | anterior body fragment, lumbar probably, |  |
| V | 7 | 67 | skull fragments | undetermined | 2 non diagnostic skull fragments | 3.06 cm aprox. height, 2.34 cm width |
| V | 7 | 68 | scapula fragment | left | fragment of the glenoid fossa |  |
| V | 7 | 69 | radius fragment | left | shaft fragment, calcium carbonate on all surfaces. More on the posterior/lateral |  |
| V | 7 | 70 | metacarpal fragment | undetermined | head fragment |  |


| V | 7 | 71 | metatarsal fragment | undetermined | head fragment and part of the shaft. Calcium carbonate on all surfaces. | 2.29 cm long |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 72 | intermediate phalanx (hand) | undetermined |  |  |
| V | 7 | 73 | fibula fragments | probable left | Calcium carbonate on the posterior surface, two shaft fragments |  |
| V | 7 | 74 | metacarpal fragment | undetermined | Posterior surface has calcium carbonate. Proximal end is missing. |  |
| V | 7 | 75 | rib fragments | both | one right and one left rib (vertebral end) fragments, two shaft fragments |  |
| V | 7 | 76 | rib fragments | right | two shaft rib fragments of an adult 7-10 |  |
| V | 7 | 77 | intermediate phalanges (hang | undetermined | three, the two smaller ones have damage to the proximal ends, and the larger one has damage to head. |  |
| V | 7 | 78 | metacarpal fragment | undetermined | 2 shaft fragments |  |
| V | 7 | 79 | thoracic vertebra fragment |  | Probable 11 thoracic vertebra body with the vertebral foramen and the right superior |  |


| V | 7 | 80 | shaft fragments | undetermined | 6 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 81 | canine |  | $\begin{gathered} \text { LC (upper), RC } \\ \text { (upper) - different } \\ \text { people, LP3 (upper) } \end{gathered}$ |
| V | 7 | 82 | Tibia fragment | undetermined | distal or proximal fragment |
| V | 7 | 83 | lateral cuneiform | right | planter side is badly deteriorated, part of the facets on the side where the intermediate cuneiform articulates |
| V | 7 | 84 | fragments | undetermined | nondiagnostic fragments. |
| V | 7 | 85 | Mandible fragment | right | Teeth present: right canine, first premolar, and first and second molars. |
| V | 7 | 86 | Humerus fragments | right | Distal fragment and shaft fragment. <br> Proximal epiphysis is not completely fused. Trochlea badly deteriorated. <br> Olecranon fossa more triangular shaped. <br> Calcium carbonate on |

posterior surface.

| V | 7 | 87 | left Upper Second premolar |  | N.W. pit written on package. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| V | 7 | 88 | rib fragments | left | Two rib fragments found in NW pit |
| V | 7 | 89 | canine |  | 7 molars, 5 premolars, 3 canines, and one incisor |
| V | 7 | 90 | molar |  |  |
| V | 7 | 91 | molar |  |  |
| V | 7 | 92 | molar |  |  |
| V | 7 | 93 | molar |  |  |
| V | 7 | 94 | molar |  |  |
| V | 7 | 95 | molar |  |  |
| V | 7 | 96 | molar |  |  |
| V | 7 | 97 | incisor |  |  |
| V | 7 | 98 | canine |  |  |
| V | 7 | 99 | canine |  |  |
| V | 7 | 100 | canine |  |  |
| V | 7 | 101 | premolar |  |  |
| V | 7 | 102 | premolar |  |  |
| V | 7 | 103 | premolar |  |  |
| V | 7 | 104 | premolar |  |  |
| V | 7 | 105 | premolar |  |  |


| V | 1 | G | 49 | humerus fragments |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V | 1 | E | 666 | proximal manual phalanx fragments |  |  |
| V | 7 |  | 90 | metatarsal fragment |  |  |
| V | 1 | G | 50 | proximal manual phalanx fragments |  |  |
| V | 1 | G | 51 | vertebra fragment |  |  |
| V | 1 | G | 52 | rib fragment |  |  |
| V | 1 | E | 667 | second metacarpal |  |  |
| V | 1 | G | 53 | ulna fragment |  |  |
| V | 1 | E | 668 | rib fragments |  |  |
| V | 1 | G | 54 | fifth metatarsal |  |  |
| V | 7 |  | 91 | cranial fragment |  |  |
| V | 1 | G | 55 | mandible fragment |  |  |
| V | 1 | G | 56 | vertebra fragment |  |  |
| V | 1 | G | 57 | rib fragment |  |  |
| V | 1 | G | 58 | rib fragments |  |  |
| V | 1 | E | 669 | mandible fragment |  |  |
| V | 1 | E | 670 | mandible fragment |  |  |
| V | 1 | E | 671 | mandible fragment |  |  |
| VI | 1 | a | 1 | humerus fragments | undetermined | 3 humerus shaft fragments, small, possible female or juvenile |
| VI | 1 | a | 2 | first metatarsal fragment | right | distal fragment, treated with b-72 |
| VI | 1 | a | 3 | cranial fragment | undetermined | tympanic portion of an adult, treated with |


| VI | 1 | a | 4 | second metatarsal <br> fragment | left | proximal fragment, <br> treated with b-72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 1 | a | 5 | parietal fragment | right | pin pick porosity <br> internal defect <br> suggestive of porotic <br> hyperostosis |
| VI | 1 | a | 6 | scaphoid | right | adult |
| VI | 1 | a | 7 | scaphoid | left | adult, post mortem <br> damage |
| VI | 1 | a | 8 | capitate | right | adult |
| VI | 1 | a | 9 | proximal manual <br> phalanx | undetermined | adult |
| VI | 1 | a | 10 | intermediate manual <br> phalanx | undetermined | adult |
| VI | 1 | a | 11 | proximal manual <br> phalanx | undetermined | adult |
| VI | 1 | a | 12 | fourth metacarpal | left | adult |
| VI | 1 | a | 13 | metacarpal fragment | undetermined | shaft and head |
| fragment |  |  |  |  |  |  |

$\left.\begin{array}{ccccccc} & & & & \text { in length } \\ \text { VI } & 1 & \text { a } & 18 & \text { rib fragment } & \text { undetermined } & \text { shaft , roughly } 3 \mathrm{~cm} \\ \text { in length }\end{array}\right]$

| VI | 1 | B | 3 | ulna fragment | left | adult, proximal fragment with most of the shaft, calcite | lateral to medial $14.58 \mathrm{~mm}, 6.6$ mm anterior to posterior, taken just below nutrient foramen |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 1 | B | 4 | radius fragment | right | distal fragment of the head and tuberosity | $\begin{aligned} & 19.38 \mathrm{~mm} \text { head } \\ & \text { diameter } \end{aligned}$ |
| VI | 1 | B | 5 | ulna fragment | right | proximal fragment , adult, calcite |  |
| VI | 1 | B | 6 | navicular | right | adult, calcite |  |
| VI | 1 | B | 7 | first cuneiform | right | adult, calcite |  |
| VI | 1 | B | 8 | patella | right | possible subadult, badly deteriorated, calcite |  |
| VI | 1 | B | 9 | cervical fragment |  | first cervical |  |
| VI | 1 | B | 10 | cervical vertebra |  | either C3 or C4, articulate with 11 , all of these vertebra have a red discoloration |  |
| VI | 1 | B | 11 | cervical vertebra |  | either C4 or C5, articulates with 10 and 12 |  |
| VI | 1 | B | 12 | cervical vertebra |  | either C5 or6, articulates with 11 and 13 |  |
| VI | 1 | B | 13 | cervical vertebra |  | either C6 or 7, articulates with 12 |  |
| VI | 1 | B | 14 | thoracic vertebra fragment |  | body fragment, T3-7 probably, covered in |  |

reddish substance

| VI | 1 | B | 15 | interproximal manual phalanx | undetermined | covered in reddish substance | 20.29 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 1 | B | 16 | interproximal manual phalanx | undetermined | covered in reddish substance | 23.78 mm |
| VI | 1 | B | 17 | first metacarpal | left | covered in reddish substance | 39.48 mm length |
| VI | 1 | B | 18 | proximal manual phalanx | undetermined | covered in reddish substance | 37.36 mm |
| VI | 1 | B | 19 | distal manual phalanx | undetermined | covered in reddish substance | 15.68 mm |
| VI | 1 | B | 20 | bone fragment |  | covered in reddish substance |  |
| VI | 1 | B | 21 | first metatarsal | right | calcite |  |
| VI | 1 | B | 22 | metatarsal fragment |  | calcite |  |
| VI | 1 | B | 23 | second or third metatarsal | second left, third right | head broken off, damage to the distal end, calcite |  |
| VI | 1 | B | 24 | third or fourth metatarsal | third right, fourth left | distal end is abnormal due to pathology, additional bone growth on the pedal proximal surface, bone remodeling similar to gout, <br> 5.76 mm in diameter, calcite | 69.58 mm |
| VI | 1 | B | 25 | fifth metatarsal | right | calcite | 58.02 mm |

$\left.\begin{array}{cccccccc} & \text { n } & & & \begin{array}{c}\text { shaft fragment, } \\ \text { possible subadult } \\ \text { given the size of the } \\ \text { bone, possible cut } \\ \text { mark on the lateral }\end{array} \\ \text { surface of the bone, } \\ \text { calcite }\end{array}\right]$
medial epicondyle is level
27.21 mm
anterior to
posterior, 30.11 mm medial to
lateral

| VI | 1 | B | 37 | proximal manual phalanx | undetermined |  | 36.11 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 1 | B | 38 | proximal pedal phalanx | undetermined |  | 18.82 mm |
| VI | 1 | B | 39 | manual phalanx fragment | undetermined | badly deteriorated, calcite, reddish color |  |
| VI | 1 | B | 40 | humerus | right | proximal epiphysis is fused but still open, spool like trochlea, triangular shaped fossa, wide angle, medial epicondyle is level, mate to 36 | 39.88 mm head diameter, 57.56 mm epicondylar width |
| VI | 1 | B | 41 | first rib | left | subadult, unfused vertebral end |  |
| VI | 1 | B | 42 | first rib | right | subadult, mate to 41?, reddish discoloration |  |
| VI | 1 | B | 43 | rib fragment | left | vertebra end |  |
| VI | 1 | B | 44 | rib fragment | left | vertebra end |  |
| VI | 1 | B | 45 | rib fragment | undetermined | shaft fragment, possible subadult |  |
| VI | 1 | B | 46 | rib fragment | right | vertebra end |  |
| VI | 1 | B | 47 | humerus fragments | probable right | shaft fragment, badly deteriorated |  |


| VI | 1 | B | 48 | calcaneus | right |  | 71.87 mm length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 1 | B | 49 | radius fragment | probable left | shaft fragment, calcite |  |
| VI | 1 | B | 50 | talus fragments | right | posterior fragment |  |
| VI | 1 | B | 51 | second cuneiform | right | adult, calcite |  |
| VI | 1 | B | 52 | third cuneiform | right | adult, calcite |  |
| VI | 1 | B | 53 | frontal fragment | right | child, eye orbit, possible cut marks |  |
| VI | 1 | B | 54 | humerus fragments | undetermined | subadult, head only |  |
| VI | 1 | B | 55 | talus fragments | right | anterior portion, may <br> be the same as 50 |  |
| VI | 1 | B | 56 | metatarsal fragment | undetermined | head only |  |
| VI | 1 | B | 57 | triquetral | left |  |  |
| VI | 1 | B | 58 | hamate | left |  |  |
| VI | 1 | B | 59 | scapula fragment | undetermined | spine fragment |  |
| VI | 1 | B | 60 | cervical vertebra fragment |  | C1, left fragment, slight reddish color |  |
| VI | 1 | B | 61 | vertebra fragment |  | spinous process fragment, slight reddish color |  |
| VI | 1 | B | 62 | femur fragment | undetermined | distal condyle fragment |  |
| VI | 1 | B | 63 | vertebra fragment |  | body fragment, probably a thoracic vertebra |  |
| VI | 1 | B | 64 | first rib fragment | possible left | sternal end fragment, reddish color |  |
| VI | 1 | B | 65 | 4 unidentified fragments |  |  |  |
| VI | 1 | B | 66 | unidentified fragment |  | reddish color |  |


| VI | 1 | B | 67 | unidentified fragment |  | reddish color |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 1 | B | 68 | unidentified fragment |  | reddish color |
| VI | 1 | B | 69 | 80+ unidentified fragments |  |  |
| VI | 1 | B | 70 | femur fragment | left | proximal fragment, head, neck, and part of the greater trochanter, too much damage to the head for measurement |
| VI |  | B | 71 | occipital and parietal fragments | both | pin prick porosity suggestive of porotic hyperostosis, suture between occipital and parietals was open enough to allow for a clean fracture in shipping, parietal sutures are much more closed |
| VI | 1 | B | 72 | parietal fragment | left | slight reddish color |
| VI | 1 | B | 73 | occipital fragment |  | basioccipital region |
| VI | 1 | B | 74 | frontal fragment |  | rather thin, possible subadult |
| VI | 1 | B | 75 | frontal fragment |  | rather thin, possible subadult |
| VI | 1 | B | 76 | tibia fragment | right | proximal lateral fragment, proximal epiphysis is fused but still open, treated |

with B-72
$\left.\begin{array}{cccccccc}\hline \text { VI } & 1 & \text { B } & 77 & \text { occipital fragment } & & \begin{array}{c}\text { left portion with } \\ \text { jugular tubercle, } \\ \text { reddish color on } \\ \text { exterior }\end{array} \\ \hline \text { VI } & 1 & \text { B } & 78 & \text { scapula fragment } & \text { undetermined } & \begin{array}{c}\text { reddish color and } \\ \text { calcite on posterior }\end{array} \\ \hline \text { VI } & 1 & \text { B } & 79 & \text { tibia fragment } & \text { undetermined } & \begin{array}{c}\text { proximal fragment, } \\ \text { possibly part of } \\ \text { number 76 }\end{array} \\ \hline \text { VI } & 1 & \text { B } & 80 & \text { temporal fragment } & \text { probable left } & \begin{array}{c}\text { mastoid process } \\ \text { fragment }\end{array} \\ \hline \text { VI } & 1 & \text { B } & 81 & \text { rib fragment } & & \begin{array}{c}\text { vertebral end } \\ \text { fragment }\end{array} \\ \hline \text { VI left } & \text { parible left } & \begin{array}{c}\text { orangish red color on } \\ \text { exterior }\end{array} \\ \hline \text { VI } & 1 & \text { B } & 82 & \text { pagment } & \text { parangish red color on } \\ \text { exterior }\end{array}\right]$

| VI | 2 | a | 1 | proximal pedal phalanx | undetermined | adult | 29.56 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | a | 2 | hyoid fragment | right | horn, unfused, subadult, from water pit |  |
| VI | 2 | a | 3 | scapula fragment | right | inferior margin, adult, from water pit |  |
| VI | 2 | B | 1 | proximal pedal phalanx | undetermined | possible subadult | 20.53 mm |
| VI | 2 | B | 2 | femur fragment | undetermined | adult, distal condyle fragment |  |
| VI | 2 | B | 3 | ilium fragment | undetermined | adult, fragment from near the crest |  |
| VI | 2 | B | 4 | occipital fragment |  | adult, some porosity |  |
| VI | 2 | B | 5 | temporal bone | left | mastoid process is narrow and slightly elongated |  |
| VI | 2 | B | 6 | calcaneus | left | adult, damaged | 71.59 mm length |
| VI | 2 | B | 7 | os coxa fragment | right | part of the lunate surface, inferior aspect of the preauricular surface |  |
| VI | 2 | B | 8 | temporal fragment | undetermined | seems thicker than normal |  |
| VI | 2 | B | 9 | cranial fragment | undetermined | pin prick porosity visible on exterior |  |
| VI | 2 | B | 10 | cranial fragment | undetermined |  |  |
| VI | 2 | B | 11 | cranial fragment | undetermined |  |  |
| VI | 2 | B | 12 | cranial fragment | undetermined |  |  |


| VI | 2 | B | 13 | temporal fragment | undetermined |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 14 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 15 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 16 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 17 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 18 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 19 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 20 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 21 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 22 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 23 | rib fragment | right | adult, vertebral end, possibly rib 11 |
| VI | 2 | B | 24 | rib fragment | left | adult, vertebral end, probably rib 7-10 |
| VI | 2 | B | 25 | rib fragment | right | possible subadult |
| VI | 2 | B | 26 | thoracic vertebra fragment |  | adult, lamina fragment of a lower thoracic |
| VI | 2 | B | 27 | thoracic vertebra fragment |  | adult, lamina fragment of a lower thoracic |


| VI | 2 | B | 28 | thoracic vertebra fragment |  | adult, transverse process and left articular facets of a middle thoracic |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 29 | thoracic vertebra fragment |  | subadult, unfused pedicle on this lamina fragment, upper thoracic |
| VI | 2 | B | 30 | occipital fragment |  | adult, macroporosity on exterior, sample taken for isotope testing |
| VI | 2 | B | 31 | parietal fragments | both | adult, posterior portion of both parietals, sutures are beginning to become obliterated on the superior portion, pin prick porosity, sample taken on right parietal, this is not the same individual as 30 |
| VI | 2 | B | 32 | frontal and parietal fragment | left | cranial modification, adult, suture was still relatively open, which eased the fracturing of the parietal, no supraorbital torus, sharp supraorbital margin, possible female, interior has |


|  |  |  | adult, blunt <br> supraorbital margins, <br> raised supraorbital <br> torus, possible male, <br> pin prick porosity <br> further up on the <br> forehead, possible <br> cranial modification <br> given the flatness of <br> the forehead, frontal <br> crest is practically |  |
| :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 33 | frontal fragment |
| VI | 2 | B | 34 | frontal fragment |


|  |  |  |  |  |  | premolar is present all others appear to be lost post mortem |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 37 | scapula fragment | right | adult, glenoid, part of the spine and coracoid, slight lipping on the glenoid is suggestive of arthritis | glenoid height 35.54 mm , width 26.5 mm |
| VI | 2 | B | 38 | thoracic vertebra |  | probable t 7-9, adult, covered in calcite |  |
| VI | 2 | B | 39 | scapula fragment | right | inferior medial border fragment, probably the same as 37 |  |
| VI | 2 | B | 40 | rib fragment | left | vertebral fragment, probably rib 8-10 |  |
| VI | 2 | B | 41 | rib fragment | right | vertebral fragment, probably rib 3-6 |  |
| VI | 2 | B | 42 | rib fragment | undetermined | shaft fragment, upper rib, possibly subadult |  |
| VI | 2 | B | 43 | rib fragment | undetermined | shaft fragment, upper rib, possibly subadult |  |
| VI | 2 | B | 44 | first rib | right |  |  |
| VI | 2 | B | 45 | first rib | right |  |  |
| VI | 2 | B | 46 | proximal manual phalanx fragment | undetermined | most of the phalanx, part of the proximal is broken | 47.52 mm |
| VI | 2 | B | 47 | proximal manual phalanx | undetermined | lateral ridges are well defined | 44.17 mm |


|  |  | proximal manual <br> phalanx fragment |  |  |  | undetermined | distal fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |


| VI | 2 | B | 67 | thoracic vertebra fragment |  | transverse processes are missing along with the spinous process |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 68 | thoracic vertebra fragment |  | lamina fragment with part of the right transverse process |
| VI | 2 | B | 69 | cervical vertebra fragment |  | lamina fragment |
| VI | 2 | B | 70 | rib fragment | left | adult, vertebral end fragment |
| VI | 2 | B | 71 | rib fragment | left | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 72 | rib fragment | right | adult, neck fragment, possibly second rib |
| VI | 2 | B | 73 | rib fragment | right | adult, vertebral end fragment |
| VI | 2 | B | 74 | rib fragment | left | adult, vertebral end fragment |
| VI | 2 | B | 75 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 76 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 77 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 78 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 79 | rib fragment | undetermined | adult, shaft fragment, rib 3-10 |
| VI | 2 | B | 80 | rib fragment | undetermined | adult, shaft fragment, |

> rib 3-10

| VI | 2 | B | 81 | rib fragment | possible right | adult, shaft fragment, rib 3-10 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 82 | mandible fragment | left | left ramus fragment, covered in calcite, third molar area was in the act of reabsorbing |  |
| VI | 2 | B | 83 | ygomatic and spheno fragment | right |  |  |
| VI | 2 | B | 84 | os coxa fragment | possible right | acetabular fossa <br> fragment, adult |  |
| VI | 2 | B | 85 | ischium fragment | possible left |  |  |
| VI | 2 | B | 86 | os coxa fragment | undetermined |  |  |
| VI | 2 | B | 87 | os coxa fragment | possible right | acetabular fossa fragment, possible adult |  |
| VI | 2 | B | 88 | talus | left |  | 41.19 mm length, 35.97 mm width |
| VI | 2 | B | 89 | ilium fragment | right | crest fragment with the anterior portion of the iliac tuberosity |  |
| VI | 2 | B | 90 | ilium fragment | undetermined | crest fragment |  |
| VI | 2 | B | 91 | mandible fragment |  | masculine looking chin |  |
| VI | 2 | B | 92 | scapula fragment | right | acromion only |  |
| VI | 2 | B | 93 | os coxa fragment | probable left | fragment with the arcuate lone and the margin of the preauricular surface |  |


| VI | 2 | B | 94 | tibia fragment | undetermined | shaft fragment | 31.56 anterior to posterior, 20.92 medial to lateral, 10.8 cm circumference |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 95 | humerus fragment | right | subadult, over 5 years of age, distal fragment, distal epiphysis is still not fused | $\begin{gathered} 33.23 \mathrm{~mm} \\ \text { epicondylar width } \\ \hline \end{gathered}$ |
| VI | 2 | B | 96 | scapula fragment | right | young child, spine fragment |  |
| VI | 2 | B | 97 | scapula fragment | left | adult, fragment of where the spine and glenoid come together, calcite on all surfaces |  |
| VI | 2 | B | 98 | vertebra fragment |  | body fragment, possibly a thoracic, possible Schmorl's node 5.7 mm in diameter |  |
| VI | 2 | B | 99 | vertebra fragment |  | body fragment, possibly a cervical |  |
| VI | 2 | B | 100 | vertebra fragment |  | body fragment, possibly a cervical |  |
| VI | 2 | B | 101 | first rib | left | subadult, calcite on superior surface |  |

upper rib, sternal fragment with sternal facet intact, unsure if it is rib four, but it is an upper rib. The pit is $U$ shaped, thick walls, with only mild scalloping, indicating

| VI | 2 | B | 102 | rib fragment | undetermined | age 24.1-27.7 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 103 | rib fragment | right | middle rib, adult, <br> neck fragment |
| VI | 2 | B | 104 | thoracic vertebra |  | adult, transverse <br> processes broken off |
| VI | 2 | B | 105 | thoracic vertebra |  | subadult, body is <br> unfused |
| VI | 2 | B | 106 | first metacarpal | left | adult |
| VI | 2 | B | 107 | scapula fragment | possible left | inferior angle <br> fragment |
| VI | 2 | B | 108 | first metacarpal | undetermined | subadult, unfused <br> proximal end |
| VI | 2 | B | 109 | ilium fragment | undetermined |  |
| VI | 2 | B | 110 | thoracic vertebra |  | transverse process |
| fragment |  |  | fragment with only <br> the lateral incisor <br> crypt to the first <br> premolar, adult |  |  |  |
| VI | 2 | B | 111 | maxilla fragment | right |  |
| VI | 2 | B | 112 | tibia fragment | left |  |
| VI | 2 | B | 113 | thoracic vertebra <br> fragment |  | lamina fragment |


| VI | 2 | B | 114 | tibia fragment | left | subadult, slight bowing indicative of rickets, calcium on the posterior surface, shaft fragment, over 5 years of age based on size | 19.08 mm anterior to posterior, 15.01 mm medial to lateral |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 115 | lumbar vertebra fragment |  | L2 or L3 |  |
| VI | 2 | B | 116 | thoracic vertebra fragment |  | body only |  |
| VI | 2 | B | 117 | thoracic vertebra fragment |  | subadult, unfused body |  |
| VI | 2 | B | 118 | cervical vertebrae |  | fused first and second cervical vertebrae, arthritic lipping on the inferior facet of the second |  |
| VI | 2 | B | 119 | lumbar vertebra fragment |  | probably L3 or 4, lamina fragment only |  |
| VI | 2 | B | 120 | femur fragment |  | head only, not enough to measure diameter |  |
| VI | 2 | B | 121 | rib fragment | undetermined | middle rib, shaft fragment, calcite |  |
| VI | 2 | B | 122 | rib fragment | undetermined | probably rib 8-10, shaft fragment, calcite |  |
| VI | 2 | B | 123 | rib fragment | undetermined | middle rib, shaft fragment, calcite |  |
| VI | 2 | B | 124 | rib fragment | undetermined | subadult, shaft fragment, calcite |  |


| VI | 2 | B | 125 | sacrum fragment | undetermined | adult, too small to <br> determine age or sex |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 126 | vertebra fragment |  | adult, probably <br> cervical, body <br> fragment only |
| VI | 2 | B | 127 | thoracic vertebra <br> fragment |  | subadult, unfused <br> pedicle |
| VI | 2 | B | 128 | cranial fragment | undetermined |  |
| VI | 2 | B | 129 | cranial fragment | undetermined |  |
| VI | 2 | B | 130 | fibula fragment | probable right | proximal shaft |
| fragment |  |  |  |  |  |  |


| VI | 2 | B | 142 | long bone fragment | undetermined | subadult based on the unfused epiphysis, too fragmentary to identify further |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 143 | humerus fragment | undetermined | subadult, possible cut marks, over 5 years of age |
| VI | 2 | B | 144 | radius fragment | left | adult, shaft fragment of the distal end, oblique line and crest present |
| VI | 2 | B | 145 | thoracic vertebra fragment |  | left lamina fragment |
| VI | 2 | B | 146 | 49 skull fragments | undetermined | various bones, cannot be sided due to size or lack of morphology |
| VI | 2 | B | 147 | tibia fragment | right | proximal fragment, adult, condyles only, covered in calcite |
| VI | 2 | B | 148 | 132 unidentified fragments | undetermined |  |
| VI | 2 | B | 149 | 60 skull fragments | undetermined | appears to be mostly adults, |
| VI | 2 | B | 150 | 40 unidentified fragments | undetermined |  |
| VI | 2 | B | 151 | tibia fragment | right | proximal shaft fragment, soleal line present |
| VI | 2 | B | 152 | humerus fragment | undetermined | subadult shaft fragment |


| VI | 2 | B | 153 | long bone fragment | undetermined | subadult, possible radius or ulna |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | B | 154 | sphenoid fragment | right | greater wing fragment |  |
| VI | 2 | B | 155 | 50 unidentified fragments |  |  |  |
| VI | 2 | B | 156 | rib fragment | right | vertebral end fragment, adult |  |
| VI | 2 | B | 157 | humerus fragment | left | distal fragment, with the medial border of the trochlea |  |
| VI | 2 | B | 158 | probable calcaneus fragment | undetermined |  |  |
| VI | 2 | B | 159 | cervical vertebra fragment |  | right lamina fragment with superior and inferior articular facets |  |
| VI | 2 | B | 160 | 10 unidentified fragments | undetermined |  |  |
| VI | 2 | C | 1 1 | 3 radius fragments | right | adult, fragment with tuberosity, shaft fragment, and distal fragment, calcite covering most surfaces |  |
| VI | 2 | C | 2 | first metatarsal | right | adult, fragment with tuberosity, shaft fragment, and distal fragment, calcite covering most surfaces, calcite on | 63.67 mm length |

## plantar surface

| VI | 2 | C | 3 | clavicle fragment | left | lateral fragment with part of the shaft gracile in size |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 2 | C | 4 | fourth metatarsal | right | adult, slight post mort damage to head | 65.07 mm length |
| VI | 2 | C | 5 | femur fragment | right | adult, proximal fragment, damage to head and trochlear area | 42.95 mm head diameter |
| VI | 2 | C | 6 | humerus fragment | right | adult, proximal fragment, calcite on posterior surface | 41.94 mm head diameter |
| VI | 2 | C | 7 | humerus fragments | undetermined | adult, badly deteriorated, could not label |  |
| VI | 2 | C | 8 | ulna fragment | right | proximal shaft fragment |  |
| VI | 2 | C | 9 | ischium fragment | probable left | adult, post mortem damage has squished the bone and altered the natural morphology |  |
| VI | 2 | C | 10 | 10+ unidentifiable fragments | undetermined | could not label due to size |  |

cut marks on the anterior surface of this distal fragment of an adult. Cut marks are roughly 1 cm in length. Some are not

| VI | 3 | D | 1 | radius fragment | left | cut marks |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | D | 2 | rib fragment | left | neck fragment, adult |  |
| VI | 3 | D | 3 | rib fragment | right | neck fragment, adult |  |
| VI | 3 | D | 4 | rib fragment | right | neck fragment, adult |  |
| VI | 3 | D | 5 | rib fragment | undetermined | shaft fragment |  |
| VI | 3 | D | 6 | rib fragment | undetermined | shaft fragment |  |
| VI | 3 | D | 7 | femur fragment | left | proximal fragment of an adult with head and trochlear region, bad condition, numerous cut marks on the lateral surface | 42.13 mm head diameter |
| VI | 3 | D | 8 | rib fragment | right | adult rib 3-10, vertebral end |  |
| VI | 3 | D | 9 | rib fragment | right | adult rib 3-10, vertebral end |  |
| VI | 3 | D | 10 | first rib fragment | left | neck fragment, adult |  |
| VI | 3 | D | 11 | rib fragment | right | most of the rib, missing part of the sternal end, most likely 3rd |  |
| VI | 3 | D | 12 | radius fragment | probable left | proximal fragment with part of the tuberosity, adult |  |

adult, badly
deteriorated, possible

| VI | 3 | D | 13 | 10+ humerus fragments | undetermined | deteriorated, possible <br> cut marks |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | D | 14 | rib fragment | right | neck and shaft <br> fragment, probably <br> rib 4-6 |
| VI | 3 | D | 15 | femur fragment | left | distal fragment of an <br> adult with only the <br> condyles |
| VI | 3 | D | 16 | cervical vertebra <br> fragment |  | adult body fragment |


| VI | 3 | E | 3 | humerus fragment | right | adult, head fragment | 44.44 mm head diameter |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | E | 4 | patella | left | adult | 43.09 mm height, 44.66 mm width |
| VI | 3 | E | 5 | clavicle fragment | right | adult, lateral fragment, large |  |
| VI | 3 | E | 6 | ulna fragments | right | adult, three fragments, distal and shaft fragments | 17.94 mm anterior to posterior, 12.85 lateral to medial |
| VI | 3 | E | 7 | humerus fragment | left | adult, distal fragment, narrow trochlear notch, spool shaped, trochlea projects out, triangular shaped fossa |  |
| VI | 3 | E | 8 | femur fragment | left | adult, proximal fragment with head, neck and trochanteric crest, calcite and mud coating the posterior surface | 43.06 mm head diameter |
| VI | 3 | E | 9 | femur fragment | right | shaft and distal fragment, broke in transit, lots of calcite on all surfaces |  |
| VI | 3 | E | 10 | femur fragment | left | juvenile, shaft and head fragment, femur head and trochlea crest are fused, so at | 33.75 mm head diameter |


|  |  |  |  |  |  | least 15 years of age, gracile |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | E | 11 | first meta tarsal | left | adult | 62.22 mm length |
| VI | 3 | E | 12 | first meta tarsal | left | adult | 63.93 mm length |
| VI | 3 | E | 13 | first meta tarsal | right | adult, badly deteriorated | 55.74 mm length |
| VI | 3 | E | 14 | humerus fragment | right | shaft fragment of an adult, well developed deltoid tubercle | $\begin{aligned} & \text { available length } \\ & 22 \mathrm{~cm} \\ & \hline \end{aligned}$ |
| VI | 3 | E | 15 | femur fragment | undetermined | adult shaft fragment | $\sim 15 \mathrm{~cm}$ length |
| VI | 3 | E | 16 | clavicle | left | adult, complete, calcite more on the inferior surface, large in size, probably male, lateral surface is spongy in appearance, possible arthritis | 16.5 cm length |
| VI | 3 | E | 17 | humerus fragment | left | adult, but gracile, triangular shaped fossa, wide trochlea angle, level, covered in calcite | 18.88 mm ant to post diameter, 16.86 mm med to lateral |
| VI | 3 | E | 18 | talus | right | adult, slight reddish discoloration | 56.87 mm length, 52.44 mm width |
| VI | 3 | E | 19 | cervical vertebra |  | adult, probably one of the lower cervical, lamina broke in transit |  |


| VI | 3 | E | 20 | fibula fragments | right | adult, distal end and part of the shaft fragment, red discoloration |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | E | 21 | humerus fragment | left | adult shaft fragment, large deltoid tuberosity |  |
| VI | 3 | E | 22 | proximal pedal phalanx | undetermined | adult | 30.82 mm length |
| VI | 3 | E | 23 | proximal manual phalanx | undetermined | adult | 34.13 mm length |
| VI | 3 | E | 24 | fourth metacarpal | right | adult | 58.13 mm length |
| VI | 3 | E | 25 | probable third metatarsal | left | adult, if not it is the second right | 69.50 mm length |
| VI | 3 | E | 26 | third metacarpal | right | adult | 68.19 mm length |
| VI | 3 | E | 27 | proximal pedal phalanx | undetermined | adult, slight damage to proximal edge | 27.71 mm length |
| VI | 3 | E | 28 | first proximal pedal phalanx $\qquad$ | undetermined | adult | 33.04 mm length |
| VI | 3 | E | 29 | proximal manual phalanx | undetermined | adult, defined lateral ridges on the palmar surface | 42.48 mm length |
| VI | 3 | E | 30 | second metacarpal | right | adult | 70.44 mm length |
| VI | 3 | E | 31 | proximal pedal phalanx | undetermined | adult | 25.47 mm length |
| VI | 3 | E | 32 | 5 unidentifiable cranial fragments | undetermined |  |  |
| VI | 3 | E | 33 | 30+ unidentifiable long bone fragments | undetermined |  |  |


| VI | 3 | E | 34 | premolar | right | probably right maxillary second premolar | 9.26 mm lingual to buccal, 7.04 mm lateral to medial |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | E | 35 | skull fragments and teeth | undetermined | most of the left side of the skull and two large parietal fragments. Pin prick porosity and internal defects suggests porotic hyperostosis. all teeth have erupted but only the second premolar, and first two upper left molars are present. Facets are well worn, blunt supraorbital margin, mastoid process looks more masculine, minimal supraorbital torus | premolar lingual to buccal9.13 mm , anterior to posterior. 10 mm , 1 m labial to lingual 11.56 mm anterior to posterior 9.84 $\mathrm{mm}, 2 \mathrm{~m}$ lingual to buccal <br> 11.03 mm anterior to posterior 9.80 mm |
| VI | 3 | E | 36 | 4 parietal fragments | undetermined | pin prick porosity, some red staining, slight internal defects |  |
| VI | 3 | E | 37 | frontal and nasal fragment |  | central fragment, red staining, large supraorbital torus |  |

$\left.\begin{array}{ccccccc} & & & & \begin{array}{c}\text { greater sciatic notch } \\ \text { partly available, but } \\ \text { not enough to }\end{array} \\ \text { VI } & 3 & \text { E } & & & & \begin{array}{c}\text { determine sex, part of } \\ \text { the lunate surface is }\end{array} \\ \text { visible }\end{array}\right]$

|  |  |  |  |  |  | shaft, rather gracile possible your adult or female |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | E | 46 | femur fragment | right | proximal fragment, adult, not gracile but not overly defined, lots of calcium carbonate on all surfaces | 43.75 mm head diameter |
| VI | 3 | E | 47 | femur fragment | right | adult distal portion, broke in transit, possible arthritis on the condlyes, sample taken for testing |  |
| VI | 3 | E | 48 | molar | left | first lower |  |
| VI | 3 | E | 49 | mandible fragment |  | left portion with three molars, canine and right central incisor |  |
| VI | 3 | E | 50 | mandible fragment |  | left portion with three molars |  |
| VI | 3 | F | 1 | tibia fragment | left | shaft fragment of a juvenile | available length $\sim 6 \mathrm{~cm}$ |
| VI | 3 | F | 2 | femur | right | juvenile, no epiphyses are fused, calcium carbonate and caked on mud is caked on the posterior surface, reddish discoloration | $\begin{gathered} 102.65 \mathrm{~mm} \\ \text { length } \\ \hline \end{gathered}$ |


| VI | 3 | F | 3 | frontal fragment | right | orbital fragment, probable adult male based on the rounded orbital margin, slight supraorbital torus, reddish discoloration |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | F | 4 | mandible fragments |  | deciduous incisors have not erupted, but there crown is fully formed, deciduous molar formation is started, estimated age 6 month +/-3 months |  |
| VI | 3 | F | 5 | 6 sphenoid fragments |  | adult, mostly part of the body of the sphenoid with some of nearby foramen, one fragment has part of the volmer attached |  |
| VI | 3 | G | 1 | proximal manual phalanx | undetermined | adult | 40.65 mm |
| VI | 3 | G | 2 | fourth metatarsal fragment | left | shaft and proximal fragment |  |
| VI | 3 | G | 3 | metacarpal fragment | undetermined | probably second or third |  |
| VI | 3 | G | 4 | 3 fibula fragments | possible right | adult, shaft fragments, covered in calcite |  |


| VI | 3 | G | 5 | humerus fragment | right | distal portion of shaft and upper margin of the lateral epicondyle, adult, calcite on all surfaces |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | G | 6 | talus | left | adult, reddish staining, small | 48.42 mm length, <br> 41.35 mm width |
| VI | 3 | G | 7 | metatarsal fragment | undetermined | possibly second or third, adult, shaft and distal fragment |  |
| VI | 3 | G | 8 | humerus fragment | right | distal adult fragment, gracile, medial epicondyle is angled, triangular shaped fossa, calcite thick on posterior surface |  |
| VI | 3 | G | 9 | proximal manual phalanx | undetermined | adult | 45.85 mm |
| VI | 3 | G | 10 | third metacarpal | left | adult, distal end is badly deteriorated | 63.33 mm |
| VI | 3 | G | 11 | femur fragments | undetermined | adult, possibly part of the head and numerous shaft fragments, cut marks |  |
| VI | 3 | G | 12 | fifth metatarsal fragment | right | adult, proximal and shaft fragment |  |
| VI | 3 | G | 13 | first proximal palmar $\qquad$ phalanx | undetermined |  | 31.64 mm |
| VI | 3 | G | 14 | proximal palmar phalanx | undetermined | covered in calcite |  |


| VI | 3 | G | 15 | intermediate palmar $\qquad$ | undetermined |  | 20.16 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | G | 16 | intermediate palmar phalanx | undetermined |  | 28.92 mm |
| VI | 3 | G | 17 | proximal pedal phalanx | undetermined | covered in calcite | 29.12 mm |
| VI | 3 | G | 18 | distal palmar phalanx | undetermined |  | 17.62 mm |
| VI | 3 | G | 19 | proximal pedal phalanx | undetermined | badly deteriorated at proximal end |  |
| VI | 3 | G | 20 | intermediate palmar phalanx | undetermined |  | 24.07 mm |
| VI | 3 | G | 21 | intermediate palmar phalanx | undetermined |  | 28.55 mm |
| VI | 3 | G | 22 | intermediate palmar phalanx | undetermined | calcite covering both sides | 30 mm |
| VI | 3 | G | 23 | first proximal palmar phalanx | undetermined | calcite mostly on the palmar side | 30.11 mm |
| VI | 3 | G | 24 | first proximal palmar phalanx | undetermined |  | 46.17 mm |
| VI | 3 | G | 25 | first proximal palmar phalanx | undetermined |  | 41.38 mm |
| VI | 3 | G | 26 | fifth metacarpal | right |  | 56.72 mm |
| VI | 3 | G | 27 | first proximal pedal phalanx | undetermined |  | 33.62 mm |
| VI | 3 | G | 28 | tibia fragment | right | distal fragment of an adult, only roughly 7 cm in length |  |


| VI | 3 | G | 29 | first distal pedal phalanx | undetermined | adult, slight damage to distal end |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 3 | G | 30 | first distal manual phalanx | undetermined |  | 23.6 mm |
| VI | 3 | G | 31 | distal manual phalanx | undetermined |  | 15.97 mm |
| VI | 3 | G | 32 | navicular (foot) | probably right | adult, badly deteriorated |  |
| VI | 3 | G | 33 | cuboid | right | adult, badly deteriorated |  |
| VI | 3 | G | 34 | first cuneiform | left | adult, badly deteriorated |  |
| VI | 3 | G | 35 | second cuneiform | left | adult, badly deteriorated |  |
| VI | 3 | G | 36 | first meta tarsal | left | adult, badly deteriorated |  |
| VI | 3 | G | 37 | long bone fragment | undetermined | ??? |  |
| VI | 3 | G | 38 | metacarpal or metatarsal fragment | undetermined | head, badly deteriorated |  |
| VI | 3 | G | 39 | unidentified fragment | undetermined |  |  |
| VI | 4 |  | 1 | 2 rib fragments | left | adult rib, probably 510, broke in transit |  |
| VI | 4 |  | 2 | rib fragment | undetermined | adult shaft fragment |  |
| VI | 4 |  | 3 | rib fragment | undetermined | adult shaft fragment |  |
| VI | 4 |  | 4 | rib fragment | undetermined | adult shaft fragment |  |
| VI | 4 |  | 5 | rib fragment | undetermined | adult shaft fragment |  |
| VI | 4 |  | 6 | rib fragment | undetermined | adult shaft fragment |  |
| VI | 4 |  | 7 | rib fragment | undetermined | adult shaft fragment |  |
| VI | 4 |  | 8 | rib fragment | undetermined | adult shaft fragment |  |

rim of the lunate surface that is visible is irregular with remodeling, no macroporosity present, adult but
$\left.\left.\begin{array}{cccccc}\text { VI } & 4 & 9 & \text { ischium fragment } & \text { probable right } & \text { small in size } \\ \hline \text { VI } & 4 & 10 & \begin{array}{c}\text { cervical vertebra } \\ \text { fragment }\end{array} & & \text { body } \\ \hline \text { VI } & 4 & 11 & \text { femur fragment } & \text { left } & \begin{array}{c}\text { fragment of the } \\ \text { condyles, adult }\end{array} \\ \hline \text { VI } & 4 & & & & \begin{array}{c}\text { fragment of one of } \\ \text { the condyles, does not } \\ \text { cross mend with } \\ \text { number 11 }\end{array} \\ \hline \text { VI } & 4 & 12 & \text { femur fragment } & \text { unidentified } & \text { unidentified }\end{array} \begin{array}{c}\text { adult, badly } \\ \text { deteriorated }\end{array}\right] \begin{array}{c}\text { adult, cannot identify } \\ \text { further }\end{array}\right]$
$\left.\begin{array}{cccccc}\text { VI } & 4 & 19 & \text { rib fragment } & \text { left } & \begin{array}{c}\text { adult, neck fragment, } \\ \text { mid rib }\end{array} \\ \hline \text { VI } & 4 & 20 & \text { rib fragment } & \text { undetermined } & \begin{array}{c}\text { adult, shaft fragment, } \\ \text { mid rib }\end{array} \\ \hline \text { VI } & 4 & 21 & \text { rib fragment } & \text { right } & \begin{array}{c}\text { adult, neck fragment, } \\ \text { mid rib }\end{array} \\ \hline \text { VI } & 4 & 22 & \text { rib fragment } & \text { undetermined } & \begin{array}{c}\text { adult, shaft fragment, } \\ \text { mid rib }\end{array} \\ \hline \text { VI } & 4 & 23 & \text { rib fragment } & & \text { adult, neck fragment, } \\ \text { mid rib }\end{array}\right]$
some of the articular
facets

| VI | 4 | 33 | humerus fragments | left | adult, shaft fragments, cracking |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 4 | 34 | cranial fragments | undetermined | adult, 40 + fragments |  |
| VI | 4 | 35 | long bone fragments | undetermined | adult, 16 large long bone fragments |  |
| VI | 4 | 36 | sternal fragment |  | superior portion of the sternum |  |
| VI | 4 | 37 | ilium fragment | undetermined | blade fragment |  |
| VI | 4 | 38 | unidentifiable fragments | undetermined | 85+ |  |
| VI | 6 | 1 | canine | right | probable right upper canine with IK modification |  |
| VI | 8 | 1 | radius fragment | right | proximal fragment, head with most of the shaft | 21.71 head diameter, 13.6 medial to lateral, 10.92 anterior to posterior |
| VI | 8 | 2 | ulna fragment | right | proximal fragment | 13.80 mm lateral to medial, 12.63 mm anterior to superior |
| VI | 8 | 3 | rib fragment | right | vertebral end fragment, middle rib |  |
| VI | 8 | 4 | rib fragment | left | shaft fragment |  |
| VI | 8 | 5 | rib fragment | left | shaft fragment, possibly rib 10 |  |

$\left.\begin{array}{ccccccc}\text { VI } & 8 & 6 & \text { rib fragment } & \text { possible left } & \text { shaft fragment } & \\ \hline \text { VI } & 8 & 7 & \text { rib fragment } & \text { right } & \text { vertebral end } \\ \text { fragment }\end{array}\right]$

| VI | 8 | 24 | capitate | right |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 8 | 25 | trapezium | right |  |
| VI | 8 | 26 | trapezoid | right |  |
| VI | 8 | 27 | vertebra fragment |  | body only, probably a cervical vertebra |
| VI | 8 | 28 | rib fragment | undetermined | shaft fragment |
| VI | 8 | 29 | faunal | undetermined | shaft fragment, seems distorted morphologically |
| VI | 8 | 30 | faunal | undetermined |  |
| VI | 8 | 31 | rib fragment | undetermined | rib 1 or 2 shaft fragment |
| VI | 8 | 32 | shaft fragment | undetermined | subadult, unfused epiphysis on one end |
| VI | 8 | 33 | tibia fragment | probable right | shaft fragment, most of the length but a horrible fragment |
| VI | 8 | 34 | thoracic vertebra fragment |  | body fragment, T 310 |
| VI | 8 | 35 | femur fragment | undetermined | condyle fragment |
| VI | 8 | 36 | vertebra fragment |  | probably thoracic based on size and shape of the body |
| VI | 8 | 37 | fifth metatarsal fragment | right | proximal and shaft fragment |
| VI | 8 | 38 | second metatarsal fragment | right | proximal and shaft fragment |
| VI | 8 | 39 | tarsal fragment | undetermined |  |
| VI | 8 | 40 | tarsal fragment | undetermined |  |


| VI | 8 |  | 41 | distal manual phalanx | undetermined |  | 16.03 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 8 |  | 42 | rib fragment | undetermined | shaft fragment |  |
| VI | 8 |  | 43 | clavicle fragment | undetermined | shaft fragment |  |
| VI | 8 |  | 44 | ulna fragment | undetermined | shaft fragment |  |
| VI | 8 |  | 45 | possible clavicle fragment | undetermined | shaft fragment |  |
| VI | 8 |  | 46 | 60+ unidentified fragments | undetermined |  |  |
| VI | 9 |  | 1 | mandible fragment |  |  |  |
| VI | 9 |  | 2 | mandible fragment |  |  |  |
| VI | 9 |  | 3 | os coxa fragment | undetermined |  |  |
| VI | 9 |  | 4 | os coxa fragment | undetermined |  |  |
| VI | 9 |  | 5 | os coxa fragment | undetermined |  |  |
| VI | 9 |  | 6 | os coxa fragment | undetermined |  |  |
| VI | 9 |  | 7 | os coxa fragment | undetermined |  |  |
| VI | 9 |  | 8 | os coxa fragment | undetermined |  |  |
| VI | 9 |  | 9 | os coxa fragment | undetermined |  |  |
| VI | 9 |  | 10 | cranial fragments | undetermined |  |  |
| VI | 11 | C | 1 | rib | right | almost complete, calcite and mud |  |
| VI | 11 | C | 2 | thoracic vertebra |  | almost complete, calcite and mud, probably T3-6 |  |
| VI | 11 | C | 3 | radius fragment | left | proximal fragment | 20.63 mm head diameter |
| VI | 11 | C | 4 | 3 unidentified fragments | undetermined | shaft fragments |  |


| VI | 12 | 1 | ilium fragment | right | phase 1 for auricular surface, age 20-24, no transverse organization, billows |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VI | 12 | 2 | rib fragment | right | vertebral end fragment |  |
| VI | 12 | 3 | rib fragment | right | vertebral end fragment |  |
| VI | 12 | 4 | clavicle fragment | undetermined | shaft fragment |  |
| VI | 12 | 5 | rib fragment | undetermined | shaft fragment |  |
| VI | 12 | 6 | os coxa fragment | probable left | acetabular fossa <br> fragment, small |  |
| VI | 12 | 7 | first metatarsal | right | calcite and carbon, much like everything else in this deposit | 58.6 mm |
| VI | 12 | 8 | intermediate manual phalanx | undetermined |  | 21.76 mm |
| VI | 12 | 9 | vertebra fragment |  | probable thoracic vertebra fragment with an articular facet |  |
| VI | 12 | 10 | 3 os coxa fragment | undetermined | greater sciatic notch fragment is not large enough to determine sex |  |
| VI | 12 | 11 | humerus fragment | undetermined | head fragment only |  |
| VI | 12 | 12 | rib fragment | undetermined | sternal end fragment | the phase appears to be a phase 2 , age 20.8-23.1 |


| VI | 12 | 13 | 28 unidentified fragments | undetermined |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 1 | femur fragment | left | head and neck of an adult, head badly damaged - prevents measurement, appears gracile |  |
| VII | 1 | 2 | mandible fragment |  | arc fragment extends from second left molar socket to first right molar. Only tooth present is left lower first molar. <br> Pinched chin suggests male. Set aside for sampling. | 10.57 mm lingual to labial, 10.93 anterior to posterior, 6 cusps, wear is mild |
| VII | 1 | 3 | proximal manual phalanx |  | carbon covered | 37.97 mm |
| VII | 1 | 4 | proximal manual phalanx |  | pronounced ridges on the lateral margins, carbon covered | 40.86 mm |
| VII | 1 | 5 | second metatarsal | left | adult, carbon covered |  |
| VII | 1 | 6 | rib fragment | right | adult, carbon covered, vertebral end fragment |  |
| VII | 1 | 7 | rib fragment | left | adult, carbon covered, vertebral end fragment |  |
| VII | 1 | 8 | rib fragment | undetermined | shaft, adult |  |
| VII | 1 | 9 | rib fragment | undetermined | shaft, adult |  |

vertebral end, neck,
and most of the shaft,

| VII | 1 | 10 | rib fragment | left | carbon covered |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 11 | rib fragment | undetermined | shaft adult fragment, carbon covered |  |
| VII | 1 | 12 | rib fragment | undetermined | shaft adult fragment, carbon covered |  |
| VII | 1 | 13 | rib fragment | undetermined | shaft adult fragment, carbon covered |  |
| VII | 1 | 14 | rib fragment | undetermined | shaft adult fragment, carbon covered |  |
| VII | 1 | 15 | rib fragment | undetermined | shaft adult fragment, carbon covered |  |
| VII | 1 | 16 | parietal fragment | right | adult, appears healthy |  |
| VII | 1 | 17 | humerus fragment | undetermined | adult, shaft fragment, covered in carbon |  |
| VII | 1 | 18 | second metacarpal | right | adult, covered in carbon | 63.99 mm |
| VII | 1 | 19 | second metacarpal | left | adult, covered in carbon | 66.3 mm |
| VII | 1 | 20 | fifth metatarsal | left | adult, covered in carbon | 65.76 mm |
| VII | 1 | 21 | humerus | left | adult, complete, trochlea is spool like with a wide angle, medial epicondyle is level, fossa is triangular | 44.81 mm head diameter, 32 cm in length |


| VII | 1 | 22 | sternal fragment |  | covered with carbon, possible subadult, three sternal facets present on the fragment |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 23 | first proximal manual phalanx fragment | undetermined | distal fragment, covered in carbon |
| VII | 1 | 24 | ulna fragment | right | distal fragment, covered in carbon |
| VII | 1 | 25 | vertebra fragment |  | unfused body of a cervical or thoracic belonging to a subadult |
| VII | 1 | 26 | vertebra fragment |  | unfused pedicle of a cervical or thoracic vertebra with superior articular facet |
| VII | 1 | 27 | metacarpal fragment | undetermined | shaft and upper distal portion of an adult metacarpal |
| VII | 1 | 28 | 2 tibia fragments | undetermined | broke in transit, two shaft fragments, one had part of the medial malleolus, adult, covered in carbon |
| VII | 1 | 29 | femur fragment | undetermined | adult, condyle fragment, covered in carbon |
| VII | 1 | 30 | rib fragment | undetermined | vertebral end of rib 3- $10$ |


| VII | 1 | 31 | rib fragment | undetermined | adult, shaft fragment, covered in carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 32 | rib fragment | undetermined | adult, shaft fragment, covered in carbon |  |
| VII | 1 | 33 | vertebra fragment |  | body fragment, too fragmentary to identify further |  |
| VII | 1 | 34 | vertebra fragment |  | body fragment, too fragmentary to identify further |  |
| VII | 1 | 35 | 27 humerus fragments |  |  |  |
| VII | 1 | 36 | 124 unidentified fragments |  | mostly long bone fragments |  |
| VII | 1 | 37 | proximal manual phalanx |  | adult, very defined lateral margins | 42.54 mm |
| VII | 1 | 38 | fifth metatarsal | right | adult, covered with some carbon, eburnation on the proximal facet |  |
| VII | 1 | 39 | fourth metatarsal | left | adult, covered with carbon | 70.34 mm |
| VII | 1 | 40 | fifth metacarpal | right | adult, defined muscle attachments on palmar surface | 51.70 mm |
| VII | 1 | 41 | humerus fragment | right | probable subadult, proximal head fragment only, possibly belonging to the same humerus | 36.34 mm head diameter |

shaft fragments for number 42

| VII | 1 | 42 | humerus fragments |  | shaft fragments of a subadult | $\begin{aligned} & 16.21 \mathrm{~mm} \text { ant to } \\ & \text { post, } 15.67 \mathrm{~mm} \\ & \text { lateral to medial } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 43 | cervical vertebra |  | adult, probably c 3-6, superior articular facets have lipping and indicate arthritis (especially the left one), similarly on the inferior right facet, lipping on the body as well |  |
| VII | 1 | 44 | lumbar vertebra |  | probably L 1, damage to the right lamina, lightly covered in carbon, lipping on the superior margin of the body with small spondylophyte formation, pinching of the body in the anterior margin |  |
| VII | 1 | 45 | first metacarpal | left | adult, light carbon covering | 45.53 mm |
| VII | 1 | 46 | third metacarpal | right | adult, light carbon covering, defined muscle attachments | 58.25 mm |


| VII | 1 | 47 | proximal pedal phalanx |  | adult, light carbon covering | 26.3 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 48 | proximal pedal phalanx |  | adult, light carbon covering, slight eburnation on proximal facet. | 27.8 mm |
| VII | 1 | 49 | third metatarsal fragment |  | , proximal and shaft fragment |  |
| VII | 1 | 50 | talus | right | damaged and covered in carbon, possible subadult due to size |  |
| VII | 1 | 51 | clavicle | right | adult | 14.97 cm length, superior to inferior 8.80 mm , 12.08 mm anterior to posterior |
| VII | 1 | 52 | scapula fragments | right | adult, two fragments of the spine and acromion |  |
| VII | 1 | 53 | clavicle fragment | probable left | healed shaft fracture, damage to the medial and lateral sides, no active healing, indicating it occurred long before death |  |
| VII | 1 | 54 | first metatarsal fragment | probable right | distal fragment, covered in carbon |  |


| VII | 1 | 55 | mandible fragment | right | right ramus fragment, covered with some carbon, taphonomic damage has changed morphology, probably an older individual due to an absence and reabsorption of the second and third molars |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 56 | mandible fragment | left | fragment of the arc, no teeth, reabsorption apparent, taphonomic damage to the morphology of the fragment |  |
| VII | 1 | 57 | first metacarpal | right | adult, possible button osteoma | 44.48 mm |
| VII | 1 | 58 | first metatarsal | right | adult, slight damage to proximal end | 54.47 mm |
| VII | 1 | 59 | scapula fragment | left | adult, fragment of the glenoid | $\begin{gathered} \text { height } 32.08 \text {, } \\ 22.59 \mathrm{~mm} \text { width } \end{gathered}$ |
| VII | 1 | 60 | rib fragment | undetermined | adult, shaft fragment |  |
| VII | 1 | 61 | rib fragment | undetermined | adult, shaft fragment |  |
| VII | 1 | 62 | rib fragment | left | second rib, most of the rib, adult |  |
| VII | 1 | 63 | rib fragment | right | vertebral fragment |  |



|  |  |  |  |  | covered with carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 70 | rib fragment | undetermined | shaft fragment, adult, covered with carbon |  |
| VII | 1 | 71 | rib fragment | right | vertebral fragment, adult, covered with carbon, slightly deformed possibly |  |
| VII | 1 | 72 | rib fragment | right | vertebral fragment, adult, covered with carbon |  |
| VII | 1 | 73 | rib fragment | right | vertebral fragment, adult, covered with carbon |  |
| VII | 1 | 74 | rib fragment | left | first rib |  |
| VII | 1 | 75 | radius fragment | left | adult, shaft fragment, covered in carbon | 15.25 mm medial to lateral, 10.66 mm anterior to posterior |
| VII | 1 | 76 | second metacarpal fragment | right | adult, proximal fragment, covered with carbon, well defined muscle attachment |  |
| VII | 1 | 77 | scapula fragment | undetermined | medial border fragment from an adult, covered in carbon |  |
| VII | 1 | 78 | radius fragment | left | distal fragment, covered in carbon, adult, button osteoma |  |


|  |  |  |  |  | present on the medial surface |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 79 | rib fragment | undetermined | shaft fragment, upper rib, covered in carbon |  |
| VII | 1 | 80 | rib fragment | right | vertebral end fragment, adult, covered in carbon, rib 3-6 probably |  |
| VII | 1 | 81 | rib fragment | undetermined | shaft fragment, upper rib, covered in carbon |  |
| VII | 1 | 82 | rib fragment | right | neck fragment, adult, covered in carbon, rib 3-6 probably |  |
| VII | 1 | 83 | rib fragment | undetermined | shaft fragment, upper rib, covered in carbon |  |
| VII | 1 | 84 | lumbar vertebra fragment |  | body with left transverse process and superior articular facet, adult, covered in carbon, lipping, spondylophytes forming on the superior margin of the body |  |
| VII | 1 | 85 | first metacarpal | right | adult, covered in carbon | 42.44 mm |
| VII | 1 | 86 | proximal manual phalanx |  | adult, covered in carbon, lateral margins are well | 42.05 mm |

defined

| VII | 1 | 87 | proximal pedal phalanx |  | adult, covered in carbon | 22.30 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 88 | first proximal pedal phalanx |  | adult, covered in carbon, bone remodeling on the distal end of the foot |  |
| VII | 1 | 89 | proximal manual phalanx fragment |  | adult, covered in carbon, proximal fragment |  |
| VII | 1 | 90 | cervical vertebra fragment |  | second cervical vertebra, most of the left side is present, adult, covered in carbon, inferior articular facet is arthritic |  |
| VII | 1 | 91 | vertebra fragment |  | probably lumbar fragment, adult, covered in carbon, body fragment with part of a transverse process |  |
| VII | 1 | 92 | metacarpal fragment |  | adult, covered in carbon, shaft and head fragment |  |
| VII | 1 | 93 | first metatarsal fragments | left | head and proximal fragment, adult, covered in carbon, do |  |

not cross mend

| VII | 1 | 94 | ulna fragment | undetermined | shaft fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 95 | thoracic vertebra fragment |  | body fragment, adult, slight lipping, taphonomic damage, covered in carbon, probably T2-8 based on size |  |
| VII | 1 | 96 | talus | left | badly detonated, small, adult, covered in carbon |  |
| VII | 1 | 97 | vertebra fragment |  | probably a thoracic transverse process fragment, adult, covered in carbon |  |
| VII | 1 | 98 | vertebra fragment |  | adult, body fragment, covered in carbon, slight lipping |  |
| VII | 1 | 99 | first proximal pedal phalanx |  | adult, covered in carbon | 33.81 mm |
| VII | 1 | 100 | rib fragment | undetermined | adult, covered in carbon, vertebral end fragment |  |
| VII | 1 | 101 | vertebra fragment |  | adult, covered in carbon, spinous process |  |
| VII | 1 | 102 | first metatarsal fragment | left | adult, covered in carbon |  |


| VII | 1 | 103 | first proximal pedal phalanx fragment |  | adult, covered in carbon |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 104 | rib fragment | undetermined | shaft fragment, adult, covered in carbon |
| VII | 1 | 105 | proximal manual phalanx fragment |  | adult, lateral ridges slightly developed, covered in carbon |
| VII | 1 | 106 | rib fragment | left | adult, vertebral fragment, covered in carbon |
| VII | 1 | 107 | femur fragment | undetermined | condyle fragment |
| VII | 1 | 108 | ischium fragment | undetermined | adult, covered with carbon |
| VII | 1 | 109 | rib fragment | undetermined | adult, shaft fragment, covered in carbon |
| VII | 1 | 110 | clavicle fragment | left | shaft fragment, gracile, covered in carbon |
| VII | 1 | 111 | vertebra fragment |  | probable cervical fragment with articular facet, covered in carbon |
| VII | 1 | 112 | 12 unidentified fragments |  |  |
| VII | 1 | 113 | cervical vertebra |  | probably C2-5, major arthritis on inferior margin of the body and the inferior articular facets |
| VII | 1 | 114 | cervical vertebra |  | probably C4-6 |


| VII | 1 | 115 | thoracic vertebra fragment |  | transverse processes are broken, abnormal growth on the anterior portion of the body that runs superior to inferior, no more than a cm in width |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 116 | thoracic vertebra fragment |  | body only, abnormal growth on the anterior portion of the body that runs superior to inferior, no more than a cm in width |  |
| VII | 1 | 117 | thoracic vertebra |  | probably the 10th |  |
| VII | 1 | 118 | thoracic vertebra |  | probably the 11th, some spondylophyte formation and anterior margin of the body is slightly pinched |  |
| VII | 1 | 119 | lumbar vertebra |  | fourth lumbar, spondylophytes on the superior margin |  |
| VII | 1 | 120 | radius fragment | right |  |  |
| VII | 1 | 121 | rib fragment | right | sternal end, subadult |  |
| VII | 1 | 122 | thoracic vertebra fragment |  | body fragment with one superior articular facet |  |
| VII | 1 | 123 | proximal manual phalanx |  |  | 40.69 mm |



| VII | 1 | 138 | rib fragment | left | neck fragment, some calcite, lower rib |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 139 | thoracic vertebra fragment |  | lamina and spine fragment of a mid thoracic, adult, slight calcite |
| VII | 1 | 140 | cervical vertebra |  | adult, complete, mid to lower cervical |
| VII | 1 | 141 | ulna fragment |  | adult, distal fragment, dorsal tubercle is highly defined |
| VII | 1 | 142 | rib fragment | left | adult, sternal end, calcite, mid rib |
| VII | 1 | 143 | rib fragment | right | adult, sternal end, calcite, lower rib |
| VII | 1 | 144 | humerus fragment | left | adult, distal fragment of the shaft right above the medial epicondyle and fossa, calcite |
| VII | 1 | 145 | calcaneus | right | posterior portion, adult, calcite and carbon |
| VII | 1 | 146 | thoracic vertebra |  | adult, mostly complete, some damage to the lamina and spine on the left side, calcite, mid thoracic |


| VII | 1 |  | 147 | thoracic vertebra |  | adult, T12 probably due to full costal facet position, damage to the lamina, body is slightly pinched on the anterior margin, syndesmophytes mostly on the inferior anterior margin |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 |  | 148 | calcaneus fragment | right | adult, fragment of the superior facets |  |
| VII | 2 | a | 1 | radius fragment | unidentifiable | adult shaft fragment |  |
| VII | 2 | a | 2 | proximal pedal phalanx |  | adult shaft fragment | 22.21 mm |
| VII | 2 | a | 3 | probable second metatarsal | right | adult, covered in calcite | 67.27 mm |
| VII | 2 | a | 4 | fifth metatarsal | undetermined | adult, covered with calcite, and bone fragments are fused together with calcite at the distal portion, thus preventing siding |  |
| VII | 2 | a | 5 | 6 shaft fragments |  |  |  |
| VII | 2 | a | 6 | 19 unidentified fragments |  |  |  |
| VII | 1 |  | 1 | long bone fragment |  | Duplicate number |  |
| VII | 1 |  | 2 | long bone fragment |  | Duplicate number |  |
| VII | 1 |  | 3 | cranial fragment |  | Duplicate number |  |
| VII | 1 |  | 4 | cranial fragment |  | Duplicate number |  |


| VII | 1 | 5 | proximal pedal phalanx | undetermined | Duplicate number, adult, calcite and carbon | 22.81 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 6 | proximal manual phalanx | undetermined | Duplicate number, adult, calcite, defined lateral margins | 33.96 mm |
| VII | 1 | 7 | proximal manual phalanx | undetermined | Duplicate number, adult, first digit, calcite and carbon | 33.87 mm |
| VII | 1 | 8 | intermediate manual phalanx | undetermined | Duplicate number, adult, calcite and carbon, defined lateral ridges | 25.94 mm |
| VII | 1 | 9 | proximal manual phalanx |  | Duplicate number, adult, lateral margins are pronounced | 42.31 mm |
| VII | 1 | 10 | proximal manual phalanx |  | Duplicate number, adult, lateral margins are pronounced, small bone spurs on the distal lateral margins, probably the first digit | 32.26 mm |
| VII | 1 | 11 | proximal manual phalanx |  | Duplicate number, adult, lateral margins are pronounced | 41.77 mm |
| VII | 1 | 12 | greater multangular | left | Duplicate number, adult, calcite and carbon |  |


| VII | 1 | 13 | intermediate manual phalanx | undetermined | Duplicate number, adult, lateral margins are pronounced | 29.94 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 14 | intermediate manual phalanx | undetermined | Duplicate number, adult, lateral margins are pronounced | 21.63 mm |
| VII | 1 | 15 | manual phalanx fragment | undetermined | Duplicate number, adult, distal fragment of a proximal or intermediate phalanx |  |
| VII |  | 16 | first metatarsal fragment | left | Duplicate number, adult, proximal fragment, additional bone growth and porosity on the proximal facet, possibly arthritis or early stage gout |  |
| VII | 1 | 17 | fifth metatarsal | left | Duplicate number, adult, not the same person as 18 , calcite and carbon | 58.69 mm |
| VII | 1 | 18 | fifth metatarsal | right | Duplicate number, adult, not the same person as 17, calcite and carbon | 66.62 mm |
| VII | 1 | 19 | second metacarpal | left | Duplicate number, adult, calcite, possible gout or arthritis on the proximal facet | 65.78 mm |


| VII | 1 | 20 | first metatarsal | right | Duplicate number, adult, smaller than 16 , so probably not the same person | 58.34 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 21 | second metacarpal fragment | left | Duplicate number, adult, proximal and shaft fragment, head missing, some damage to the proximal facets |  |
| VII | 1 | 22 | fourth metatarsal fragment | left | Duplicate number, adult, proximal fragment, some porosity on the proximal facet |  |
| VII | 1 | 23 | fifth metacarpal | right | Duplicate number, adult, calcite and carbon, bone spurs on the posterior proximal surface | 51.67 mm |
| VII | 1 | 24 | fifth metatarsal | right | Duplicate number, adult, probably the mate to 17 , calcite and carbon | 60.43 mm |
| VII | 1 | 25 | third metatarsal | left | adult, calcite and carbon | 66.13 mm |
| VII | 1 | 26 | thoracic vertebra fragment |  | Duplicate number, adult, body fragment, mid thoracic region, body margins is not lipping but is |  |

becoming irregular due to compression

| VII | 1 | 27 | thoracic vertebra |  | Duplicate number, adult, slight damage to the left inferior articular facet, probably T12, due to the position of the full costal facet, some macroporosity of the body |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 28 | rib fragment | right | Duplicate number, vertebral end, adult, mid rib |
| VII | 1 | 29 | rib fragment | left | Duplicate number, sternal end, adult, calcite and carbon, mid rib |
| VII | 1 | 30 | rib fragment | right | Duplicate number, vertebral end, adult, mid rib |
| VII | 1 | 31 | rib fragment | undetermined | Duplicate number, sternal end, adult, calcite and carbon, mid rib, appears young due to smooth margins |


| VII | 1 | 32 | rib fragment | undetermined | Duplicate number, shaft fragment, lower rib, some irregular growth on the surface of the bone, no porosity, adult, |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 33 | rib fragment | undetermined | Duplicate number, sternal fragment, adult, calcite and carbon, irregular margins and thickening on the interior surface is suggestive of a healed break, mid rib |
| VII | 1 | 34 | rib fragment | undetermined | Duplicate number, sternal end, mid rib, adult, calcite and carbon |
| VII | 1 | 35 | rib fragment | left | Duplicate number, neck fragment, lower/mid rib, carbon and calcite, adult |
| VII | 1 | 36 | cervical vertebra |  | Duplicate number, damage to the transverse processes, major arthritis, pinching of the body, lipping and syndesmophytes, adult, calcite and |

carbon, lower cervical

| VII | 1 | 37 | cervical vertebra | Duplicate number, upper cervical, damage to the spine and left transverse process, slight lipping on the inferior margin of the anterior portion of the body |
| :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 38 | thoracic vertebra fragment | Duplicate number, body fragment, adult, mid thoracic region, calcite and carbon |
| VII |  | 39 | thoracic vertebra fragment | Duplicate number, body fragment, adult, mid thoracic region, calcite and carbon, slight lipping on the inferior margin of the body |
| VII | 1 | 40 | lumbar vertebra fragment | Duplicate number, part of a body and the transverse process with an articular facet, adult, carbon and calcite |

Duplicate number, adult, upper thoracic, some visible porosity

| VII | 1 | thoracic vertebra | Duplicate number, <br> adult, mid thoracic, <br> right superior <br> articular facet is |  |
| :---: | :---: | :---: | :---: | :---: |
| VII | 1 |  |  | broken off, some <br> porosity in the body |
| VII | 1 | 42 | thoracic vertebra | Duplicate number, <br> adult, damage to the <br> transverse processes, <br> lipping on the body |
|  |  |  |  | thoracic vertebra |


| VII | 1 | 47 | vertebra fragment |  | Duplicate number, adult, probably a lumbar body fragment, anterior pinching and lipping, crushed body |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 48 | thoracic vertebra fragment |  | Duplicate number, adult, possibly T11, most of the body, some slight lipping |
| VII | 1 | 49 | rib fragment | right | Duplicate number, adult, first rib, vertebral end, almost complete, calcite and carbon |
| VII | 1 | 50 | rib fragment | right | Duplicate number, adult, vertebral end fragment, mid rib, calcite and carbon |
| VII | 1 | 51 | rib fragment | right | Duplicate number, adult, neck fragment, upper rib, calcite and carbon |
| VII | 1 | 52 | rib fragment | left | Duplicate number, adult, vertebral end fragment, possibly 12th rib, calcite and carbon |
| VII | 1 | 53 | rib fragment | undetermined | Duplicate number, adult, shaft fragment, mid to lower rib |

Duplicate number, adult, shaft fragment,

| VII | 1 | 54 | rib fragment | undetermined | mid to lower rib |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 55 | rib fragment | undetermined | Duplicate number, adult, shaft fragment, mid to lower rib |
| VII | 1 | 56 | rib fragment | undetermined | Duplicate number, adult, shaft fragment, mid to lower rib, calcite and carbon |
| VII | 1 | 57 | rib fragment | left | Duplicate number, adult, neck fragment, upper rib, calcite and carbon |
| VII | 1 | 58 | rib fragment | right | Duplicate number, adult, neck fragment, middle rib, calcite and carbon |
| VII | 1 | 59 | rib fragment | right | Duplicate number, adult, neck fragment, middle rib, calcite and carbon |
| VII | 1 | 60 | rib fragment | undetermined | Duplicate number, adult, shaft fragment, mid to lower rib |
| VII | 1 | 61 | rib fragment | undetermined | Duplicate number, adult, shaft fragment, mid to lower rib |
| VII | 1 | 62 | rib fragment | right | Duplicate number, adult, vertebral |

fragment, mid rib

| VII | 1 | rib fragment | right | Duplicate number, <br> adult, vertebral end, <br> possibly 12th rib |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 63 | rib fragment | left | Duplicate number, <br> adult, neck fragment, <br> upper rib, calcite and <br> carbon |
| VII | 1 | 64 | rib fragment | left | Duplicate number, <br> adult, vertebral end <br> fragment, mid rib, <br> calcite and carbon |
| VII | 1 | 65 | rib fragment |  | left |

damage to identify

| VII | 1 | 71 | clavicle fragments | left | Duplicate number, adult, two lateral fragments that cross mend |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 72 | tibia fragment | undetermined | Duplicate number, proximal fragment, adult, calcite and carbon, not complete, may be the same as 73 and 74 |
| VII | 1 | 73 | tibia fragment | undetermined | Duplicate number, proximal fragment, adult, calcite and carbon, not complete, may be the same as 72 and 74 |
| VII | 1 | 74 | tibia fragment | undetermined | Duplicate number, proximal fragment, adult, calcite and carbon, not complete, may be the same as 73 and 72 |
| VII | 1 | 75 | humerus fragment | right | Duplicate number, adult, distal fragment, with only the anterior portion of the medial epicondyle and the medial portion of the |

trochlea, calcite and carbon

| VII | 1 | navicular | probable left |  | Duplicate number, <br> adult, plantar portion <br> of the navicular, <br> calcite and carbon |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 76 | cuboid | left | Duplicate number, <br> adult, distal fragment, <br> calcite and carbon |
| VII | 1 | 77 | radius fragment | undetermined | Duplicate number, <br> adult, head only, too <br> incomplete to <br> measure, looks small |
| VII | 1 | 79 | rib fragment | undetermined | Duplicate number, <br> shaft fragment, adult, <br> calcite and carbon |
| VII | 1 | 80 | rib fragment | undetermined | Duplicate number, <br> shaft fragment, adult, <br> calcite and carbon |
| VII | 1 | 81 | rib fragment | undetermined | Duplicate number, <br> shaft fragment, adult, <br> calcite and carbon |
| VII | 1 | 82 | rib fragment | undetermined | Duplicate number, <br> shaft fragment, adult, <br> calcite and carbon |


| VII | 1 | 84 | rib fragment | undetermined | Duplicate number, shaft fragment, adult, calcite and carbon |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 85 | rib fragment | undetermined | Duplicate number, shaft fragment, adult, calcite and carbon |
| VII | 1 | 86 | rib fragment | undetermined | Duplicate number, shaft fragment, adult, calcite and carbon |
| VII | 1 | 87 | rib fragment | undetermined | Duplicate number, shaft fragment, adult, calcite and carbon |
| VII | 1 | 88 | rib fragment | right | Duplicate number, vertebral end, adult, calcite and carbon, upper rib |
| VII | 1 | 89 | cuboid | right | Duplicate number, adult, complete, kind of small |
| VII | 1 | 90 | humerus fragment | possible left | Duplicate number, distal fragment of most of the trochlea, adult, calcite and carbon |
| VII | 1 | 91 | ulna fragment | right | Duplicate number, proximal fragment of the olecranon, adult, calcite and carbon, bone spurs developing on the most proximal |


| VII | 1 | 92 | metatarsal fragment | undetermined | Duplicate number, <br> adult, distal fragment, <br> calcite and carbon |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 93 | manual phalanx <br> fragment | undetermined | Duplicate number, <br> adult, distal fragment, <br> additional growth on <br> the palmar surface, <br> calcite and carbon |
| VII | 1 | 94 | metacarpal fragment | undetermined | Duplicate number, <br> adult, shaft fragment |
| VII | 1 | 95 | fibula fragment | undetermined | Duplicate number, <br> adult, shaft fragment, <br> calcite and carbon |
| VII | 1 | 96 | radius fragment | undetermined | Duplicate number, <br> adult, shaft fragment, <br> some carbon |
| VII | 1 | 97 | scapula fragment | undetermined | Duplicate number, <br> adult, body fragment, <br> carbon |
| VII | 1 | 98 | scapula fragment | undetermined | Duplicate number, <br> adult, margin |
| VII | 1 |  |  |  |  |
| scapula fragment | undetermined | Duplicate number, <br> adult, neck fragment, <br> calcite and carbon |  |  |  |

fragment, carbon

| VII | 1 | 101 | scapula fragment | undetermined | Duplicate number, adult, possible left, inferior margin, carbon |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 102 | cranial fragments | undetermined | Duplicate number, adult, 16 small cranial fragments, some are parietal and frontal it appears, carbon |
| VII | 1 | 103 | cervical vertebra fragment |  | Duplicate number, adult, upper cervical, lamina and spine fragment |
| VII | 1 | 104 | cervical vertebra fragment |  | Duplicate number, adult, body fragment, not the same as 103 , carbon |
| VII | 1 | 105 | thoracic vertebra fragment |  | Duplicate number, adult, lamina fragment of a lower thoracic with inferior articular facets and the left superior articular facet (with some evidence of lipping |


| VII | 1 | 106 | lumbar vertebra fragment | Duplicate number, adult, anterior body fragment, with part of the left transverse process, heavily covered in carbon |
| :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 107 | thoracic vertebra fragment | Duplicate number, adult, left transverse process, articular facets, left portion of the lamina and the spine, upper thoracic |
| VII | 1 | 108 | cervical vertebra fragment | Duplicate number, adult, possibly lower cervical, spine and most of the lamina |
| VII | 1 | 109 | thoracic vertebra fragment | Duplicate number, adult, posterior body fragment, carbon |
| VII | 1 | 110 | thoracic vertebra fragment | Duplicate number, adult, transverse process, carbon |
| VII | 1 | 111 | thoracic vertebra fragment | Duplicate number, adult, transverse process, carbon |
| VII | 1 | 112 | thoracic vertebra fragment | Duplicate number, adult, spinous process |
| VII | 1 | 113 | lumbar vertebra fragment | Duplicate number, adult, transverse process, carbon |


| VII | 1 | 114 | lumbar vertebra fragment |  | Duplicate number, adult, transverse process, carbon |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 115 | cervical vertebra fragment |  | Duplicate number, adult, lamina fragment |
| VII | 1 | 116 | thoracic vertebra fragment |  | Duplicate number, adult, transverse process, carbon |
| VII | 1 | 117 | thoracic vertebra fragment |  | Duplicate number, adult, transverse process, carbon |
| VII | 1 | 118 | thoracic vertebra fragment |  | Duplicate number, adult, superior or inferior portion of an upper thoracic body, carbon |
| VII | 1 | 119 | thoracic vertebra fragment |  | Duplicate number, adult, lamina fragment of a lower thoracic with inferior articular facets |
| VII | 1 | 120 | lumbar vertebra fragment |  | Duplicate number, adult, transverse process, carbon |
| VII | 1 | 121 | maxilla fragment | undetermined | Duplicate number, probable adult, carbon, anterior teeth root sockets, lost post mortem |


| VII | 1 | 122 | lumbar vertebra fragment |  | Duplicate number, adult, inferior articular facet, carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 1 | 123 | vertebra fragment |  | Duplicate number, adult, anterior body fragment, possibly a thoracic based on height |  |
| VII | 1 | 124 | ischium fragment | undetermined | adult, carbon |  |
| VII | 1 | 125 | cranial fragments | undetermined | 6 cranial fragments, carbon and calcite |  |
| VII | 1 | 126 | 26 long bone fragments | undetermined |  |  |
| VII | 1 | 127 | 91 unidentified fragments | undetermined |  |  |
| VII | 11 |  <br> 1 | lumbar fragment |  | possible L3, adult, fragment of superior articular facet and right transverse process |  |
| VII | 11 | 2 | femur fragment | left | proximal fragment with head and upper portion of the shaft | $\begin{gathered} 32.83 \mathrm{~mm} \text { head } \\ \text { diameter } \\ \hline \end{gathered}$ |
| VII | 11 | 3 | rib fragment | probable left | sternal fragment, damage to the sternal end, unable to age |  |
| VII | 11 | 4 | rib fragment | right | vertebral end fragment |  |
| VII | 11 | 5 | ulna fragment | undetermined | shaft fragment |  |

$\left.\begin{array}{lccccc} & & & & \begin{array}{c}\text { shaft fragment, badly } \\ \text { deteriorated, } \\ \text { measurements cannot } \\ \text { be made }\end{array} \\ \text { VII } & 12 & 1 & \text { humerus fragment } & \text { undetermined } & \text { probably 3-9 } \\ \hline \text { VII } & 12 & 2 & \text { thoracic vertebra } & & \text { undetermined } \\ \hline \text { VII } & 12 & 3 & \text { femur fragment } & \text { shaft fragment } \\ \hline \text { VII } & 12 & 4 & \text { fibula fragment } & \text { undetermined } & \text { shaft fragment } \\ \hline \text { VII } & 12 & 5 & \text { radius fragment } & \text { undetermined } & \text { shaft fragment } \\ \hline \text { VII } & 12 & 6 & \begin{array}{c}\text { fourth metatarsal } \\ \text { fragment }\end{array} & \text { right } & \text { proximal fragment } \\ \hline \text { VII } & 12 & 7 & \text { third metacarpal } & \text { left } & \\ \hline \text { VII } & 12 & 8 & \text { humerus fragment } & \text { undetermined } & \text { proximal humerus } \\ \text { head epiphysis }\end{array}\right]$
what it is

| VII | 12 | 16 | radius fragment | possible left | distal shaft fragment, child over 5 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 12 | 17 | rib fragment | undetermined | shaft fragment |  |
| VII | 12 | 18 | rib fragment | undetermined | shaft fragment |  |
| VII | 12 | 19 | first proximal pedal phalanx |  |  | 28.82 mm |
| VII | 12 | 20 | humerus fragment | possible left | proximal subadult fragment, older than 5 years |  |
| VII | 12 | 21 | os coxa fragment | undetermined | young child, lunate surface is not developed yet |  |
| VII | 12 | 22 | vertebra fragment |  | transverse process of a thoracic vertebra |  |
| VII | 12 | 23 | ulna fragment | probable right | proximal fragment |  |
| VII | 12 | 24 | molar |  | lower left, 6 cusps? | 13.04 mm anterior to posterior, 10.93 mm lingual to buccal, 7.65 mm height |
| VII | 12 | 25 | rib fragment | undetermined | sternal end fragment, stage $2 / 3$, age $20.8-$ 27.7 |  |
| VII | 12 | 26 | 0+ unidentified shaft fragments |  |  |  |

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline VII \& 12 \& \& 27 \& 52 unidentified fragments \& \& a few shaft fragments, possibly a fibula, radius, and ulna <br>
\hline VIII \& ren

1 \& a \& - \& Cervical Vertebra \& \& 1st vertebra, adult, gray calcium carbonate, left articular facets are broken but the piece is there <br>
\hline VIII \& \& a \& 5 \& Thoracic Vertebra \& \& adult, calcium carbonate is grey, Enlarged inferior demi facets with lipping, syndesmophytes on the right and anterior superior surface, possible Schmorl's node on inferior surface <br>
\hline VIII \& 1 \& a \& 6 \& Cuboid \& Right \& adult, grey calcium carbonate, slight fire blackening underneath <br>
\hline VIII \& 1 \& a \& 8 \& Thoracic Vertebra \& \& adult, fire blackened, taphonomic damage to the body, slight lipping on the inferior margin of the body, superior demi facet is much larger than the <br>
\hline
\end{tabular}

inferior ones

| VIII | 1 | a | 9 | Probable Femur Fragment | Undetermined | Relatively small proximal end, no greater trochanter or head fused | 25.75 mm epiphysis width |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 11 | Rib fragment | Possible Left | Shaft fragment, grayish calcium carbonate, middle rib, adult |  |
| VIII | 1 | a | 12 | Rib fragment | Right | Vertebral end fragment, probably an adult, grey calcium carbonate |  |
| VIII | 1 | a | 13 | Rib fragment | Right | angle/shaft fragment of an adult, calcium carbonate with fire blackening |  |
| VIII | 1 | a | 14 | Rib fragment | Right | Vertebra end, child, possible middle rib |  |
| VIII | 1 | a | 15 | Rib fragment | Undetermined | Child, sternal end, grayish calcium carbonate |  |
| VIII | 1 | a | 16 | Rib fragment | Left | Child, relatively complete, grayish calcium carbonate, middle rib |  |


| VIII | 1 | a | 17 | Rib fragment | Left | Child, relatively complete, grayish calcium carbonate, upper 6, fused with another sternal end fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 18 | Rib fragment | Right | Child, sternal end, grayish calcium carbonate |
| VIII | 1 | a | 19 | Rib fragment | Right | Sternal fragment, child, grayish calcium carbonate |
| VIII | 1 | a | 20 | Rib fragment | Left | Sternal fragment, child, grayish calcium carbonate |
| VIII | 1 | a | 21 | Rib fragment | Right | Sternal fragment, child, grayish calcium carbonate |
| VIII | 1 | a | 22 | Rib fragment | Right | Shaft fragment, grayish calcium carbonate, middle rib, adult |
| VIII | 1 | a | 23 | Rib fragment |  |  |
| VIII | 1 | a | 24 | Rib fragment | Left | Child, relatively complete, grayish calcium carbonate, upper 6 , fused with another sternal end fragment |
| VIII | 1 | a | 25 | Shaft fragment |  |  |


| VIII | 1 | a | 26 | Shaft fragment | Undetermined | Too much calcium carbonate on the fragment prevents identification |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 27 | Ulna | Left | Perinate, covered in calcium carbonate and fire blackening |
| VIII | 1 | a | 28 | Lesser Multangular | Left | adult, grey calcium carbonate, slight fire blackening underneath |
| VIII | 1 | a | 29 | Zygomatic | Right | adult, grey calcium carbonate, slight fire blackening underneath |
| VIII | 1 | a | 30 | Vertebra Fragment |  | Spinous process, grayish calcium carbonate, with fire blackening, adult |
| VIII | 1 | a | 31 | Second Cuneiform | Right | adult, grey calcium carbonate, slight fire blackening underneath |
| VIII | 1 | a | 32 | Ilium | Right | Perinate, covered in calcium carbonate and fire blackening |
| VIII | 1 | a | 33 | Third cuneiform | Right | adult, grey calcium carbonate, slight fire blackening underneath |


| VIII | 1 | a | 34 | Hamate | Left | adult, grey calcium carbonate, slight fire blackening underneath |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 35 | 5th sacral vertebra |  | Perinate, covered in calcium carbonate and fire blackening |  |
| VIII | 1 | a | 36 | Intermediate phalanx | Undetermined | not completely fused, foot, grayish calcium carbonate | 16.23 mm |
| VIII | 1 | a | 37 | Distal phalanx | Undetermined | adult | 16.87 mm |
| VIII | 1 | a | 38 | Intermediate phalanx | Undetermined | not completely fused, foot, grayish calcium carbonate | 11.31 mm |
| VIII | 1 | a | 39 | Distal phalanx | Undetermined | does not appear completely fused yet | 15.20 mm |
| VIII | 1 | a | 40 | Thoracic Vertebra Fragment |  | Transverse process fragment, adult, covered in a grayish calcium carbonate |  |
| VIII | 1 | a | 41 | Distal phalanx | Undetermined | adult, possible 1st phalanx | 21.12 mm |
| VIII | 1 | a | 42 | Triquetral | Left | adult, calcium carbonate is grayish with fire blackening |  |
| VIII | 1 | a | 43 | Cranial Fragment |  | Thinness suggests a very young individual, taphonomic breakage |  |


| VIII | 1 | a | 44 | Thoracic Neural arch | Right | Perinate, covered in calcium carbonate and fire blackening |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 45 | Cervical Neural arch | Left | Perinate, covered in calcium carbonate and fire blackening |  |
| VIII | 1 | a | 46 | Vertebra body |  | Perinate, probable thoracic | $\begin{gathered} 10.8 \mathrm{~mm} \text { at the } \\ \text { widest } \end{gathered}$ |
| VIII | 1 | a | 47 | Fragment |  |  |  |
| VIII | 1 | a | 48 | Rib fragment | Undetermined | Shaft fragment, grayish coloring, light calcium carbonate covering, adult, middle rib |  |
| VIII | 1 | a | 49 | Rib fragment | Right | Shaft fragment, light dusting of grayish calcium carbonate |  |
| VIII | 1 | a | 50 | Metacarpal Fragment |  | Distal fragment with shaft, hand, adult, grayish calcium carbonate |  |
| VIII | 1 | a | 51 | Probable Ulna Fragment |  | Taphonomic cracking prevents more definitive siding, light dusting of gray calcium carbonate |  |
| VIII | 1 | a | 52 | Radius Fragment | Right | Shaft Fragment, adult, grayish calcium carbonate |  |


| VIII | 1 | a | 53 | 5th Metatarsal | Right | adult, heavy coating of grey calcium carbonate on all surfaces | 72.66 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 54 | 4th Metacarpal | Right | Head not yet fused, grayish calcium carbonate |  |
| VIII | 1 | a | 55 | Metacarpal Fragment | Undetermined | Possible 3rd <br> Metacarpal, proximal fragment, fire blackened, calcium carbonate |  |
| VIII | 1 | a | 56 | 1st Rib | Left | adult, grayish calcium carbonate, and fire blackening, vertebral end |  |
| VIII | 1 | a | 57 | Lunate | Left | adult, grayish calcium carbonate |  |
| VIII | 1 | a | 58 | Femur | Left | Between third trimester and perinate according to Baker, completely covered in grayish calcium carbonate | 77.1 mm |
| VIII | 1 | a | 59 | 3rd Metacarpal | Left | adult, completely covered in grayish calcium carbonate | 61.12 mm |
| VIII | 1 | a | 60 | Radius Fragment | Left | Distal end, adult, grayish calcium carbonate |  |


| VIII | 1 | a | 61 | Proximal phalanx |  | Hand, adult, grayish calcium carbonate | 42.19 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 62 | 5th Metacarpal | Left | adult, light dusting of calcium carbonate |  |
| VIII | 1 | a | 63 | Ulna Fragment | Right | Proximal fragment, adult, very slight grayish calcium carbonate |  |
| VIII | 1 | a | 64 | 3rd Metatarsal | Right | grayish calcium carbonate and fire blackening | 69.87 mm |
| VIII | 1 | a | 65 | Intermediate phalanx |  | Foot, adult, grayish calcium carbonate and fire blackening |  |
| VIII | 1 | a | 66 | 1st Metacarpal | Left | adult, light dusting of calcium carbonate | 34.90 mm |
| VIII | 1 | a | 67 | 2nd Metacarpal | Left | adult, light dusting of calcium carbonate | 63.11 mm |
| VIII | 1 | a | 68 | Humerus | Right | Perinate, light calcium carbonate | 65.67 mm |
| VIII | 1 | a | 69 | Proximal phalanx |  | Hand, adult, calcium carbonate and fire blackening | 40.78 mm |
| VIII | 1 | a | 70 | 1st Metatarsal |  | Foot, child, head and base not fused yet, grayish calcium carbonate,, probably 5-8 years of age | 37.55 mm |
| VIII | 1 | a | 71 | Intermediate phalanx |  | Hand, adult, grayish calcium carbonate on | 27.68 mm |

all surfaces

| VIII | 1 | a | 72 | Metacarpal Fragment |  | Shaft and head, adult, more fire blackening than calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 73 | Radius Fragment | Possible Right | Proximal fragment, taphonomic damage and cracking, fire blackened and light dusting of calcium carbonate |
| VIII | 1 | a | 74 | Thoracic Vertebra |  | adult, lower thoracic vertebra, single body facet, grayish calcium carbonate on all surfaces. |
| VIII | 1 | a | 75 | Parietal | Left | Possible older child or young adult (temporal suture probably not completely <br> fused)grayish calcium carbonate (more on interior), pitting on interior. |
| VIII | 1 | a | 76 | Occipital Fragment |  | Possible older child or young adult (sutures not fully fused)grayish calcium |

carbonate with more fire blackening

| VIII | 1 | a | 77 | Rib fragment | Undetermined | Shaft fragment, heavy coating of grayish calcium carbonate, middle rib |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 78 | Rib fragment | Left | Vertebral, angle and shaft fragment, adult, heavy coating of grayish calcium carbonate, upper 6 |  |
| VIII | 1 | a | 79 | Tibia | Left | $\sim 1$ year old, completely covered in grayish calcium carbonate | 66.92 mm |
| VIII | 1 | a | 80 | 4th Metatarsal | Right | adult, light dusting of calcium carbonate and fire blackening | 63.99 mm |
| VIII | 1 | a | 81 | Calcaneus | Right | adult, grayish calcium carbonate and fire blackening | 69.51 mm |
| VIII | 1 | a | 82 | Intermediate phalanx |  | adult, light gray calcium carbonate, and fire blackening | 36.65 mm |
| VIII | 1 | a | 83 | Intermediate phalanx |  | adult, gray calcium carbonate | 42.77 mm |
| VIII | 1 | a | 84 | Fibula Fragment | Right | Distal fragment, adult, grey calcium carbonate. |  |


| VIII | 1 | a | 85 | Scapula | Right | $\sim 1$ year old, completely covered in grayish calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 86 | Rib fragment |  | Shaft fragment, adult, middle rib, covered in calcium carbonate |  |
| VIII | 1 | a | 87 | Rib | Right | Probably 11 or 12 , covered in grey calcium carbonate |  |
| VIII | 1 | a | 88 | Rib fragment | Probable Right | Middle rib, adult, slight orangish tint with light coating of calcium carbonate |  |
| VIII | 1 | a | 89 | Rib fragment | Left | Upper 6, adult, grayish calcium carbonate |  |
| VIII | 1 | a | 90 | Cervical Vertebra |  | adult, C2, Light dusting of calcium carbonate |  |
| VIII | 1 | a | 91 | 3rd Metatarsal | Left | Head absent, heavy coating of grey calcium carbonate on the shaft |  |
| VIII | 1 | a | 92 | Shaft Fragment |  |  |  |
| VIII | 1 | a | 93 | Talus | Right | adult, grayish calcium carbonate. | 50.46 mm |
| VIII | 1 | a | 94 | Tibia Fragment | left | Proximal fragment, a little over 5 years of age, thick coating of | 46.57 mm |


| VIII | 1 | a | 95 | 5th Metatarsal | Right | adult, light coating of calcium carbonate with more fire blackening | 59.75 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 96 | Occipital Fragment |  | superior portion of the occipital, grayish calcium carbonate |  |
| VIII | 1 | a | 97 | 4th Metacarpal | Right | Head does not appear to be fused, morphology on proximal end is hazy, more fire blackening than calcium carbonate |  |
| VIII | 1 | a | 98 | Basioccipital portion |  | adult, light grayish calcium carbonate with fire blackening |  |
| VIII | 1 | a | 99 | Intermediate phalanx |  | adult, hand, light grey calcium carbonate with fire blackening |  |
| VIII | 1 | a | 100 | Proximal phalanx |  | adult, hand, more grey calcium carbonate on the palmar surface | 31.18 mm |
| VIII | 1 | a | 101 | 1st Metacarpal | Right | More calcium carbonate on the palmar surface, some | 43.63 mm |


|  |  |  |  |  |  | fire blackening on posterior surface, adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 102 | Humerus | Left | Same as person in 68, perinate, heavier calcium carbonate with fire blackening | 66.79 mm |
| VIII | 1 | a | 103 | Ulna Fragment | possible Right | Distal fragment, grayish calcium carbonate on all surfaces |  |
| VIII | 1 | a | 104 | 1st Metatarsal | Right | Heavy coating of grayish calcium carbonate | 64.34 mm |
| VIII | 1 | a | 105 | Possible fibula |  | possibly same person as 108, Young child, light dusting of grey calcium carbonate |  |
| VIII | 1 | a | 106 | 4th Metacarpal | Left | Proximal fragment, missing head, adult, grey calcium carbonate and fire blackening |  |
| VIII | 1 | a | 107 | 5th Metatarsal | Left | adult, thick layer of grey calcium carbonate | 60.81 mm |
| VIII | 1 | a | 108 | Possible fibula |  | possibly same person as 104, Young child, light dusting of grey calcium carbonate |  |


| VIII | 1 | a | 109 | Navicular | Right | Thick coating of pale gray calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 110 | Rib fragment | Right | Young child, sternal end, shaft, and angle, grayish calcium carbonate with fire blackening |  |
| VIII | 1 | a | 111 | Scapula Fragment | Undetermined | Coracoid process, adult thick grey calcium carbonate |  |
| VIII | 1 | a | 112 | Humerus Fragment | Left | Proximal fragment of an adult, light coating of grayish calcium carbonate | 36.86 mm |
| VIII | 1 | a | 113 | Rib fragment | Left | Vertebral end fragment, dark grey calcium carbonate, adult, upper 6 rib |  |
| VIII | 1 | a | 114 | Parietal Fragment | Undetermined | Slight lytic activity on exterior, light dusting of grey calcium carbonate |  |
| VIII | 1 | a | 115 | Rib fragment | Undetermined | Child, light calcium carbonate, more fire blackening |  |
| VIII | 1 | a | 116 | Zygomatic | Right | With Maxilla of lower orbit, adult, thick light grey calcium carbonate covering |  |


| VIII | 1 | a | 117 | Parietal | Left | Heavy coating of grayish calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 118 | Intermediate phalanx fragment |  | adult, foot, proximal fragment, some calcium carbonate and fire blackening |  |
| VIII | 1 | a | 119 | Rib fragment | Undetermined | Vertebral end fragment, adult, grayish calcium carbonate |  |
| VIII | 1 | a | 120 | Rib fragment | Vertebral end, grayish calcium carbonate, child |  |  |
| VIII | 1 | a | 121 | Epiphysis | Undetermined | Possible femur epiphysis, unsure due to taphonomic breakage |  |
| VIII | 1 | a | 122 | Rib fragment | Undetermined | Shaft fragment, adult, upper 6 ribs, grayish calcium carbonate |  |
| VIII | 1 | a | 123 | Scapula Fragment | Right | Glenoid, coracoid, and part of blade, grayish calcium carbonate, adult | 33.4 mm glenoid height, 23.4 mm wide |
| VIII | 1 | a | 124 | Humerus Fragment | Right | Proximal adult fragment, probably same person as 112 , | $\begin{gathered} 39.38 \mathrm{~mm} \text { head } \\ \text { diameter } \\ \hline \end{gathered}$ |


|  |  |  |  | light coating of grey <br> calcium carbonate <br> mostly on the shaft |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a |  |  |  | Distal Fragment, <br> adult, light calcium <br> carbonate, ovate <br> olecranon fossa, <br> angled medial <br> epicondyle, |


| VIII | 1 | a | 130 | Zygomatic | Right | adult, darker grey calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 131 | Rib fragment |  | Sternal end, child, grey calcium carbonate |
| VIII | 1 | a | 132 | Rib fragment |  | Sternal end, child, grey calcium carbonate |
| VIII | 1 | a | 133 | Rib fragment |  | Child, grey calcium carbonate |
| VIII | 1 | a | 134 | Humerus Fragment | Undetermined | Shaft fragment, juvenile, white and grey calcium carbonate |
| VIII | 1 | a | 135 | Rib fragment |  | Shaft fragment, grey calcium carbonate, probable adult |
| VIII | 1 | a | 136 | Rib fragment |  | Shaft fragment, grey calcium carbonate, probable adult |
| VIII | 1 | a | 137 | Tibia Fragment | Right | Proximal fragment, adult, grayish calcium carbonate, some additional shaft fragments |
| VIII | 1 | a | 138 | Shaft fragments |  | Tibia probable, adult, grayish calcium carbonate |
| VIII | 1 | a | 139 | Rib Fragment | Left | adult, shaft fragment, upper 6, calcium |


|  |  |  |  | carbonate on the <br> interior surface |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 140 | Rib Fragment | Left | adult, vertebral end, <br> calcium carbonate <br> and fire blackening <br> over most of the <br> surface, upper 6 |
| VIII | 1 | a | 141 | Rib Fragment |  | adult, vertebral end, <br> calcium carbonate <br> and fire blackening <br> over most of the <br> surface, upper 6 |
| VIII | 1 | a | 142 | Scapula Fragment | Possible Right | medial border and the <br> beginning of the spine |
| VIII | 1 | a | 143 | Thoracic Vertebra |  | adult, grayish <br> coloring, light <br> calcium carbonate, <br> upper thoracic one <br> large demi facet |
| VIII | 1 | a | 144 | Talus Fragment | Undetermined |  |
| VIII | 1 | a | 145 | Thoracic Vertebra |  | Fragment |
| VIII | 1 | a | 146 | Ulna Fragment |  | Right |

Distal fragment,
adult, grayish calcium

| VIII | 1 | a | 149 | Tibia Fragment | Right | carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 150 | Rib Fragment |  | Shaft Fragment, adult, Calcium carbonate and fire blackening |  |
| VIII | 1 | a | 151 | Metacarpal Fragment | Undetermined | adult, distal and shaft fragment |  |
| VIII | 1 | a | 152 | Intermediate Phalanx |  | adult, hand, grayish calcium carbonate |  |
| VIII | 1 | a | 153 | Proximal Phalanx |  | adult, hand, calcium carbonate, taphonomic breakage to the palmar surface proximal area |  |
| VIII | 1 | a | 154 | Ulna Fragment | Possible Right | Shaft fragment, fire blackening and calcium carbonate |  |
| VIII | 1 | a | 155 | Femur Fragment | Right | Distal fragment, adult, sample taken, cut marks near the distal end above the popliteal surface, four cut marks in total, three are very close, the proximal one is further away | from proximal to distal, length of cuts 13.18 mm , $9.53 \mathrm{~mm}, 7.65$ $\mathrm{mm}, 10.58 \mathrm{~mm}$ |
| VIII | 1 | a | 156 | Shaft Fragment |  |  |  |
| VIII | 1 | a | 157 | Shaft Fragment |  |  |  |


| VIII | 1 | a | 158 | Rib fragment | Right | adult, vertebral end, calcium carbonate and fire blackening over most of the surface, upper 6 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | a | 159 | Metacarpal/Metatarsal epiphysis |  | Distal unfused head of a child |  |
| VIII | 1 | a | 159 | Ulna Fragment | Left | Proximal fragment, younger individual, more gracile, olecranon process fragment |  |
| VIII | 1 | a | 160 | Sternum |  | adult |  |
| VIII | 1 | a | 161 | Ulna Fragment |  | distal fragment, probable adult |  |
| VIII | 1 | a | 162 | 3rd Metatarsal Fragment | Right |  |  |
| VIII | 1 | a | 163 | 1st Rib | Right | adult, most of the calcium carbonate is on the inferior surface |  |
| VIII | 1 | a | 164 | Patella | Left | adult, some calcium carbonate and fire blackening |  |
| VIII | 1 | a | 165 | Scapula Fragment | Left | adult, glenoid and lateral border, calcium carbonate | 34.06 mm height, <br> 25.74 mm width |
| VIII | 1 | a | 166 | Ulna Fragment | Right | Distal shaft fragment of an adult |  |
| VIII | 1 | a | 167 | Radius Fragment | Left |  |  |
| VIII | 1 | a | 168 | Femur fragment | Possible Right | adult |  |


| VIII | 1 | B | 1 | Cervical Vertebra | 2nd adult, grey and black coloring |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 2 | Cervical Vertebra | Lower cervical articulates with number 3, lipping of the inferior body margin, calcium carbonate and fire blacking |
| VIII | 1 | B | 3 | Cervical Vertebra | Lower cervical articulates with number 2, lipping of the inferior body margin, calcium carbonate and fire blacking |
| VIII | 1 | B | 7 | Cervical Vertebra | Middle cervical, no lipping, possibly not the same person as 2 and 3 , covered in calcium carbonate and fire blackened |
| VIII | 1 | B | 9 | Cervical Vertebra | Lower cervical articulates with number 3 , lipping of the inferior body margin, calcium carbonate and fire blacking |


| VIII | 1 | B | 10 | Cervical Vertebra | Young child, lower cervical based on superior articular facets |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 29 | Thoracic Vertebra Fragment | Just the body of a child, pedicle is fused but line still visible, rest is broken off, covered in calcium carbonate |
| VIII | 1 | B | 30 | Lumbar Vertebra Fragment | Lamina fragment, adult, covered in calcium carbonate and fire blackening, probably C 3 |
| VIII | 1 | B | 31 | Lumbar Vertebra Fragment | Lamina fragment, adult, covered in calcium carbonate and fire blackening, probably C4 or C5 |
| VIII | 1 | B | 32 | Lumbar Vertebra Fragment | Lamina fragment, adult, covered in calcium carbonate and fire blackening, probably C 1 or C 2 |
| VIII | 1 | B | 33 | Thoracic Vertebra | adult, fully covered with calcium carbonate that is grey, left transverse process slightly broken |


| VIII | 1 | B | 34 | Lumbar Vertebra Fragment | Lamina fragment, adult, covered in calcium carbonate and fire blackening, probably C 1 or C2 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 35 | Lumbar Vertebra Fragment | Lamina fragment, adult, covered in calcium carbonate and fire blackening, probably C 1 or C2 |
| VIII | 1 | B | 36 | Thoracic Vertebra | Mostly covered with calcium carbonate, and fire blackening, middle thoracic, inferior end articulates with 37 |
| VIII | 1 | B | 37 | Thoracic Vertebra | Mostly covered with calcium carbonate, and fire blackening, middle thoracic, superior end articulates with 36 |
| VIII | 1 | B | 38 | Thoracic Vertebra Fragment | Calcium carbonate covering most of it, right lamina fragment with spine, possibly T1 or T2 |
| VIII | 1 | B | 39 | Sacrum Vertebra | Either S1 or S2, ala/transverse processes are fused but the line is visible, |

covered in calcium
carbonate

| VIII | 1 | B | 40 | Basioccipital portion |  | adult, grayish colored calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 41 | Manubrium Fragment |  | Covered with calcium carbonate on the posterior with fire blackening on the anterior, young child |  |
| VIII | 1 | B | 42 | Femur Epiphysis |  | somewhat fire blackened | 27.09 mm |
| VIII | 1 | B | 43 | Cervical Vertebra Fragment |  | Covered with calcium carbonate, adult, fragment has a transverse foramen and articular facets |  |
| VIII | 1 | B | 44 | Thoracic Vertebra Fragment |  | Child, lamina fragment, pedicle appears unfused |  |
| VIII | 1 | B | 45 | Neural arch | Left | Probably lumbar, perinate |  |
| VIII | 1 1 | B | 46 | Thoracic Vertebra Fragment |  | Calcium carbonate covering most of it, left lamina fragment, probable juvenile (same as 108 or 109 |  |
| VIII | 1 | B | 47 | Thoracic Vertebra Fragment |  | Calcium carbonate covering most of it, right lamina |  |


|  |  |  |  |  |  | fragment, probable juvenile (same as 108 or 109 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 48 | Lumbar Vertebra Fragment |  | articular facet and transverse process fragment, calcium carbonate, adult |
| VIII | 1 | B | 49 | Scapula Fragment | Right | glenoid fossa and base of spine, young child |
| VIII | 1 | B | 50 | Cervical Vertebra Fragment |  | Neural arch, left of a perinate, calcium carbonate and fire blackened |
| VIII | 1 | B | 51 | Ilium | Left | Perinate, grayish calcium carbonate |
| VIII | 1 | B | 52 | Tibia Epiphysis |  | Proximal epiphysis |
| VIII | 1 | B | 53 | Possible vertebra fragment |  | Facet, completely covered in calcium carbonate |
| VIII | 1 | B | 54 | Capitate | Left | adult, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 55 | Thoracic Vertebra Fragment |  | Left Lamina fragment, pedicle is unfused, child |
| VIII | 1 | B | 56 | Thoracic Vertebra Fragment |  | Right Lamina fragment, pedicle is unfused, child |


| VIII | 1 | B | 57 | Thoracic Vertebra Fragment |  | Spinous process, grayish calcium carbonate, with fire blackening, adult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 58 | Lunate | Right | adult, calcium carbonate |
| VIII | 1 | B | 59 | Metacarpal Fragment |  | adult, head fragment, covered in calcium carbonate |
| VIII | 1 | B | 60 | Rib fragment |  | Child, upper 6 ribs, calcium carbonate and fire blackening |
| VIII | 1 | B | 61 | Intermediate phalanx |  | adult, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 62 | Rib fragment |  | Calcium carbonate and fire blacking, there is a juvenile intermediate phalanx fused to it. |
| VIII | 1 | B | 63 | Proximal Phalanx |  | adult, hand, fire <br> blackening and <br> calcium carbonate |
| VIII | 1 | B | 64 | Metacarpal |  | Child, head unfused, proximal end is not developed |
| VIII | 1 | B | 65 | Medial Phalanx Fragment |  | distal fragment with shaft, hand, adult, fire blackening |


| VIII | 1 | B | 66 | Rib fragment |  | shaft fragment, grayish calcium carbonate, middle rib, child |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 67 | Rib fragment |  | shaft fragment, grayish calcium carbonate, middle rib, child |
| VIII | 1 | B | 68 | Rib fragment |  | shaft fragment, grayish calcium carbonate, middle rib, adult? |
| VIII | 1 | B | 69 | Rib fragment | Right | Vertebral and shaft fragment, grayish calcium carbonate, middle rib, child |
| VIII | 1 | B | 70 | Rib fragment | Left | Vertebral and shaft fragment, grayish calcium carbonate, middle rib, child |
| VIII | 1 | B | 71 | Rib fragment | Left | Vertebral and shaft fragment, grayish calcium carbonate, middle rib, child |
| VIII | 1 | B | 72 | Rib fragment |  | shaft fragment, grayish calcium carbonate, middle rib, adult? |
| VIII | 1 | B | 73 | Rib fragment |  | shaft fragment, grayish calcium carbonate, middle rib, |


| VIII | 1 | B | 74 | Rib fragment | Left | vertebral and shaft fragment, grayish calcium carbonate, middle rib, adult? |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 75 | Rib fragment | Left | vertebral fragment, grayish calcium carbonate, middle rib, child |
| VIII | 1 | B | 76 | Rib | Left | Child, relatively complete, most of the calcium carbonate is on the anterior surface, unlike all the previous ones |
| VIII | 1 | B | 77 | Rib | Right | Young child, calcium carbonate and fire blackening. There is breakage with misalignment, before it was covered with calcium carbonate, upper 6 ribs |
| VIII | 1 | B | 78 | Rib | Right | shaft fragment, grayish calcium carbonate, upper 6, child |
| VIII | 1 | B | 79 | Rib | Possible Left | shaft fragment, grayish calcium |


|  |  |  |  |  |  | carbonate, middle rib, child |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 80 | Rib | Possible Right | shaft fragment, grayish calcium carbonate, middle rib, child |
| VIII | 1 | B | 81 | Rib |  | shaft fragment, grayish calcium carbonate, middle rib, child |
| VIII | 1 | B | 82 | Rib | Possible Right | Probable 1st rib, taphonomic breakage makes confirming side difficult |
| VIII | 1 | B | 83 | Rib | Left | shaft fragment, grayish calcium carbonate, upper 6, child |
| VIII | 1 | B | 84 | Shaft fragment |  | Covered in grayish calcium carbonate |
| VIII | 1 | B | 85 | Shaft fragment |  | Covered in grayish calcium carbonate |
| VIII | 1 | B | 86 | Rib fragment |  | shaft fragment, grayish calcium carbonate, upper 6, adult |
| VIII | 1 | B | 87 | Rib fragment |  | shaft fragment, grayish calcium carbonate, upper 6, adult |


| VIII | 1 | B | 88 | Rib fragment |  | shaft fragment, grayish calcium carbonate, middle rib, adult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 89 | Rib fragment |  | shaft fragment, grayish calcium carbonate, middle rib, adult |
| VIII | 1 | B | 90 | Rib fragment |  | shaft fragment, grayish calcium carbonate, middle rib, adult |
| VIII | 1 | B | 91 | Rib fragment | Probable Right | shaft fragment, grayish calcium carbonate, middle rib, adult |
| VIII | 1 | B | 92 | Rib fragment | Left | Calcium carbonate on inferior surface, fire blackened |
| VIII | 1 | B | 93 | Rib fragment | Right | Middle rib, adult, calcium carbonate and fire blackening |
| VIII | 1 | B | 94 | Rib fragment | Left | Middle rib, adult, calcium carbonate and fire blackening |
| VIII | 1 | B | 95 | Rib fragment | Left | shaft fragment with angle, Upper 6 rib, possibly a juvenile or small adult, covered in calcium carbonate and fire blackened |


| VIII | 1 | B | 96 | Rib fragment | Right | Sternal fragment, adult, grayish colored calcium carbonate, sternal end is slightly wavy. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 97 | Rib fragment | Left | Vertebral end fragment, adult, middle rib, grey calcium carbonate |
| VIII | 1 | B | 98 | Rib fragment | Left | Vertebral end, probably adult, completely covered in calcium carbonate, middle rib |
| VIII | 1 | B | 99 | Rib fragment | Undetermined | calcium carbonate prevents siding, adult, possibly lower 6 |
| VIII | 1 | B | 100 | Rib fragment | Possible Right | Calcium carbonate and fire blackening, vertebral fragment, adult, middle rib |
| VIII | 1 | B | 101 | Rib fragment | Left | grayish calcium carbonate, angle and shaft fragment, middle rib, adult |
| VIII | 1 | B | 102 | Rib fragment | Right | grayish calcium carbonate, angle and shaft fragment, upper 6 , adult |


| VIII | 1 | B | 103 | Shaft fragment | Undetermined | Juvenile, covered in calcium carbonate and fire blackening, possible ulna or radius |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 104 | Rib fragment | Undetermined | Shaft fragment, adult, middle rib, covered in calcium carbonate |  |
| VIII | 1 | B | 105 | Fragment | Undetermined | Possibly the distal end of a juvenile femur, covered in calcium carbonate |  |
| VIII | 1 | B | 106 | Calcaneus | Left | Possible perinate to 1 year of age, calcium carbonate and fire blackening | 35.48 mm length |
| VIII | 1 | B | 107 | Thoracic vertebra |  | Probably the same person as the next two, Upper thoracic, Body fused with pedicle and lamina, juvenile, pedicle fusion line still visible, calcium carbonate mainly on the lamina and spine, fire blackening |  |


| VIII | 1 | B | 108 | Thoracic vertebra |  | articulated on the inferior surface with 109, juvenile, covered in calcium carbonate and fire blackening, middle to lower thoracic vertebra |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 109 | Thoracic vertebra |  | articulated on the inferior surface with 108, juvenile, covered in calcium carbonate and fire blackening, middle to lower thoracic vertebra |
| VIII | 1 | B | 110 | Fragment | Undetermined | Calcium carbonate completely covering it, an articular facet is visible but the breakage and calcium prevents further identification |
| VIII | 1 | B | 111 | Zygomatic | Left | Possible adult, calcium carbonate is grayish in color, some of the maxilla is present |
| VIII | 1 | B | 112 | Rib fragment | Right | angle and shaft fragment, adult, middle rib, covered in grayish calcium carbonate |

$\left.\begin{array}{lllllll}\text { VIII } & \text { B } & & & \begin{array}{c}\text { angle and shaft } \\ \text { fragment, adult, } \\ \text { middle rib, covered in } \\ \text { grayish calcium }\end{array} \\ \text { carbonate }\end{array}\right]$
carbonate

| VIII | 1 | B | 118 | Rib fragment | Left | vertebral, angle and shaft fragment, adult, lower 6, covered in grayish calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 119 | Rib fragment | Right | vertebral, angle and shaft fragment, adult, lower 6, covered in grayish calcium carbonate |  |
| VIII | 1 | B | 120 | Ulna Fragment | Right | Proximal fragment with most of the shaft, covered in grayish calcium carbonate and fire blackening, around 5 years of age. | $\begin{gathered} 104.09 \mathrm{~mm} \\ \text { available } \end{gathered}$ |
| VIII | 1 | B | 121 | Lumbar Vertebra Fragment |  | Juvenile, calcium carbonate and fire blackening, body epiphysis is unfused, superior articular facets are present, calcium carbonate prevents determination of breakage or fusion of pedicle. |  |


| VIII | 1 | B | 122 | Calcaneus | Right | Probably 8 years or younger (check measurement), covered in grayish calcium carbonate and fire blackening | 65.12 mm length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 123 | Rib fragment | Undetermined | shaft fragment, grayish calcium carbonate, and fire blackening, adult |  |
| VIII | 1 | B | 124 | 2nd Metacarpal | Right | adult, lighter covering of calcium carbonate and fire blackening | 68.05 mm |
| VIII | 1 | B | 125 | 2nd Metacarpal | Left | adult, lighter covering of calcium carbonate and fire blackening | 67.57 mm |
| VIII | 1 | B | 126 | Intermediate phalanx |  | Hand, adult, most of the calcium carbonate is on the posterior surface | 32.88 mm |
| VIII | 1 | B | 127 | Proximal phalanx |  | Hand, adult, grayish calcium carbonate, probably the 1st |  |
| VIII | 1 | B | 128 | 1st Metatarsal | Probable Right | Little calcium carbonate and fire blackening, adult, taphonomic breakage to the proximal end prevents definitive siding | 59.6 mm |


| VIII | 1 | B | 129 | Metatarsal fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 130 | Shaft fragments |  |
| VIII | 1 | B |  | Two unidentifiable <br> shaft fragments fused <br> together with grayish <br> colored calcium <br> carbonate |  |
| VIII | 1 | B | 131 | Tibia Fragment | Left |

the calcium carbonate
is on the internal surface.

| VIII | 1 | B | 136 | Shaft Fragment | Undetermined | Undeterminable due to breakage at one end and grayish calcium carbonate covering the entire surface. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII |  | B | 137 | Rib fragment |  | Shaft fragment, grayish calcium carbonate mostly on the anterior surface, with more fire blackening on the interior surface, adult |
| VIII | 1 | B | 138 | Metacarpal Fragment | Undetermined | Young child, head unfused, the proximal end is covered in calcium carbonate and is partly deteriorated, thus preventing further identification, calcium carbonate is mainly on one of the sides, with additional fire blackening |


| VIII | 1 | B | 139 | Thoracic Vertebra Fragment |  | Superior articular facet and transverse process, higher thoracic vertebra, calcium carbonate is covering the transverse process, adult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 140 | Lunate | Left | adult, grayish calcium carbonate, and fire blackening |
| VIII | 1 | B | 141 | Thoracic Vertebral Body |  | Child 2-4 years of age, calcium carbonate and fire blackening |
| VIII | 1 | B | 142 | Scaphoid | Left | adult, slight grayish calcium carbonate, but more fire blackening |
| VIII | 1 | B | 143 | Lumbar Vertebra Body |  | Child 2-4 years of age, calcium carbonate and fire blackening |
| VIII | 1 | B | 144 | Scaphoid | Right | Same person as 142, more calcium carbonate than the left, some fire blackening, odd bone growth on the convex surface |


| VIII | 1 | B | 145 | Hamate | Left | adult, grayish calcium carbonate, and fire blackening |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 146 | Rib fragment |  | possible juvenile, calcium carbonate and fire blackening |  |
| VIII |  | B | 147 | Fibula Fragment |  | Fire blackened proximal end, completely covered with grayish calcium carbonate, over 5 years of age due to the width |  |
| VIII | 1 | B | 148 | Rib fragment | Possible Left | adult, middle rib, covered in grayish calcium carbonate and fire blackening |  |
| VIII | 1 | B | 149 | Calcaneus | Right | Juvenile, smaller than 122 , covered in grayish calcium carbonate, probably close to 5 years of age. | 48.6 mm |
| VIII | 1 | B | 150 | Femur Epiphysis | Left | Calcium carbonate and fire blackening | 54.53 mm width |
| VIII | 1 | B | 151 | Calcaneus | Right | Older child (proximal epiphysis line is still distinct under the calcium carbonate, everything is fused, calcium carbonate | 76.54 mm |

almost completely
covers it

| VIII | 1 | B | 152 | Scapula Fragment | Right | acromion Fragment of an adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 153 | Mandible Fragment | anterior and left | Most mortem loss of incisors and canines, two left molars are present 2-5 years of age, calcium carbonate and fire blackening |  |
| VIII | 1 | B | 154 | Tibia Epiphysis |  | Calcium carbonate and fire blackening is slight | 34 mm width |
| VIII | 1 | B | 155 | Parietal | Left | Pretty much complete, young child, light coating of grayish calcium carbonate interior and exterior. |  |
| VIII | 1 | B | 156 | 5th Metatarsal | Left | adult, found articulated in place, Most of the calcium carbonate is on the plantar surface, some fire blackening on the superior surface | 70.62 mm |

adult, found
articulated in place, Most of the calcium carbonate is on the plantar surface, some fire blackening on the

| VIII | 1 | B | 157 | 2nd Metatarsal | Left | superior surface | 76.2 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 158 | 3rd Metatarsal | Left | adult, found articulated in place, Most of the calcium carbonate is on the plantar surface, some fire blackening on the superior surface | 72.5 mm |
| VIII | 1 | B | 159 | 4th Metatarsal | Left | adult, found articulated in place, Most of the calcium carbonate is on the plantar surface, some fire blackening on the superior surface | 72.92 mm |
| VIII | 1 | B | 160 | 3rd Cuneiform | Left | adult, found articulated in place, some calcium carbonate and fire blackening |  |
| VIII | 1 | B | 161 | Proximal Phalanx | Left | adult, found articulated in place, Most of the calcium carbonate is on the plantar surface, some |  |

fire blackening on the superior surface

| VIII | 1 | B | 162 | Intermediate Phalanx | Left | adult, hand, Most of <br> the calcium carbonate <br> is on the palmar <br> surface, some fire <br> blackening on the <br> superior surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 163 | Proximal Phalanx | Left | adult, found <br> articulated in place, <br> some calcium <br> carbonate and fire <br> blackening |
| VIII | 1 | B | 164 | Proximal Phalanx | Left | adult, found <br> articulated in place, <br> some calcium <br> carbonate and fire <br> blackening |
| VIII | 1 | B | 165 | Rib Fragment |  | Vertebral end, adult, <br> some calcium <br> carbonate and fire <br> blackening |
|  |  |  |  |  |  |  |
| VIII | 1 | B | 166 | 4th Metatarsal |  |  |
| (probably) | Right | Child, head not fused, <br> proximal end not <br> fully developed |  |  |  |  |

adult, found
articulated in place, Most of the calcium carbonate is on the plantar surface, some fire blackening on the

| VIII | 1 | B | 167 | Distal phalanx | Left | superior surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 168 | Proximal Phalanx | Left | adult, found articulated in place, fire blackening |
| VIII | 1 | B | 169 | Proximal Phalanx | Left | adult, found articulated in place, fire blackening |
| VIII |  | B | 170 | Distal phalanx | Left | adult, found articulated in place, Most of the calcium carbonate is on the plantar surface, some fire blackening on the superior surface |
| VIII | 1 | B | 171 | Proximal Phalanx | Left | adult, found articulated in place, fire blackening |
| VIII | 1 | B | 172 | Sesamoid? |  | adult, found with articulated foot |
| VIII | 1 | B | 173 | Thoracic Vertebra Fragment |  | Superior articular facet and part of the body some fire blackening and calcium carbonate |


| VIII | 1 | B | 174 | Femur Fragment | Right | Child, closer to 5 than to 9 years of age, proximal fragment, epiphyses not fused, completely covered in grayish colored calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 175 | Femur Fragment | Left | Child, probably 2-3 years of age, covered in calcium carbonate |  |
| VIII | 1 | B | 176 | Humerus Fragment | Possible Right? | Proximal end, head not fused, $\sim 9$ years of age |  |
| VIII | 1 | B | 177 | Humerus Fragment | Right | Distal end, adult, grayish calcium carbonate, with underlying fire blackening, asymmetrical trochlea, triangular shaped olecranon fossa, taphonomic damage to the medial epicondyle | 24.95 mm olecranon fossa width, H7-H5: 3.8 cm |
| VIII | 1 | B | 178 | Tibia Fragment | Left | Proximal fragment, epiphysis not yet fused, probably closer to 9 years than 5, child, covered with calcium carbonate |  |


| VIII | 1 | B | 179 | Temporal Fragment | Right | Mandibular fossa present, interior is covered with calcium carbonate, thin cranial bone indicative of a younger individual |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII |  | B | 180 | Sacral Vertebra |  | Child, possibly S2, taphonomic damage <br> to the anterior superior surface and right transverse process, covered in grayish calcium carbonate |
| VIII | 1 | B | 181 | Cuboid | Left | adult, calcium carbonate on all surfaces more so on the surface without the cuboid tubercle |
| VIII | 1 | B | 182 | Calcaneus | Left | Child, less than 2-3 years old, almost completely covered in calcium carbonate |
| VIII | 1 | B | 183 | Femur epiphysis | possible Right | Distal epiphysis of a child, less than 9 years of age |
| VIII | 1 | B | 184 | Fragment | Undetermined | Child bone based upon the unfused epiphyseal surface, but calcium carbonate prevents further |

identification

| VIII | 1 | B | 185 | Pubic Fragment |  | Young adult, billows <br> are still visible with <br> all of the calcium <br> carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 186 | Scapula Fragment | Left | Blade portion, <br> glenoid fossa, <br> covered with calcium <br> carbonate along the <br> borders and fire <br> blackening in other <br> areas |
| VIII | 1 | B | 187 | Tibia Fragment |  | Right |

$\%$ of the posterior is covered, fire
blackening, upper 6

| VIII | 1 | B | 190 | Rib fragment | Right |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 191 | Rib fragment | Vertebral end, more <br> calcium carbonate on <br> the posterior surface, <br> some fire blackening, <br> lower 6, adult |
| VIII | 1 | B | 192 | Rib fragment | Shaft fragment, <br> middle rib, covered in <br> calcium carbonate, <br> adult |
| VIII | 1 | B | 193 | Rib fragment | Right |


| VIII | 1 | B | 196 | Rib fragment | Shaft fragment, <br> middle rib, covered in <br> calcium carbonate, <br> adult |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 197 | Rib fragment | Shaft fragment, <br> middle rib, covered in <br> calcium carbonate, <br> adult |
| VIII | 1 | B | 198 | Rib fragment | Shaft fragment, <br> Viddle rib, covered in <br> calcium carbonate, <br> adult |
| VIII | 1 | B | 199 | Clavicle Fragment | Left |


| VIII | 1 | B | 203 | Fibula Fragment | Probable Right | Distal fragment, on the small side, completely covered in calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 204 | Radius Fragment | Probable Left | Proximal fragment with taphonomic damage, adult, completely covered in calcium carbonate |
| VIII | 1 | B | 205 | Pubis | Left | Young child, most of the calcium carbonate is on the epiphyses, some fire blackening |
| VIII | 1 | B | 206 | Rib fragment |  | Upper 6, shaft fragment, covered in calcium carbonate, adult |
| VIII | 1 | B | 207 | Thoracic Vertebra |  | adult, middle thoracic, demi facets are of roughly similar size, almost completely covered in calcium carbonate |
| VIII | 1 | B | 208 | Cervical Vertebra |  | Lower cervical vertebra, adult, covered in calcium carbonate, slightly less on the superior surface, fire blackening |


| VIII | 1 | B | 209 | Thoracic Vertebra |  | adult, taphonomic damage at the pedicle fusion area, grey calcium carbonate more on the superior surface, underlying fire blackening, higher thoracic due to larger demi facet on superior and smaller on inferior |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII |  | B | 210 | 1st rib | Right | vertebral end, adult or older child, more calcium carbonate on the posterior than superior surface, fire blackening |
| VIII | 1 | B | 211 | Thoracic Vertebra |  | adult, middle thoracic, demi facets are of roughly similar size, almost completely covered in calcium carbonate |
| VIII | 1 | B | 212 | Cervical vertebra |  | Child, completely covered in calcium carbonate, middle cervical |
| VIII | 1 | B | 213 | Thoracic Vertebra |  | Possibly young adult (body epiphysis line visible), covered in calcium carbonate |

(more on superior surface), middle
thoracic
Child, pedicle fused, but line is still visible, calcium carbonate on all surfaces, fire
blackened, middle
$\left.\left.\begin{array}{cccccc}\text { VIII } & 1 & \text { B } & 214 & \text { Thoracic Vertebra } & \begin{array}{c}\text { thoracic } \\ \text { Lamina fragment } \\ \text { with left articular } \\ \text { facets and transverse } \\ \text { process, child most } \\ \text { likely, middle } \\ \text { thoracic, calcium } \\ \text { carbonate on both } \\ \text { surfaces }\end{array} \\ \text { VIII } & 1 & \text { B } & 215 & \begin{array}{c}\text { Thoracic Vertebra } \\ \text { Fragment }\end{array} & \begin{array}{c}\text { Child, possible } \\ \text { thoracic, billows still } \\ \text { present }\end{array} \\ \hline \text { VIII } & 1 & \text { B } & 216 & \text { Vertebra Body } & \begin{array}{c}\text { Proximal fragment, } \\ \text { adult, taphonomic } \\ \text { damage occurred }\end{array} \\ \text { VIII } & 1 & \text { B } & 217 & \text { Ulna Fragment } & \text { Possible Right torick layer of } \\ \text { calcium carbonate }\end{array}\right] \begin{array}{c}\text { Proximal Fragment, } \\ \text { no more than 5 years } \\ \text { of age, covered in } \\ \text { calcium carbonate } \\ \text { and fire blackening }\end{array}\right]$

| VIII | 1 | B | 219 | Scapula Fragment | Right | Glenoid fragment, glenoid surface does not have calcium carbonate, but everything else does |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 220 | Tibia Epiphysis |  | Proximal epiphysis, child, taphonomic damage to one surface, calcium carbonate on both surfaces |
| VIII | 1 | B | 221 | 1st Cuneiform | Left | adult, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 222 | Humerus Epiphysis | Left | Young child, more fire blackening that calcium carbonate, mate to 188 |
| VIII | 1 | B | 223 | 3rd Cuneiform | Right | all surfaces covered in calcium carbonate |
| VIII | 1 | B | 224 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate, adult |
| VIII | 1 | B | 225 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate, adult |
| VIII | 1 | B | 226 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate, |

adult

| VIII | 1 | B | 227 | Talus | Left | adult, fire blackened with calcium carbonate (more on plantar surface) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 228 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate, adult |
| VIII | 1 | B | 229 | Shaft Fragment |  | Covered in calcium carbonate |
| VIII | 1 | B | 230 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate, adult |
| VIII | 1 | B | 231 | 1st Rib fragment |  | adult, sternal end, calcium carbonate and fire blackening on both sides |
| VIII | 1 | B | 232 | Rib Fragment | Right | Child, Sternal end, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 233 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate, child |
| VIII | 1 | B | 234 | Rib fragment |  | Shaft fragment, middle rib, covered in |

calcium carbonate, child

| VIII | 1 | B | 235 | Rib fragment | Right | Vertebral end, Child, calcium carbonate and fire blackening, upper 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 236 | Rib fragment | Left | Vertebral end, Child, calcium carbonate and fire blackening, lower 6 |
| VIII | 1 | B | 237 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate and fire blackening, possible child |
| VIII | 1 | B | 238 | Rib fragment | Left | Shaft fragment, lower 6 , rib, covered in calcium carbonate, child |
| VIII | 1 | B | 239 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate and fire blackening, possible child |
| VIII | 1 | B | 240 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate and fire blackening, possible child |


| VIII | 1 | B | 241 | Rib fragment |  | Shaft fragment, middle rib, covered in calcium carbonate and fire blackening, possible child |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 242 | Rib fragment | Possible Left | Shaft fragment, middle rib, covered in calcium carbonate and fire blackening, adult |
| VIII | 1 | B | 243 | Rib fragment | Possible Left | Sternal end fragment, middle rib, covered in calcium carbonate, adult |
| VIII | 1 | B | 244 | Lumbar Vertebra |  | Vertebral body lipping on the superior and inferior margins, adult, probably L1 or L2, completely covered in calcium carbonate, taphonomic damage to the inferior articular facet, there is a metacarpal wedged in the vertebral canal |

$\left.\begin{array}{cccccc} \\ \text { VIII } & \text { B } & & & \begin{array}{c}\text { Younger adult than } \\ \text { 244, Epiphysis line is } \\ \text { visible, with some } \\ \text { billowing still }\end{array} \\ \text { noticeable, probably } \\ \text { L1 or L2, calcium } \\ \text { carbonate covers the } \\ \text { entire surface }\end{array}\right]$

| VIII | 1 | B | 249 | Tibia Fragment | Left | Proximal fragment, unfused epiphysis, aprox. 5 years of age, covered in calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 250 | Radius Fragment | Possible Right | proximal fragment, more calcium carbonate on the posterior, more fire blackening on the anterior surface, unfused epiphyseal head, closer to 9 years of age |
| VIII | 1 | B | 251 | Humerus Fragment | Right | Child, calcium carbonate on most surfaces, fire blackening, closer to 9 years of age |
| VIII | 1 | B | 252 | Radius Fragment | Possible Left | Younger than 250, closer to 5 years old, proximal fragment, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 253 | Rib fragment | Left | Sternal end fragment, possible older child, calcium carbonate and fire blackening on both surfaces |


| VIII | 1 | B | 254 | Rib fragment | Left | Vertebral end fragment, upper 6, more calcium carbonate on the posterior surface, possible older child |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 255 | Rib fragment |  | Child, shaft fragment, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 256 | Rib fragment |  | Child, shaft fragment, covered in calcium carbonate and fire blackening, upper 6 |
| VIII | 1 | B | 257 | Mandible Fragment |  | adult, only missing the right ramus portion, originally completely covered in calcium carbonate, the carbonate on the teeth (except the Right canine and 3rd left molar came off. Left incisors and first premolar are worn exposing the dentine, Second premolar has no issues, first molar has pin prick exposure of dentine on every cusp and a |

caries in the center, second molar has
slight wear on the two
lingual cusps, third is
in process of erupting, linear enamel hypoplasia on the left canine mid way, rest of the teeth are lost post mortem.

| VIII | 1 | B | 258 | Fragment of Calcium carbonate |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 259 | Fragment of Calcium carbonate |  |  |
| VIII | 1 | B | 260 | Parietal | Calcium carbonate on interior and exterior, meningeal grooves just barely visible, possible child | Right |
| VIII | 1 | B | 261 | Thoracic Vertebra | adult, calcium carbonate on everything except the superior surface of the body, middle thoracic (upper demi facet is larger than the |  |

## lower one).

| VIII | 1 | B | 262 | Tibia Fragment | Right | adult, proximal fragment with some of the shaft, calcium carbonate over the whole thing with less on the lateral surface |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 263 | Clavicle | Right | adult, calcium carbonate on all surfaces |  |
| VIII | 1 | B | 264 | Rib Fragment | Left | Vertebral end, adult, lower rib completely covered in calcium carbonate |  |
| VIII | 1 | B | 265 | Clavicle | Right | Child, calcium carbonate on all surfaces | 95.53 mm |
| VIII | 1 | B | 266 | Humerus Fragment | Left | distal fragment, child $\sim 1.5$ years of age |  |
| VIII | 1 | B | 267 | Rib Fragment |  | adult shaft fragment, calcium carbonate covers all surfaces, taphonomic damage to the anterior surface |  |
| VIII | 1 | B | 268 | Rib Fragment | Right | Vertebral end fragment, adult, upper 6 , completely covered |  |

in calcium carbonate

| VIII | 1 | B | 269 | Rib Fragment | Right | Vertebral end fragment, adult, upper 6, completely covered in calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 270 | Rib Fragment | Left | Vertebral end, adult, lower rib completely covered in calcium carbonate |  |
| VIII | 1 | B | 271 | Rib Fragment | Right | Vertebral end fragment, adult, lower rib, completely covered in calcium carbonate |  |
| VIII | 1 | B | 272 | Tibia Fragment | Right | Child, possibly the same as 128 , proximal fragment, completely covered in calcium carbonate |  |
| VIII | 1 | B | 273 | Humerus Fragment | Right | adult, proximal fragment (head and upper shaft), completely covered in calcium carbonate | 43.9 mm head diameter |
| VIII | 1 | B | 274 | Ilium | Right | Young Child, over 5 probably, maybe closer to 9 , more calcium carbonate on the posterior surface |  |

than the anterior

| VIII | 1 | B | 275 | Basioccipital Fragment | Possible young adult <br> of child due to <br> thinness |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 276 | Thoracic Vertebra Body | Young child, body <br> not fused to anything, <br> covered in calcium <br> carbonate and fire <br> blackening |
| VIII | 1 | B | 277 | Thoracic Vertebra Body | Young child, body <br> not fused to anything, <br> covered in calcium <br> carbonate and fire <br> blackening |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  | Body, with a spinous <br> process broken and <br> fused onto the <br> transverse process <br> area. Young |
| VIII | 1 | B | 278 | Vertebra Fragment | individual, billows on <br> the body and body <br> epiphysis not fused, <br> possible Thoracic or <br> lumbar |


| VIII | 1 | B | 279 | Thoracic Vertebra | Child, everything is fused, but the pedicle line is still visible, middle Thoracic, everything but the superior part of the body has calcium carbonate, there is a rib cemented in with calcium carbonate n the vertebral canal |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 280 | Thoracic Vertebra Body | Everything appears fused, adult, taphonomic breakage of the posterior area, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 281 | Cervical Vertebra | adult, calcium carbonate on all surfaces, less on the superior part of the body, middle cervical, bifurcated spine |
| VIII | 1 | B | 282 | Shaft Fragment | Taphonomic morphology and calcium carbonate prevents further identification |


| VIII | 1 | B | 283 | Femur Fragment | Left | Child, calcium carbonate on all surfaces, possible mate to 174 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 284 | Cervical Vertebra |  | adult, calcium carbonate on all surfaces, lower cervical |
| VIII | 1 | B | 285 | Ulna Fragment | Right | Proximal Fragment, calcium carbonate over fire blackening, probably closer to 9 years of age |
| VIII | 1 | B | 286 | Fibula Shaft Fragment |  | Child, shaft fragment, calcium carbonate on all surfaces |
| VIII | 1 | B | 287 | Rib Fragment |  | adult, middle rib, calcium carbonate on all surfaces, but there is more on the posterior, shaft fragment |
| VIII | 1 | B | 288 | Number not assigned |  |  |
| VIII | 1 | B | 289 | Rib fragment | Right | Vertebral fragment, adult, calcium carbonate on all surfaces, middle rib |
| VIII | 1 | B | 290 | Lumbar Vertebra |  | adult, probably L1 or L2, light calcium carbonate and fire |


| VIII | 1 | B | 291 | Vertebra Fragment |  | adult, body fragment, possible lower Thoracic or upper lumbar, taphonomic damage to the posterior area, more calcium carbonate on the superior surface of the body |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 292 | Lumbar Vertebra |  | Child, calcium carbonate on all surfaces except the superior surface of the body, Probably L 2 , everything is fused, body still has some billows |  |
| VIII |  | B | 293 | Radius | Right | adult, complete, calcium carbonate is more on the lateral and media surfaces, posterior surface looks like it was resting on something | 21.98 mm head diameter, 23.1 cm length |
| VIII | 1 | B | 294 | Hamate | Left | adult, covered with calcium carbonate and fire blackening |  |

Young Child,
vertebral end, calcium
carbonate on the

| VIII | 1 | B | 295 | Rib Fragment | possible Right | superior surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 296 | Mandibular Fragment |  | Mandibular condyle, possibly a child |
| VIII | 1 | B | 297 | Cervical Vertebra Fragment |  | Child, higher cervical, possibly even the first, neural arch fragment with articular facets and transverse foramen |
| VIII | 1 | B | 298 | Shaft Fragment |  | Child, unfused epiphysis, possible metacarpal or metatarsal? |
| VIII | 1 | B | 299 | Vertebra Body |  | Child, calcium carbonate and fire blackening, probable Lumbar |
| VIII | 1 | B | 300 | Rib Fragment |  | Young adult, shaft fragment, calcium carbonate on all surfaces |
| VIII | 1 | B | 301 | Triquetral | Left | adult, covered with calcium carbonate and fire blackening |
| VIII | 1 | B | 302 | Rib Fragment |  | adult, shaft fragment, covered in calcium carbonate |


| VIII | 1 | B | 303 | 1st Metatarsal (probably) |  | Child, unfused proximal and distal epiphyses, covered in calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 304 | Lumbar Vertebra |  | Child, pedicle fused but the line is visible, most of the calcium carbonate is on the posterior surface |
| VIII | 1 | B | 305 | Shaft Fragment |  | Unfused epiphysis at one end, possibly a 1st phalanx of the foot |
| VIII | 1 | B | 306 | Lunate | Right | adult, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 307 | Greater Multangular | Left | adult, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 308 | Rib Fragment | Possible left | child, angle and shaft fragment |
| VIII | 1 | B | 309 | Cervical Neural arch | Left | Perinate, calcium carbonate covering the lamina, some fire blackening |
| VIII | 1 | B | 310 | Occipital Fragment |  | Most f it, covered on the interior and exterior with calcium carbonate, some additional bone fragments fused to the |

inside via calcium carbonate

| VIII | 1 | B | 311 | Vertebra Body Fragment | anterior | Child, body epiphysis is not fused and the body has billows |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 312 | Capitate | Right | adult, covered with calcium carbonate and fire blackening |
| VIII | 1 | B | 313 | Vertebra Fragment |  | Lamina fragment of a very young child |
| VIII | 1 | B | 314 | Thoracic Neural arch | Left | Perinate, calcium carbonate, some fire blackening |
| VIII | 1 | B | 315 | Metacarpal/Metatarsal |  | Neonate calcium carbonate and fire blackening |
| VIII | 1 | B | 316 | Metacarpal/Metatarsal |  | Neonate calcium carbonate and fire blackening |
| VIII | 1 | B | 317 | Metacarpal/Metatarsal |  | Neonate calcium carbonate and fire blackening |
| VIII | 1 | B | 318 | 5th Metatarsal fragment? |  | Child, epiphysis is not yet fused |
| VIII | 1 | B | 319 | Vertebra Body Fragment |  | Small fragment, possibly a child, covered with calcium carbonate |


| VIII | 1 | B | 320 | Thoracic Neural arch | Maybe 1 year or older <br> due to size, epiphyses <br> do not appear fused |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 321 | Coccyx | adult, three fused <br> together |
| VIII | 1 | B | 322 | Thoracic Neural arch | Between perinate and <br> 1 year most likely, <br> calcium carbonate <br> and fire blackening |
| VIII | 1 | B | 323 | Proximal Phalanx | adult, calcium <br> carbonate and fire <br> blackening on all <br> surfaces |
| VIII | 1 | B |  |  |  |
| VIII | 1 | B |  |  | Rib Fragment |


|  |  |  |  |  |  | carbonate and fire blackening |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 328 | Rib Fragment |  | Probable child, shaft fragment, covered with calcium carbonate and fire blackening |
| VIII | 1 | B | 329 | Vertebra Fragment |  | Transverse process fragment with an articular facet, covered in grayish calcium carbonate |
| VIII | 1 | B | 330 | 1st Rib Fragment | Left | Child, covered with calcium carbonate and fire blackening |
| VIII | 1 | B | 331 | Greater Multangular | Right | adult, covered with calcium carbonate and fire blackening |
| VIII | 1 | B | 332 | Lunate | Probable Left | adult, badly deteriorated fire blackened and calcium carbonate |
| VIII | 1 | B | 333 | Sacral Vertebra |  | 5th Sacral vertebra, not fused, probably neonate? |
| VIII | 1 | B | 334 | Vertebra Fragment |  | Possible child, possibly a neural arch fragment |
| VIII | 1 | B | 335 | Rib fragment |  | Child, upper rib, Sternal end, covered |


|  |  |  |  |  |  | in calcium carbonate and fire blackening |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 336 | Rib fragment |  | Child, shaft fragment, middle rib, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 337 | Vertebra Fragment |  | Possible child, possibly a neural arch fragment |
| VIII | 1 | B | 338 | Vertebra Fragment |  | Possible child, possibly a neural arch fragment |
| VIII | 1 | B | 339 | Rib fragment |  | Child, upper rib, Shaft fragment, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 340 | unidentified fragment |  |  |
| VIII | 1 | B | 341 | Cervical Neural arch fragment | Possible Left | Perinate, covered in calcium carbonate and fire blackening |
| VIII | 1 | B | 342 | Hyoid | Right | greater horn of the cornu, Child |
| VIII | 1 | B | 343 | Hyoid | Left | greater horn of the cornu, Child |
| VIII | 1 | B | 344 | Calcaneus Fragment | Left | adult, medial distal fragment |
| VIII | 1 | B | 345 | Sacrum Fragment |  | Possibly and older child, Right superior fragment, completely |

covered in calcium carbonate

| VIII | 1 | B | 346 | Navicular | Left | adult, covered in calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 347 | Vertebra Body |  | Child, very small, possible cervical, fire blackened and calcium carbonate |  |
| VIII | 1 | B | 348 | Patella | Left | adult, calcium carbonate is on the superior portions of both the anterior and posterior surfaces, some fire blackening | 38.46 mm height |
| VIII | 1 | B | 349 | Talus | Left | Young Child, calcium carbonate on the proximal and plantar surfaces |  |
| VIII | 1 | B | 350 | Manubrium |  | Complete, adult, covered on both surfaces with calcium carbonate |  |
| VIII | 1 | B | 351 | 5th Metacarpal | Right | Head is not yet fused, shaft and proximal end has calcium carbonate |  |
| VIII | 1 | B | 352 | Rib fragment |  | Child, calcium carbonate and fire blackened |  |


| VIII | 1 | B | 353 | Shaft Fragment |  | Child, probably proximal fibula fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 354 | Rib | Left | Middle rib, child, superior border on the anterior and posterior surface have calcium carbonate |
| VIII | 1 | B | 355 | Rib Fragment | Left | adult, upper 6, vertebral end is fire blackened and the angle is covered in calcium carbonate |
| VIII | 1 | B | 356 | Rib Fragment | Left | adult, upper 6, vertebral end is fire blackened and the angle is covered in calcium carbonate |
| VIII | 1 | B | 357 | 3rd Metacarpal |  | Calcium carbonate on all surfaces with underlying fire blackening |
| VIII | 1 | B | 358 | Proximal Phalanx |  | adult, calcium carbonate mostly on the palmar surface, hand |
| VIII | 1 | B | 359 | Proximal Phalanx |  | adult, calcium carbonate mostly on the palmar surface, hand |


| VIII | 1 | B | 360 | 5th Metacarpal | Right | adult, calcium carbonate on most surfaces, some fire blackening |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 361 | Proximal Phalanx |  | adult, calcium carbonate mostly on the palmar surface, hand |
| VIII | 1 | B | 362 | 1st Metacarpal | Left | adult, almost completely covered with calcium carbonate |
| VIII | 1 | B | 363 | Proximal Phalanx |  | adult, calcium carbonate mostly on the palmar surface, hand |
| VIII | 1 | B | 364 | Intermediate Phalanx |  | adult, calcium carbonate mostly on the palmar surface, hand |
| VIII | 1 | B | 365 | Phalanx fragment |  | Probably proximal or intermediate hand, most of the calcium carbonate is on the posterior surface |
| VIII | 1 | B | 366 | Rib Fragment |  | Child, middle rib, covered in calcium carbonate and fire blackening, shaft fragment |


| VIII | 1 | B | 367 | Rib Fragment | Child, middle rib, covered in calcium carbonate and fire blackening, shaft fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | B | 368 | Phalanx fragment | Probably proximal or intermediate hand, most of the calcium carbonate is on the posterior surface |  |
| VIII | 1 | B | 369 | Rib Fragment | Child, middle rib, covered in calcium carbonate and fire blackening, shaft fragment |  |
| VIII | 1 | B | 370 | Vertebra Body Fragment | adult, calcium carbonate and fire blackening, anterior portion probably of a lower Thoracic or lumbar |  |
| VIII | 1 | B | 371 | Rib Fragment | Child, middle rib, covered in calcium carbonate and fire blackening, shaft fragment |  |
| VIII | 1 | C | 1 | 1st Metatarsal | Child, head unfused, proximal end is not developed | 38.22 mm |


| VIII | 1 | C | 2 | Intermediate Phalanx |  | with light grey calcium carbonate | 26.9 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 3 | Metacarpal Fragment |  | Probably an adult, light grey calcium carbonate, head deteriorated, proximal end damaged as well |  |
| VIII | 1 | C | 4 | Proximal phalanx |  | adult, hand, completely covered in calcium carbonate | 46.5 mm |
| VIII | 1 | C | 5 | 5th Metatarsal | Right | Completely covered with calcium carbonate, adult | 65.87 mm |
| VIII | 1 | C | 6 | Metacarpal Fragment |  | Darker gray calcium carbonate, distal fragment and shaft |  |
| VIII | 1 | C | 7 | Metacarpal/Metatarsal Fragment |  | Shaft fragment with irregular coating with calcium carbonate |  |
| VIII | 1 | C | 8 | 3rd Metacarpal | Left | grayish calcium carbonate, adult | 59.89 mm |
| VIII | 1 | C | 9 | 2nd or 3rd Metatarsal | Undetermined | Calcium carbonate completely covers it, thus preventing accurate determination, adult | 76.21 mm |
| VIII | 1 | C | 10 | 2nd Metatarsal | Left | Completely covered with calcium | 71.38 mm |

carbonate, adult

| VIII | 1 | C | 11 | Proximal phalanx |  | Hand, adult, grayish calcium carbonate | 43.82 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 12 | 3rd Metacarpal | Right | adult, grayish calcium carbonate | 58.01 mm |
| VIII | 1 | C | 13 | Proximal phalanx |  | adult, hand, light grey calcium carbonate with fire blackening | 44.94 mm |
| VIII | 1 | C | 14 | Possible 1st Metacarpal |  | adult, completely covered in grayish calcium carbonate | 45.86 mm |
| VIII | 1 | C | 15 | 1st Metacarpal Fragment |  | Distal fragment, probable adult |  |
| VIII | 1 | C | 16 | Intermediate phalanx |  | adult foot, calcium carbonate covering most of it, more on the anterior surface | 19.44 mm |
| VIII | 1 | C | 17 | Intermediate phalanx |  | adult foot, calcium carbonate covering most of it, more on the posterior surface, fire blackening | 26.63 mm |
| VIII | 1 | C | 18 | Metacarpal Fragment |  | adult, shaft fragment, covered with calcium carbonate in numerous areas |  |
| VIII | 1 | C | 19 | Proximal 1st Phalanx | Probable Left | adult, foot, grayish calcium carbonate mostly on the plantar | 31.64 mm |

surface

| VIII | 1 | C | 20 | 1st Metacarpal | Possible Right | adult, bone is fire blackened under a lighter grey calcium carbonate | 43.54 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 21 | Metacarpal/Metatarsal Fragment |  | adult, shaft fragment, covered with calcium carbonate in numerous areas |  |
| VIII | 1 | C | 22 | Intermediate Phalanx |  | adult, hand, no real calcium carbonate but there is fire blackening | 33.28 mm |
| VIII | 1 | C | 23 | Intermediate Phalanx |  | adult, hand, probably 1st phalanx, calcium carbonate on palmar surface, fire blackening noticeable on posterior | 30.72 mm |
| VIII | 1 | C | 24 | Intermediate Phalanx |  | adult, foot, calcium carbonate on posterior surface, fire blackening on posterior. | 22.41 mm |
| VIII | 1 | C | 25 | Possible 5th Metacarpal |  | Completely covered with calcium carbonate, adult, taphonomic damage to proximal and distal |  |


|  |  |  |  | adult, hand, calcium <br> carbonate is mostly <br> on the palmar and <br> sides, with a thin line <br> of fire blackening on <br> the posterior surface | 38.47 mm |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 26 | Proximal phalanx | adult, completely <br> covered in grayish <br> calcium carbonate |  |
| VIII | 1 | C | 27 | Rib fragment | adult, completely <br> covered in grayish <br> calcium carbonate | 39.84 mm |

$\left.\begin{array}{llllll} & & \begin{array}{c}\text { adult, most of the } \\ \text { manubrium, minus } \\ \text { the edges, most of the } \\ \text { grayish calcium } \\ \text { carbonate is restricted } \\ \text { to the posterior }\end{array} \\ \text { VIII } & \text { Surface and the edges } \\ \text { of the anterior, some } \\ \text { fire blackening }\end{array}\right]$

| VIII | 1 | C | 37 | Tibia Fragment | Right | Same person as 131 and 132, light coating of grey calcium carbonate throughout, epiphysis is fused, but line is very visible |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 38 | Scapula Fragment | Left | Spine, acromion, and glenoid fossa fragment with some of the superior border and lateral border | 35.65 mm glenoid height, 23.92 mm width |
| VIII | 1 | C | 39 | Possible Radius Fragment |  | Proximal end, young child, head is not fused, calcium carbonate is light with more fire blackening |  |
| VIII | 1 | C | 40 | Ulna Fragment | Left | proximal and shaft fragment covered in calcium carbonate and fire blackening (more on lateral surface, older than 5 years of age, possibly 9 years |  |
| VIII | 1 | C | 41 | 1st Metatarsal | Left | head s broken post mortem, completely covered with calcium carbonate |  |


| VIII | 1 | C | 42 | Lumbar Vertebra |  | body epiphysis line is fused but line is visible, covered in grayish calcium carbonate, adult, probably L1 or L2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 43 | Rib fragment | Undetermined | Possible Middle rib, adult, vertebral and shaft fragment, completely covered in calcium carbonate |  |
| VIII | 1 | C | 44 | Rib fragment | Undetermined | Possible Middle rib, adult, vertebral and shaft fragment, completely covered in calcium carbonate |  |
| VIII | 1 | C | 45 | Rib fragment | Left | vertebral end, Upper <br> 6, adult, grayish calcium carbonate |  |
| VIII | 1 | C | 46 | Shaft Fragment | Undetermined | Grey calcium carbonate and some fire blackening |  |
| VIII | 1 | C | 47 | Radius Fragment | Undetermined | Proximal fragment, adult, almost completely covered with calcium carbonate |  |
| VIII | 1 | C | 48 | Humerus | Right | Child, covered in a grayish calcium carbonate, epiphyses unfused, length is | 18 cm length |


carbonate

| VIII | 1 | C | 54 | Scapula Fragment | Left | Glenoid and coracoid fragment, covered with grey calcium carbonate | 31.66 mm glenoid height, 21.42 width |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 55 | Vertebra fragment |  | Body, with a fused lamina and articular facet, body epiphysis is not fully fused possible Thoracic |  |
| VIII | 1 | C | 56 | Vertebra body |  | Unused body and unfused pedicle, possible Thoracic |  |
| VIII | 1 | C | 57 | Rib fragment |  | adult, grayish calcium carbonate with underlying fire blackening, upper 6 adult, shaft fragment |  |
| VIII | 1 | C | 58 | Rib fragment |  | adult, grayish calcium carbonate with underlying fire blackening, middle rib, shaft fragment |  |
| VIII | 1 | C | 59 | Possible Clavicle | Left | Completely covered in calcium carbonate, not very grey, young individual |  |


| VIII | 1 | C | 60 | Rib fragment |  | adult, grayish calcium carbonate with underlying fire blackening, upper 6 adult, shaft fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 61 | Clavicle Fragment | Left | Lateral Fragment, large adult, grayish calcium carbonate almost completely covers it. |
| VIII | 1 | C | 62 | Cervical Vertebra |  | C2, adult, superior surface is completely covered in grayish calcium carbonate, fire blackened on the inferior surface |
| VIII | 1 | C | 63 | Vertebra body |  | Possible Thoracic vertebra, taphonomic breakage at the pedicle, completely covered in calcium carbonate. |
| VIII | 1 | C | 64 | Rib fragment |  | Shaft fragment, adult, almost completely covered with calcium carbonate |
| VIII | 1 | C | 65 | Rib fragment | Left | adult, angle fragment, grayish calcium carbonate on the superior surface with fire blackening on the |


| VIII | 1 | C | 66 | Rib fragment | adult, shaft fragment, <br> covered with calcium <br> carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 67 | Rib fragment | Vertebral end, most <br> of the calcium <br> carbonate is focused <br> on the superior, <br> anterior and posterior <br> surfaces, inferior <br> margin is fire <br> blackened |
| VIII | 1 | C |  |  | Right |


| VIII | 1 | C | 71 | Scapula Fragment | Undetermined | Fragment from one of the borders, adult, calcium carbonate and fire blackening |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 72 | Thoracic Vertebra fragment |  | Child, body epiphysis is not fused yet, grayish calcium carbonate around the anterior and lateral surfaces of the body, pedicle is fused, but taphonomic damage leaves only the right superior articular facet |
| VIII | 1 | C | 73 | Rib Fragment |  | Shaft fragment, adult, light calcium carbonate mostly on the superior margin, patchy fire blackening. |
| VIII |  | C | 74 | Rib Fragment |  | Shaft fragment, adult, most of the calcium carbonate in on the interior surface, with fire blackening more noticeable on the anterior surface |


| VIII | 1 | C | 75 | Rib Fragment |  | Shaft fragment, adult, most of the calcium carbonate on the anterior surface with fire blackening on the interior surface |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 76 | Rib Fragment |  | Shaft fragment, adult, most of the calcium carbonate in on the interior surface, with fire blackening more noticeable on the anterior surface |  |
| VIII | 1 | C | 77 | Rib Fragment |  | Shaft fragment, adult, most of the calcium carbonate on the anterior surface with fire blackening on the interior surface |  |
| VIII | 1 | C | 78 | 3rd Metacarpal Fragment | Left | Proximal end and shaft fragment, adult, mostly covered in grayish calcium carbonate and fire blackened |  |
| VIII | 1 | C | 79 | Proximal phalanx |  | adult, foot, probably the 1st, grayish calcium carbonate covers all but one lateral surface | 32.96 mm |


| VIII | 1 | C | 80 | Possible Proximal Phalanx |  | adult, probable hand, almost completely covered with grayish calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 81 | Intermediate Phalanx |  | adult, foot, plantar surface completely covered in grayish calcium carbonate, rest has fire blackening. | 20.55 mm |
| VIII | 1 | C | 82 | Femur Epiphysis |  | Proximal epiphysis, light calcium carbonate | $\begin{gathered} 26.93 \mathrm{~mm} \text { head } \\ \text { diameter } \\ \hline \end{gathered}$ |
| VIII | 1 | C | 83 | Proximal phalanx |  | adult, hand, almost completely covered with grayish calcium carbonate, taphonomic crack on the posterior surface | 38.88 mm |
| VIII | 1 | C | 84 | Metatarsal fragment |  | adult, distal fragment, completely covered in calcium carbonate |  |
| VIII | 1 | C | 85 | Patella | Right | adult, calcium carbonate mostly on the posterior surface | 36.41 mm height |
| VIII | 1 | C | 86 | Proximal phalanx |  | adult, foot, calcium carbonate mostly on the posterior surface, slight fire blackening on other areas | 29.63 mm |


| VIII | 1 | C | 87 | Ulna Fragment | Right | adult, proximal fragment, calcium carbonate covers all surfaces, more on the posterior, medial and lateral margins, additional bones fused with calcium carbonate. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 88 | Humerus Fragment | Left | adult, distal fragment, light calcium carbonate, taphonomic damage to the posterior surface prevent morphological sexing | $\begin{gathered} 47.9 \mathrm{~mm} \\ \text { epicondylar width } \end{gathered}$ |
| VIII | 1 | C | 89 | 2nd Metacarpal Fragment | Left | adult, calcium carbonate on all surfaces, with fire blackening more noticeable on the palmar surface, proximal fragment with most of the shaft. |  |
| VIII | 1 | C | 90 | Intermediate phalanx |  | adult, hand, most of the calcium carbonate is on the posterior surface, with additional fire blackening | 25.07 mm |


| VIII | 1 | C | 91 | Possible Proximal Phalanx |  | Possible that fusion has not fully occurred, foot, probably 1st phalanx, calcium carbonate is mostly on the superior surface, fire blackening on the plantar surface |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 92 | 2nd or 3rd Metacarpal | Undetermined | Calcium carbonate prevent better identification, adult | 74.8 mm |
| VIII | 1 | C | 93 | Sternum Fragment |  | adult, distal end, Most of the calcium carbonate is on the posterior surface, with a little and fire blackening on the anterior surface |  |
| VIII | 1 | C | 94 | Navicular | Right | adult, Taphonomic damage, almost complete coverage with a pale grey calcium carbonate |  |
| VIII | 1 | C | 95 | 3rd Metatarsal Fragment | Left | adult, calcium carbonate on all surfaces, proximal and shaft fragment |  |


|  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C |  | Head not yet fused, <br> lightest grayish <br> calcium carbonate, <br> morphology on the <br> distal end is not fully <br> developed |  |
| VIII | 1 | C |  | 2nd Metacarpal | Right |


| VIII | 1 | C | 102 | Humerus Fragment | Right | Distal fragment, grayish calcium carbonate on all surfaces, epiphysis not fused, olecranon fossa not visible, third trimester or new born |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 103 | Intermediate phalanx |  | adult, foot, calcium carbonate mostly on the posterior surface, slight fire blackening on other areas | 28.57 mm |
| VIII | 1 | C | 104 | Scaphoid | Left | adult, light dusting of calcium carbonate on all surface, fire blackening on underlying surfaces |  |
| VIII | 1 | C | 105 | Vertebra fragment |  | Transverse process fragment with an articular facet, covered in grayish calcium carbonate |  |
| VIII | 1 | C | 106 | Cuboid | Right | adult, light coating of calcium carbonate with fire blackening |  |
| VIII | 1 | C | 107 | Capitate | Right | adult, calcium carbonate on the back side (of the face) |  |
| VIII | 1 | C | 108 | Hamate | Left | adult, grayish calcium carbonate |  |


| VIII | 1 | C | 109 | 1st Cuneiform | Left | Light calcium carbonate on all surfaces on underlying fire blackening |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 110 | Maxilla fragment | anterior | Root sockets , calcium carbonate in and around the sockets, with fire blackening in other areas. |
| VIII | 1 | C | 111 | Cervical Vertebra |  | C1, calcium carbonate on mostly the superior surface, with fire blackening on the inferior surface |
| VIII | 1 | C | 112 | Scapula Fragment | Right | adult, spine fragment, calcium carbonate covers most of the surface |
| VIII | 1 | C | 113 | Rib fragment | Left | Vertebral fragment, grayish calcium carbonate, adult, possibly upper 6 |
| VIII | 1 | C | 114 | Scapula Fragment | Left | adult, spine fragment, light dark grey calcium carbonate, mostly fire blackening |


| VIII | 1 | C | 115 | Rib fragment | Right | Vertebral fragment, adult, covered in calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 116 | Proximal Phalanx |  | adult, hand, calcium carbonate on all surfaces, another bone is cemented on | 42.04 mm |
| VIII | 1 | C | 117 | 5th Metacarpal | Left | adult, most of the calcium carbonate is on the palmar side | 40.87 mm |
| VIII | 1 | C | 118 | Rib Fragment |  | adult, shaft fragment, covered completely in grayish calcium carbonate, middle rib |  |
| VIII | 1 | C | 119 | Shaft Fragment |  | Completely covered in calcium carbonate |  |
| VIII | 1 | C | 120 | Intermediate phalanx |  | little calcium carbonate and fire blackening, proximal end not fully fused. |  |
| VIII | 1 | C | 121 | Radius Epiphysis |  | Distal radius epiphysis | 22.03 mm |
| VIII | 1 | C | 122 | Scaphoid | Right | adult, light calcium carbonate and fire blackening |  |
| VIII | 1 | C | 123 | Rib fragment | Left | Vertebral end fragment, adult, completely covered in calcium carbonate, with additional bones |  |

attached.

| VIII | 1 | C | 124 | Tibia Epiphysis | Right | Rather large, grayish calcium carbonate on all surfaces, same individual as 125 , slight taphonomic damage |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 125 | Tibia Epiphysis | Left | Calcium carbonate on all surfaces, some fire blackening, same individual as 124 | 49.45 mm |
| VIII | 1 | C | 126 | Humerus Epiphysis | Left | Proximal epiphysis, light coating of grey calcium carbonate on all surfaces, under 9 years of age | 33.54 mm head diameter |
| VIII | 1 | C | 127 | Scapula Fragment | Right | Spine and glenoid fragment with part of the superior and medial border, calcium carbonate on anterior and posterior surfaces, more on the posterior surface |  |
| VIII | 1 | C | 128 | Fibula Fragment | Right | Distal fragment, adult, grey calcium carbonate. |  |

Part of the acetabulum and the ischial tuberosity, grey calcium carbonate on all

| VIII | 1 | C | 129 | Ischium Fragment | Left | surfaces |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 130 | Talus Fragment | Left | Distal end has damage, grayish calcium carbonate and fire blackening |  |
| VIII | 1 | C | 131 | Tibia Fragment | Left | Between 9 and 15 years of age, Shaft fragment, unfused epiphysis is 132 , taphonomic cracking, lots of the calcium carbonate is on the posterior surface, some fire blackening |  |
| VIII | 1 | C | 132 | Tibia Epiphysis | Left | Proximal epiphysis, light calcium carbonate |  |
| VIII | 1 | C | 133 | Femur Fragment | Right | Badly deteriorated, treated with treated with B72, adult |  |
| VIII | 1 | C | 134 | Tibia Fragment | Left | Distal end, epiphysis is fused, calcium carbonate on all surfaces of the shaft, cross mends with 131, | 34 cm when all pieces are together but without the medial condyle |


| VIII | 1 | C | 135 | Femur Fragment | Right | Proximal fragment, young child, greater, lesser trochanter, and head are not yet fused calcium carbonate on all surfaces, slightly less on the posterior, no greater than 9 years, possibly younger |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII |  | C | 136 | Humerus Fragment | Probable Right | Proximal end, head not fused, no greater than 9 years of age, lateral and posterior surface have the most grayish calcium carbonate |
| VIII | 1 | C | 137 | Possible Humerus | Left | Proximal end, young child, possibly not the same as 136 because the head area is more developed on this individual |
| VIII | 1 | C | 138 | Tibia Fragment | Right | Shaft Fragment, possible adult, completely covered in calcium carbonate, first rib fused to proximal end |


| VIII | 1 | C | 139 | Sternum |  | Relatively complete, calcium carbonate on both posterior and anterior surfaces |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 140 | Mandible Fragment | Right | Ramus Fragment, covered in calcium carbonate |  |
| VIII | 1 | C | 141 | Talus Fragment | Right | Light coating of gray calcium carbonate, adult, proximal end damaged post mortem |  |
| VIII | 1 | C | 142 | Cervical Vertebra <br> Fragment |  | Left fragment of C1, adult, heavily coated in calcium carbonate on all surfaces |  |
| VIII | 1 | C | 143 | Tibia Epiphysis | Possible Left | Proximal epiphysis, possibly $\sim 9$ years of age, fire blackening, grayish calcium carbonate on all surfaces, more so at the inferior surface of the epiphysis |  |
| VIII | 1 | C | 144 | Proximal phalanx |  | adult, hand, completely covered with calcium carbonate, more so on the palmar surface. | 42.36 mm |


| VIII | 1 | C | 145 | Sacral Vertebra |  | Young child, more grey calcium carbonate on the anterior surface, damage to the left transverse area and posterior prevents further identification |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 146 | 5th Metatarsal Fragment | Undetermined | adult Proximal fragment, covered in a grey calcium carbonate to the point where it cannot be sided |  |
| VIII | 1 | C | 147 | Capitate | Right | adult, covered in calcium carbonate |  |
| VIII | 1 | C | 148 | Proximal phalanx |  | adult, foot, more calcium carbonate on the anterior surface, but on all surfaces | 26.94 mm |
| VIII | 1 | C | 149 | Proximal phalanx |  | adult, foot, more calcium carbonate on the anterior surface, with only fire blackening on the superior surface | 28.11 mm |
| VIII | 1 | C | 150 | Thoracic Vertebra fragment |  | adult, lamina, right transverse process and articular facets, upper Thoracic |  |


| VIII | 1 | C | 151 | Unidentified | Possible epiphysis, too much calcium carbonate to identify |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 152 | Unidentified | as many as three unidentifiable bones fused together with a thick coating of calcium carbonate, one is a shaft fragment and could be a young child |
| VIII | 1 | C | 153 | Thoracic Vertebra fragment | Body, adult, covered with calcium carbonate, taphonomic breakage to the rest |
| VIII | 1 | C | 154 | Cervical Vertebra | Complete, adult, lower cervical vertebra, calcium carbonate on all surfaces, but it is thicker on the inferior |
| VIII | 1 | C | 155 | Unidentified | Possible Vertebra body fragment or Calcaneus with calcium carbonate fully covering one surface |


| VIII | 1 | C | 156 | Sacral Vertebra |  | S3 of an adolescent, light gray calcium carbonate and fire blackening |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 157 | Phalanx Fragment |  | Proximal end is unfused, unsure if it is a proximal or intermediate foot phalanx, grey calcium carbonate. |  |
| VIII | 1 | C | 158 | Rib Fragment | Right | Vertebral end, adult, calcium carbonate on the superior margin with fire blackening on all other areas. |  |
| VIII | 1 | C | 159 | Phalanx |  | Foot, adult, calcium carbonate chipped off, but was restricted to the plantar surface with underlying fire blackening on other areas | 21.23 mm |
| VIII | 1 | C | 160 | Lunate | Left | adult, covered in calcium carbonate |  |
| VIII | 1 | C | 161 | Metacarpal Fragment |  | adult, head is broken off and the rest is covered in calcium carbonate to the point where is too difficult to identify |  |


| VIII | 1 | C | 162 | Possible Tibia Epiphysis |  | Distal epiphysis of $\sim 5$ year old, light dusting of calcium carbonate and fire blackening, most of the calcium carbonate in of the inferior surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 163 | 5th Metacarpal fragment | Right | Proximal and shaft fragment, most of the calcium carbonate is on the palmar surface with fire blackening on the posterior |
| VIII | 1 | C | 164 | Rib fragment | Left | Vertebral end fragment, calcium carbonate on the superior margin, fire blackening on the inferior |
| VIII | 1 | C | 165 | Radius Epiphysis |  | Distal epiphysis older than 5 years of age, very slight calcium carbonate |
| VIII | 1 | C | 166 | Proximal Phalanx Fragment |  | Hand, adult, distal fragment, fire blackening, no real deposit of calcium carbonate |

Of a young child, most of the calcium carbonate is on the anterior surface, with more fire blackening on the posterior

| VIII | 1 | C | 167 | Possible sternum |  | surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 168 | Metatarsal fragment |  | Distal end, completely covered in calcium carbonate |
| VIII | 1 | C | 169 | 1st Metatarsal fragment |  | Distal end, most of the calcium carbonate is on the shaft, adult |
| VIII | 1 | C | 170 | Possible clavicle fragment | Left | adolescent, most of the calcium carbonate is restricted to the inferior surface with fire blackening on the superior surface |
| VIII | 1 | C | 171 | Possible Navicular Fragment | Undetermined | adult, fragment of the concave and convex facet, light dusting of calcium carbonate |
| VIII | 1 | C | 172 | Second Cuneiform | Left | Calcium carbonate on most surfaces, adult |
| VIII | 1 | C | 173 | Hamate | Left | adult, calcium carbonate on most surfaces |
| VIII | 1 | C | 174 | Rib fragment |  | adult, badly deteriorated shaft fragment, grayish |


|  |  |  |  |  | colored calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 175 | Vertebra fragment | Transverse process fragment with an articular facet, covered in grayish calcium carbonate |  |
| VIII | 1 | C | 176 | Thoracic Vertebra fragment | Right lamina fragment with superior articular facet, most of the grey calcium carbonate is on the anterior surface |  |
| VIII | 1 | C | 177 | Fragment | Unidentifiable fragment that is broken with thick layer of calcium carbonate on most surface. |  |
| VIII | 1 | C | 178 | Vertebra fragment | Child, body unfused, covered in a grayish calcium carbonate, left pedicle fused but the line is visible |  |
| VIII | 1 | C | 179 | Rib fragment | Small shaft fragment, possible adult with gray calcium carbonate |  |
| VIII | 1 | C | 180 | Intermediate Phalanx | Probable adult, foot | 14.69 mm |


| VIII | 1 | C | 181 | Rib fragment |  | Small shaft fragment, possible adult with gray calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 182 | Intermediate phalanx |  | adult, hand, calcium carbonate on the palmar surface, fire blackening on the posterior |
| VIII | 1 | C | 183 | Possible femur epiphysis |  | Relatively small, may be a fragment, slight dusting of calcium carbonate |
| VIII | 1 | C | 184 | Metacarpal Fragment |  | Head only, unfused, slight calcium carbonate |
| VIII | 1 | C | 185 | Metacarpal Fragment |  | Head only, unfused, slight calcium carbonate |
| VIII | 1 | C | 186 | Phalanx |  | Probably the hand, a proximal phalanx of the hand, adult, calcium carbonate on the palmar surface |
| VIII |  | C | 187 | Femur | Left | Under 15 years of age, head is not fused yet, calcium carbonate on most surfaces, was found posterior surface facing up, fused with |

the rest of the bones
with this number.

| VIII | 1 | C | 187 | Talus | Left | adult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 187 | 1st Metacarpal |  |  |
| VIII | 1 | C | 187 | Ribs |  | Probably 3+ rims in the calcium carbonate matrix |
| VIII | 1 | C | 187 | Thoracic Vertebra |  |  |
| VIII | 1 | C | 187 | Cervical Vertebra |  |  |
| VIII | 1 | C | 187 | 2nd Cuneiform | Right |  |
| VIII | 1 | C | 187 | 2nd Metatarsal | Right |  |
| VIII | 1 | C | 187 | 3rd Metatarsal | Right |  |
| VIII | 1 | C | 188 | Rib fragment | Left | Lower 6, adult, calcium carbonate on all surfaces |
| VIII | 1 | C | 189 | Mandible Fragment | Right | Part of the ramus , first two molars have erupted the 3 rd is still in the crypt, premolars and canines lost post mortem, calcium carbonate on all surfaces, more on the interior surface. |


| VIII | 1 | C | 190 | Shaft Fragment | Undetermined | Narrow shaft fragment, possible radius? Completely covered in calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 191 | Radius Fragment | Left | Distal fragment with the proximal epiphysis unfused |  |
| VIII | 1 | C | 192 | Ilium | Right | Young Child, not yet fused, most of the calcium carbonate is on the posterior surface |  |
| VIII | 1 | C | 193 | Scapula Fragment | Left | Glenoid fragment with part of the medial border, most of the calcium carbonate is on the anterior surface | 31.37 mm glenoid height, 25.91 mm |
| VIII | 1 | C | 194 | Lumbar Vertebra |  | Child, body still has billows, probably L4 or L5, taphonomic damage to the posterior, calcium carbonate on all surfaces, fire blackening underneath |  |

VIII

| VIII | 1 | C | 199 | Cervical Vertebra |  | adult, lower cervical, calcium carbonate is mostly restricted to the superior surface of the vertebra |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 200 | Proximal Phalanx |  | adult, 1st foot phalanx, most of the calcium carbonate is restricted to the plantar surface, fire blackening noticeable on the superior surface | 34.68 mm |
| VIII | 1 | C | 201 | Proximal Phalanx fragment |  | adult, hand, calcium carbonate on the posterior surface, fire blackening on the palmar surface, taphonomic breakage, and the distal end is missing |  |
| VIII | 1 | C | 202 | Capitate | Right | adult, completely covered in light gray calcium carbonate |  |
| VIII | 1 | C | 203 | Pelvis fragment |  | Unable to side due to the calcium carbonate, inferior of the obturator foramen |  |
| VIII | 1 | C | 204 | 1st Metatarsal | Probable Left | Proximal epiphysis is unfused, light calcium carbonate layer |  |

mainly on the shaft

| VIII | 1 | C | 205 | Rib fragment | Right | Calcium carbonate on all surfaces, most of the rib minus the sternal end, upper 6 rib |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 206 | Lumbar Vertebra |  | adult, L1 or L2, completely covered in calcium carbonate |  |
| VIII | 1 | C | 207 | Thoracic Vertebra Fragment |  | Body, taphonomic damage to the lamina, completely covered with calcium carbonate, adult |  |
| VIII | 1 | C | 208 | Thoracic Vertebra |  | adult, Upper Thoracic vertebra, calcium carbonate covers all but the superior surface of the body |  |
| VIII | 1 | C | 209 | Patella | Left | adult, calcium carbonate covers the anterior surface and medial facet | 38.14 mm height |
| VIII | 1 | C | 210 | Thoracic Vertebra |  | adult, Upper Thoracic vertebra, calcium carbonate covers all but the superior surface of the body |  |


| VIII | 1 | C | 211 | Lumbar Vertebra Fragment |  | Lamina, transverse process and articular facet fragment of L4 or L5, post mortem breakage |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 212 | Possible Radius Fragment | Undetermined | Proximal Fragment, calcium carbonate almost completely covers it |
| VIII | 1 | C | 213 | 4th Metatarsal | Left | Completely covered in calcium carbonate |
| VIII | 1 | C | 214 | Humerus Fragment | Right | Shaft fragment beginning right below the unfused epiphysis, light calcium carbonate with fire blackening |
| VIII | 1 | C | 215 | Lumbar Vertebra |  | Completely covered with calcium carbonate, body and spine still have billows, probably L3 |
| VIII | 1 | C | 216 | Thoracic Vertebra |  | Completely covered with calcium carbonate, probably middle Thoracic vertebra |
| VIII | 1 | C | 217 | Rib fragment |  | Shaft fragment of a middle rib, light calcium carbonate with fire blackening |


| VIII | 1 | C | 218 | 3rd Cuneiform | Right | adult, light coating of calcium carbonate and fire blackening |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 219 | 3rd Cuneiform | Left | adult, possibly not the mate to 218 , but taphonomic damage prevents confirmation, light calcium carbonate |  |
| VIII | 1 | C | 220 | Lumbar Vertebra |  | Covered with calcium carbonate, less on the superior surface of the body, adult, probably L1 or L2 |  |
| VIII | 1 | C | 221 | Rib Fragment |  | Shaft fragment, completely covered with calcium carbonate, another bone is fused to the anterior surface |  |
| VIII | 1 | C | 222 | Proximal Phalanx |  | adult, hand, calcium carbonate on all surfaces | 38.37 mm |
| VIII | 1 | C | 223 | Possible Fibula Fragment |  | Young child, end fragment, light covering of calcium carbonate |  |
| VIII | 1 | C | 224 | Metacarpal |  | Head is not yet fused calcium carbonate and lack of definition on the proximal end |  |


|  |  |  |  |  |  | prevent further identification. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 225 | 4th Metacarpal | Right | adult, calcium carbonate and fire blackening | 66.86 mm |
| VIII | 1 | C | 226 | 5th Metacarpal | Left | adult, grey calcium carbonate mostly on the medial and posterior surface | 64.09 mm |
| VIII | 1 | C | 227 | Epiphysis |  | Possible distal tibia epiphysis of an individual $\sim 5$ years old, calcium carbonate is on what appears to be the distal end |  |
| VIII | 1 | C | 228 | Parietal | Left | Part of the occipital bone is present, there is lytic activity and vascularization along the midline |  |
| VIII | 1 | C | 229 | Cervical Vertebra |  | adult, calcium carbonate on most of the surface, lower cervical due to the positioning of the superior articular facet |  |


| VIII | 1 | C | 230 | Rib Fragment |  | adult, middle rib, covered in grayish calcium carbonate and fire blackening most of the calcium carbonate is on the interior surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 231 | Shaft Fragment |  | Completely covered in calcium carbonate, possible unfused epiphysis |
| VIII | 1 | C | 232 | Rib Fragment | Right | Calcium carbonate all over, less on the inferior surface, vertebral end, adult, upper 6 |
| VIII | 1 | C | 233 | Rib Fragment |  | adult, shaft fragment, grayish calcium carbonate, middle rib |
| VIII | 1 | C | 234 | Rib Fragment |  | adult, shaft fragment, grayish calcium carbonate, middle rib |
| VIII | 1 | C | 235 | Rib Fragment |  | adult, shaft fragment, grayish calcium carbonate, middle rib |
| VIII | 1 | C | 236 | Rib Fragment |  | adult, shaft fragment, grayish calcium carbonate, middle rib |
| VIII | 1 | C | 237 | Patella | Right | Probable juvenile, calcium carbonate on both surfaces, badly |

deteriorated

| VIII | 1 | C | 238 | Distal phalanx |  | Foot, possibly the first, has not completely fused |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 239 | Metacarpal fragment |  | Distal fragment of the head, line is visible thus not completely fused |  |
| VIII | 1 | C | 240 | Possible Scapula Fragment | Probable Left | Blade portion, covered in calcium carbonate |  |
| VIII | 1 | C | 241 | Femur Epiphysis | Possible Right | Medial condyle, older child, older than 9 , probably closer to 12 |  |
| VIII | 1 | C | 242 | Lumbar Vertebra |  | Child, body still has billows, probably L4 or L5, taphonomic damage to the posterior, calcium carbonate on all surfaces with less on the inferior surface |  |
| VIII | 1 | C | 243 | Thoracic Vertebra |  | adult, middle Thoracic, grayish calcium carbonate light all over |  |
| VIII | 1 | C | 244 | Femur Epiphysis |  | Head epiphysis | 38.67 mm head diameter |


| VIII | 1 | C | 245 | Cervical Vertebra Fragment | Body fragment with right transverse foramen, child, calcium carbonate is mostly on the superior surface |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 246 | Rib Fragment | adult, shaft fragment, grayish calcium carbonate, middle rib |
| VIII | 1 | C | 247 | Rib Fragment | adult, shaft fragment, grayish calcium carbonate, middle rib |
| VIII | 1 | C | 248 | Rib Fragment | adult, shaft fragment, grayish calcium carbonate, middle rib |
| VIII | 1 | C | 249 | Rib Fragment | adult, shaft fragment, grayish calcium carbonate, middle rib |
| VIII |  | C | 250 | Rib Fragment | adult, shaft fragment, thick calcium carbonate with most on the superior surface, upper 6, vertebral and angle fragment |
| VIII | 1 | C | 251 | Rib Fragment | adult, shaft fragment, grayish calcium carbonate, middle rib |


| VIII | 1 | C | 252 | Rib Fragment |  | adult, shaft fragment, thick calcium carbonate with most on the superior surface, upper 6, vertebral and angle fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 253 | Rib Fragment |  | adult, shaft fragment, grayish calcium carbonate, middle rib |  |
| VIII | 1 | C | 254 | Rib Fragment |  | adult, shaft fragment, grayish calcium carbonate, lower 6, vertebral end |  |
| VIII | 1 | C | 255 | Frontal Fragment |  | Superior portion of the frontal, young individual, has cranial modification |  |
| VIII | 1 | C | 256 | Lumbar Vertebra |  | light calcium carbonate, lots of taphonomic damage |  |
| VIII | 1 | C | 257 | Cervical Vertebra |  | Lower vertebra, light calcium carbonate, adult |  |
| VIII | 1 | C | 258 | 3rd Cuneiform | Right | adult, some taphonomic damage, some fire blackening, calcium carbonate on the other surface |  |
| VIII | 1 | C | 259 | Proximal Phalanx |  | Maybe juvenile, hand, fire blackening | 29.08 mm |


| VIII | 1 | C | 260 | Rib Fragment |  | adult, shaft fragment, more fire blackening than calcium carbonate, upper 6, vertebral and angle fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 261 | Shaft Fragment |  |  |
| VIII | 1 | C | 262 | Rib Fragment | Possible Right | Rib 1 sternal end, adult, light calcium carbonate and fire blackening |
| VIII | 1 | C | 263 | Vertebra fragment |  | Body, juvenile, possible lumbar, taphonomic damage to the body and |
| VIII | 1 | C | 264 | Thoracic Vertebra |  | Body still has some billows but is fused, taphonomic damage to the posterior surface, light calcium carbonate on all surfaces |
| VIII | 1 | C | 265 | Rib (first) | Right | Juvenile, calcium carbonate on all surfaces with fire blackening |
| VIII | 1 | C | 266 | Rib (first) | Left | Juvenile, calcium carbonate on all surfaces with fire blackening, less than |


| VIII | 1 | C | 267 | Tibia Fragment? |  | Possible proximal anterior fragment with calcium carbonate on the surface |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 268 | Patella | Left | Heavily covered in calcium carbonate |  |
| VIII | 1 | C | 269 | Femur Fragment | Left | Distal Fragment of the popliteal surface |  |
| VIII | 1 | C | 270 | Radius Fragment | Probable Left | adult, completely covered in calcium carbonate, unidentifiable shaft fused to it | 19.65 mm head diameter |
| VIII | 1 | C | 271 | Ilium | Left | Young Child, covered in grayish calcium carbonate, taphonomic damage to the blade |  |
| VIII | 1 | C | 272 | Lumbar Vertebra |  | Younger (indicated by the billows), possible L4 or L5, taphonomic damage to the right transverse process, grayish calcium carbonate with fire blackening |  |


| VIII | 1 | C | 273 | Mandible Fragment | Left | Probable child, does not appear that there are any molars that have erupted, what little of the ramus is present is indicative of a child |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | , | C | 274 | 3rd Cuneiform | Right | adult, completely covered in calcium carbonate |  |
| VIII | 1 | C | 275 | Femur Fragment | Left | Distal fragment, epiphysis unfused, young child | $\begin{gathered} 46.05 \mathrm{~mm} \text { distal } \\ \text { width } \\ \hline \end{gathered}$ |
| VIII | 1 | C | 276 | Thoracic Vertebra |  | Body, young child, slight billows visible on one surface, rest is covered in calcium carbonate, taphonomic damage to the posterior surface |  |
| VIII | 1 | C | 277 | Humerus Fragment | Left | Shaft fragment covered with calcium carbonate, gracile or young adult |  |
| VIII | 1 | C | 278 | Vertebra fragment |  | Body of a young individual indicated by the billows, possible lower cervical or upper Thoracic, grayish |  |

calcium carbonate

| VIII | 1 | C | 279 | Femur Fragment | Left | Distal fragment of the condyles, adult, covered in calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 280 | 1st Cuneiform | Right | adult, little calcium carbonate, taphonomic damage |
| VIII | 1 | C | 281 | Lumbar Vertebra |  | Young adult, body epiphysis line is still visible, probably L1 or L2, grayish calcium carbonate on entire surface except inferior body |
| VIII | 1 | C | 282 | Pelvis fragment |  | adult, part of the blade and ischium |
| VIII | 1 | C | 283 | Rib fragment |  | Sternal fragment, thick calcium carbonate with underlying fire <br> blackening, middle rib, possible young individual |
| VIII | 1 | C | 284 | Cervical Vertebra |  | Lower cervical vertebra, adult, covered in calcium carbonate, slightly |

less on the superior surface

| VIII | 1 | C | 285 | Number not assigned? |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 286 | Thoracic Vertebra |  | adult, middle Thoracic, completely covered in calcium carbonate |
| VIII | 1 | C | 287 | Thoracic Vertebra |  | adult, upper Thoracic, completely covered in light amount of grey calcium carbonate |
| VIII | 1 | C | 288 | Thoracic Vertebra Fragment |  | Lamina and transverse process fragment of a lower Thoracic vertebra |
| VIII | 1 | C | 289 | 5th Metatarsal Fragment | Undetermined | Distal fragment, no heavy calcium carbonate |
| VIII | 1 | C | 290 | Capitate | Left | adult, covered almost completely with calcium carbonate |
| VIII | 1 | C | 291 | Ischium | Left | Young Child, not fused with other bones, light coating of grayish calcium carbonate, probably the mate to 292 |


| VIII | 1 | C | 292 | Ischium | Right | Young Child, not fused with other bones, thick coating of grayish calcium carbonate, probably the mate to 291 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII |  | C | 293 | Thoracic Vertebra |  | Young adult, spine is slightly burned, possible Schmorl's node on the inferior surface of the body, body is slightly lytic, bottom demi facet is larger than the top |
| VIII | 1 | C | 294 | Talus Fragment | Probable Right | Larger concave facet on plantar surface is visible, res is taphonomically damaged and/or covered with calcium carbonate |
| VIII | 1 | C | 295 | Ischium Fragment | Probable Left | Part of the underdeveloped lunate surface is present, young child probably over 5 but younger than 9 |


| VIII | 1 | C | 296 | Thoracic Vertebra fragment |  | young adult, body with part of the lamina, calcium carbonate over the entire surface, demi facets are small but two on each side are noticeable |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 297 | Clavicle Fragment | Right | Lateral fragment, large adult, more of the calcium carbonate on the inferior surface, more fire blackening noticeable on the superior surface |
| VIII | 1 | C | 298 | Epiphysis? |  | Calcium carbonate completely covers one surface and most of the other, thus preventing identification |
| VIII | 1 | C | 299 | Lunate | Left | adult, grayish colored calcium carbonate |
| VIII | 1 | C | 300 | Lumbar Vertebra Fragment |  | Body, light covering of grayish calcium carbonate, adult |
| VIII | 1 | C | 301 | Radius Fragment | Left | Proximal fragment, unfused head, adolescent, calcium carbonate and fire |


|  |  |  |  |  |  | blackening on all surfaces |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 302 | 3rd Metatarsal | Right | adult, grayish calcium carbonate and fire blackening | 67.15 mm |
| VIII | 1 | C | 303 | 2nd Metacarpal | Left | adult, more calcium carbonate on the palmar surface, fire blackening underneath |  |
| VIII | 1 | C | 304 | 4th Metacarpal | Right | grayish calcium carbonate and blackening mostly on the palmar surface, head not present due to damage |  |
| VIII | 1 | C | 305 | 2nd Metacarpal | Right | Head not fused, young adult, most of the calcium carbonate is on the palmar surface |  |
| VIII | 1 | C | 306 | Proximal Phalanx |  | adult, hand, calcium carbonate on all surfaces |  |
| VIII | 1 | C | 307 | Intermediate phalanx |  | adult, hand, fire blackening on the posterior surface and grey calcium carbonate on the |  |

## palmar surface

| VIII | 1 | C | 308 | Lumbar Vertebra |  | adult, completely covered in calcium carbonate, probably L3 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 309 | Vertebra fragment |  | adult, possibly cervical, covered with calcium carbonate |
| VIII | 1 | C | 310 | Rib fragment |  | Shaft fragment, adult, middle rib, covered in calcium carbonate, more on the posterior surface |
| VIII | 1 | C | 311 | Clavicle Fragment | Left | Lateral fragment, gracile adult possibly, covered in grey calcium carbonate with more on the superior surface |
| VIII | 1 | C | 312 | 5th Metacarpal (probable) | Probable Left | Calcium carbonate over everything but the fire blackened head, adult |
| VIII | 1 | C | 313 | Metacarpal | Undetermined | Too much calcium carbonate prevents identification |
| VIII | 1 | C | 314 | Manubrium |  | Young, more calcium carbonate on the |

posterior surface

| VIII | 1 | C | 315 | Cervical Vertebra |  | Grayish calcium carbonate on all surfaces, adult, middle cervical most likely |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 316 | Thoracic vertebra |  | Lower Thoracic, covered in calcium carbonate, adult |  |
| VIII | 1 | C | 317 | Tibia Fragment (probably) |  | Proximal unfused fragment covered in calcium carbonate |  |
| VIII | 1 | C | 318 | Mandible Fragment | Right | adult, three molars erupted, only the first molar is present, calcium carbonate and fire blackened | 11.26 lingual buccal, 12.86 mesial distal |
| VIII | 1 | C | 319 | Proximal Phalanx |  | adult, foot, calcium carbonate on the plantar surface, fire blackening on the superior |  |
| VIII | 1 | C | 320 | Shaft Fragment |  | Possible distal radius fragment of a young child, completely covered in calcium carbonate |  |
| VIII | 1 | C | 321 | Vertebra Fragment |  | Cervical or Thoracic vertebra fragment of a |  |


|  |  |  |  |  |  | lamina with calcium carbonate on it |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 322 | Vertebra Fragment |  | young adult, billows are not well define, mostly covered in thick calcium carbonate |
| VIII | 1 | C | 323 | Thoracic Vertebra |  | Young (billows), lower Thoracic, grayish calcium carbonate on all but the superior surface of the body |
| VIII | 1 | C | 324 | Lumbar Vertebra Fragment |  | adult, posterior spine and left transverse process, probably L3 or L4, grayish calcium carbonate |
| VIII | 1 | C | 325 | Navicular | Right | adult, more of the grayish calcium carbonate is in the concave depression |
| VIII | 1 | C | 326 | 4th Metacarpal (probably) | Right | Mostly covered in calcium carbonate, adult |
| VIII | 1 | C | 327 | Femur epiphysis | Left | Over 5 years of age, covered in calcium carbonate, greater trochanter, mate to 345 |


| VIII | 1 | C | 328 | Talus Fragment | Right | adult, fire blackened |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 329 | Humerus Fragment | Left | adult, triangular shaped olecranon fossa, angled medial epicondyle |
| VIII | 1 | C | 330 | Sacral Vertebra |  | Probably 1st, younger than adolescent, grayish calcium carbonate |
| VIII | 1 | C | 331 | Pubis | Left | Young Child, covered in grayish calcium carbonate, taphonomic damage to the blade |
| VIII |  | C | 332 | Rib Fragment |  | Middle rib, adult, grey calcium carbonate on superior edge that drips down to midway on the anterior and posterior surface |
| VIII | 1 | C | 333 | Capitate | Left | adult, covered in calcium carbonate |
| VIII | 1 | C | 334 | Lumbar Vertebra Fragment |  | Body, young child, billows, fire blackened and calcium carbonate, taphonomic damage to posterior |
| VIII | 1 | C | 335 | Intermediate phalanx |  | adult, hand, grayish |


| VIII | 1 | C | 336 | Femur Epiphysis fragment | Left | Distal epiphysis, lateral condyle is more intact, grayish calcium carbonate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 337 | Humerus Fragment | Probable Right | Head fragment covered in calcium carbonate | 36.68 mm |
| VIII | 1 | C | 338 | Scapula Fragment | Right | Glenoid, coracoid, and part of blade, grayish calcium carbonate, adult | glenoid height $37.2 \mathrm{~mm}, 26.58$ mm width |
| VIII | 1 | C | 339 | Cervical Vertebra |  | 2nd vertebra, adult, covered in grayish calcium carbonate |  |
| VIII | 1 | C | 340 | Thoracic Vertebra |  | ```Young child, completely fused, upper Thoracic, light calcium carbonate``` |  |
| VIII | 1 | C | 341 | Mandible Fragment | Right | Ramus Fragment, covered in calcium carbonate |  |
| VIII | 1 | C | 342 | Humerus Fragment |  | Proximal epiphysis |  |
| VIII | 1 | C | 343 | 1st Metatarsal fragment |  | distal fragment, light covering of grey calcium carbonate |  |
| VIII | 1 | C | 344 | Patella | Left | adult, more fire black than calcium carbonate | 36.06 mm |


| VIII | 1 | C | 345 | Femur epiphysis | Right | Over 5 years of age, covered in calcium carbonate, greater trochanter, mate to 327 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 346 | Ilium fragment | Probable Right | Crest fragment, epiphysis on the crest is not fused |
| VIII | 1 | C | 347 | 3rd Metacarpal fragment | Left | Adult, proximal fragment, adult, covered in calcium carbonate |
| VIII | 1 | C | 348 | Cervical Vertebra |  | Child, but everything is fused, probably a lower cervical, most of the grayish calcium carbonate is on the superior surface |
| VIII | 1 | C | 349 | Proximal Olecranon Epiphysis |  | Child, covered in calcium carbonate thus prevents siding |
| VIII | 1 | C | 350 | Cervical Vertebra |  | Child, but everything is fused, probably a lower cervical, most of the grayish calcium carbonate is on the superior surface |
| VIII | 1 | C | 351 | Vertebra fragment |  | Body of an adult, light coating of calcium carbonate, taphonomic damage, |

possible Thoracic

|  |  |  |  | Proximal fragment, <br> child, head absent but <br> the greater and lesser <br> trochanter are not yet <br> fused, possibly same <br> age as the greater <br> trochanter epiphyses |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 352 | Femur Fragment | Vertebral end, adult, <br> upper 6, light calcium <br> carbonate and fire <br> blackening |
| VIII | 1 | C | 353 | Rib Fragment | Shaft fragment, child, <br> probably rib 1, <br> calcium carbonate <br> and fire blackening |
| VIII | 1 | C | 354 | Rib Fragment | Shaft fragment, <br> middle rib, calcium <br> carbonate and fire <br> blackening |
| VIII | 1 | C | 355 | Rib Fragment | Child, foot, not yet <br> fused, light calcium <br> carbonate on superior <br> surface |
|  |  |  |  |  |  |
| VIII | 1 | C |  |  |  |
|  |  |  |  | Proximal Phalanx | adult foot, calcium <br> carbonate on superior <br> surface and shaft of <br> the plantar surface |


| VIII | 1 | C | 358 | Rib Fragment | Sternal end fragment, <br> middle rib, calcium <br> carbonate and fire <br> blackening |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 359 | Rib Fragment | Shaft fragment, <br> middle rib, calcium <br> carbonate and fire <br> blackening |
| VIII | 1 | C | 360 | 4th sacral vertebra | grayish calcium <br> carbonate |
| VIII | 1 | C | 361 | Intermediate phalanx |  |
| VIII | 1 | C | 362 | Lunate | adult, hand, calcium <br> carbonate on the <br> proximal facet, fire <br> blackening on the rest <br> of the bone |
| VIII | 1 | C | 363 | Rib Fragment | Right |


| VIII | 1 | C | 367 | Ischium Fragment | Probable Right | Child, covered in <br> calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 368 | Thoracic Vertebra <br> Fragment |  | adult, lamina and <br> facet fragment |
| VIII | 1 | C | 369 | Cranial Fragment |  | Child, probably <br> occipital |
| VIII | 1 | C | 370 | Thoracic Vertebra <br> Fragment |  | adult, lamina and <br> facet fragment |
| VIII | 1 | C | 371 | Thoracic Vertebra <br> Fragment |  | adult, lamina and <br> facet fragment |
| VIII | 1 | C | 372 | Scapula Fragment | possible right | adult, coracoid <br> fragment |
| VIII | 1 | C | 373 | Vertebra Fragment |  | adult, transverse <br> process |
| VIII | 1 | C | 374 | Femur Fragment | Probable Right | Young child, 5-9, <br> heary grey calcium <br> carbonate |
| VIII | 1 | C | 375 | Radius Epiphysis | Possible Left | Child, Calcium <br> carbonate on the <br> proximal surface <br> Blade portion, <br> covered in calcium <br> carbonate |
| VIII | 1 | C | 376 | Scapula Fragment |  | adult, superior <br> articular facet and left <br> transverse process |
| VIII | 1 | C | 378 | Thoracic Vertebra |  | Fragment <br> adult, Shaft fragment, <br> midde rib, calcium <br> carbonate and fire <br> blackening |


| VIII | 1 | C | 379 | Proximal Phalanx |  | adult, probably the foot, heavily covered in calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 380 | Scapula Fragment | Possible left | Child, coracoid is not yet fused to the rest of the scapula |
| VIII | 1 | C | 381 | Proximal Phalanx |  | adult, foot, heavily covered in calcium carbonate |
| VIII | 1 | C | 382 | Rib Fragment |  | young adult, Sternal fragment, middle rib, calcium carbonate and fire blackening |
| VIII | 1 | C | 383 | Intermediate phalanx |  | adult, hand, calcium carbonate on shaft |
| VIII | 1 | C | 384 | Phalanx fragment |  | Child, proximal fragment not completely developed, light calcium carbonate |
| VIII | 1 | C | 385 | Rib fragment |  | adult, Shaft fragment, middle rib, calcium carbonate and fire blackening |
| VIII | 1 | C | 386 | Rib Fragment |  | young adult, Shaft fragment, middle rib, fire blackening |
| VIII | 1 | C | 387 | Thoracic Vertebra |  | child, body and left transverse process, fire blackened and |


|  |  |  |  |  |  | light calcium carbonate |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 388 | Shaft Fragment |  | child, proximal tibia fragment or unfused radius from different aged children, completely covered in calcium carbonate |
| VIII | 1 | C | 389 | Metacarpal epiphysis |  | light calcium carbonate |
| VIII | 1 | C | 390 | Cuneiform |  | Probably a child, facets cannot be easily made out |
| VIII | 1 | C | 391 | Metacarpal epiphysis |  | light calcium carbonate |
| VIII | 1 1 | C | 392 | Intermediate Phalanx |  | adult, foot, superior surface completely covered in calcium carbonate, plantar side - just the shaft |
| VIII | 1 | C | 393 | Epiphysis fragment |  |  |
| VIII | 1 | C | 394 | Lunate | Left | Child, fire blackened |
| VIII | 1 | C | 395 | Clavicle Fragment | Left | Child, lateral fragment, both surfaces covered in calcium carbonate |
| VIII | 1 | C | 396 | Metatarsal fragment |  | adult, proximal phalanx, calcium carbonate |


| VIII | 1 | C | 397 | 3rd Cuneiform Fragment | Left | adult,, calcium carbonate covers all surfaces |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 398 | Cervical Vertebra |  | Young adult/child, body does not have billows and line is more fused, body and left transverse process are present, everything but the superior portion of the body is covered in grayish calcium carbonate |
| VIII | 1 | C | 399 | Thoracic Vertebra Fragment |  | adult, lamina fragment, covered in calcium carbonate, and fused to premolar |
| VIII | 1 | C | 399 | Premolar |  | adult Premolar |
| VIII | 1 | C | 400 | Possible Patella Fragment | Right | Child, light calcium carbonate and fire blackening |
| VIII | 1 | C | 401 | Thoracic Vertebra Fragment |  | Body, Child, pedicle lines fused but visible, fire blackening and calcium carbonate |
| VIII | 1 | C | 402 | Scaphoid | Right | adult, calcium carbonate is mainly on the convex surface |


| VIII | 1 | C | 403 | Metacarpal Fragment |  | Child, shaft and part of the unfused distal head |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | C | 404 | Cervical Vertebra Fragment |  | Child, not yet fused, some taphonomic damage |
| VIII | 1 | C | 405 | Lesser Multangular | Left | adult, slight grayish calcium carbonate, but more fire blackening |
| VIII | 1 | C | 406 | Scapula Fragment | Possible right | Child, coracoid is not yet fused to the rest of the scapula |
| VIII | 1 | C | 407 | Number not assigned? |  |  |
| VIII | 1 | C | 408 | Proximal Phalanx |  | adult, foot, covered in calcium carbonate |
| VIII | 1 | C | 409 | Shaft Fragment |  | Light covering of calcium carbonate |
| VIII | 1 | C | 410 | Shaft Fragment |  | Covered in grayish calcium carbonate mostly on one surface |
| VIII | 1 | C | 411 | Ischium | Left | Child, light grayish calcium carbonate and fire blackening |
| VIII | 1 | C | 412 | Proximal Phalanx |  | Child, 1st phalanx, not yet fused, more of the calcium carbonate is on the posterior surface |

adult, some calcium carbonate and fire
$\left.\begin{array}{ccccccc}\text { VIII } & 1 & \text { C } & 413 & \text { Cuboid Fragment } & \text { Possible Right } & \text { blackening } \\ \text { VIII } & 1 & \text { C } & 413 & \begin{array}{c}\text { Mandible Fragment } \\ \text { with 2 molars and a } \\ \text { premolar }\end{array} & \\ \hline \text { VIII } & 1 & \text { C } & 414 & \begin{array}{c}\text { Thoracic Vertebra } \\ \text { Fragment }\end{array} & \begin{array}{c}\text { adult, body, lamina, } \\ \text { and left transverse } \\ \text { process, very friable, } \\ \text { grayish, possibly } \\ \text { burned }\end{array} \\ \hline \text { VIII } & 1 & \text { C } & 414 & \text { Molar } & \begin{array}{c}\text { Taken For Isotope } \\ \text { analysis 3/2012 }\end{array} \\ \hline \text { VIII } & 1 & \text { C } & 415 & \text { Epiphysis } & \\ \hline \text { VIII } & 1 & \text { C } & 415 & \text { Molar } & \begin{array}{c}\text { Taken For Isotope } \\ \text { analysis 3/2012 }\end{array} \\ \hline \text { VIII } & 1 & \text { C } & 416 & \text { Cuneiform } & \begin{array}{c}\text { Child, not developed } \\ \text { enough to fully } \\ \text { identify }\end{array} \\ \hline \text { VIII } & 1 & \text { C } & 416 & \text { Molar } & \begin{array}{c}\text { Taken For Isotope } \\ \text { analysis 3/2012 }\end{array} \\ \hline & & & & \text { Thoracic Vertebra } & \text { adult, possible } & \text { transverse process } \\ \text { fragment, grey }\end{array}\right]$

| VIII | 1 | C | 420 | Vertebra Fragment | fragment, covered in <br> calcium carbonate |
| :--- | :--- | :--- | :--- | :---: | :---: |
| VIII | 1 | C | 420 | Molar | Possible Ulna |
| VIII | 1 | C | 421 | Epiphysis |  |
| VIII | 1 | C | 421 | Molar | Young adult, <br> epiphysis line fused <br> but visible, calcium <br> carbonate fused to <br> metacarpal |
|  |  |  |  |  | possibly the 5th <br> metacarpal, covered <br> in calcium carbonate, <br> fused to vertebra |
| VIII | 1 | C | 422 | Cervical Vertebra |  |
|  |  |  |  |  | adolescent |
| VIII | 1 | C | 422 | Metacarpal |  |
| VIII | 1 | C | 422 | Molar | adolescent |
| VIII | 1 | C | 423 | Radius Epiphysis |  |
| VIII | 1 | C | 423 | Molar | Epiphysis fragment, <br> possible long bone, <br> flat |
| VIII | 1 | C | 424 | Clavicle Epiphysis | Molar |
| VIII | 1 | C | 424 |  | Epiphysis |


| VIII | 1 | C | 426 | Canine | body fragment |
| :--- | :--- | :--- | :--- | :---: | :---: |
| VIII | 1 | C | 427 | Vertebra Fragment |  |
| VIII | 1 | C | 427 | Canine | adult, grayish calcium <br> carbonate |
| VIII | 1 | C | 428 | Navicular Fragment |  |
| VIII | 1 | C | 428 | Canine | adult, transverse <br> process |
| VIII | 1 | C | 429 | Vertebra fragment |  |
| VIII | 1 | C | 429 | Premolar | adolescent |
| VIII | 1 | C | 430 | Clavicle Epiphysis |  |
| VIII | 1 | C | 430 | Premolar |  |
| VIII | 1 | C | 431 | tarsal fragment? |  |
| VIII | 1 | C | 431 | Incisor | adult, treated with <br> treated with B72 |
| VIII | 1 | C | 432 | 22 Unidentifiable | Fragments |
| VIII | 1 | C | 432 | Incisor | adult, treated with <br> treated with B72 |
| VIII | 1 | D | 1 | Cranial Fragment | adult, treated with <br> treated with B72 |
| VIII | 1 | D | 2 | Temporal Fragment | adult, treated with <br> treated with B72 |
| VIII | 1 | D | 3 | Cranial Fragment | adult, treated with <br> treated with B72 |
| VIII | 1 | D | 4 | Cranial Fragment | adult, treated with <br> treated with B72 |
| VIII | 1 | D | 5 | Cranial Fragment | Parietal Fragment |
|  | 1 | D | 6 |  |  |


| VIII | 1 | D | 7 | Tibia Fragment | Left | adult, distal fragment, treated with treated with B72 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII |  | D | 8 | Pubis Fragment | Left | adult, billows on pubic face indicate young, crest is pinchable but not sharp, treated with treated with B72 |  |
| VIII | 1 | D | 9 | Radius Fragment | Right | Distal Fragment, epiphysis is not fused yet, treated with treated with B72 |  |
| VIII | 1 | D | 10 | Metacarpal Fragment |  | Shaft and distal fragment, head not fused, treated with treated with B72 |  |
| VIII | 1 | D | 11 | Cuboid | Right | treated with treated with B72 |  |
| VIII | 1 | D | 12 | Vertebra Fragment |  | Body, badly deteriorated, possible cervical or Thoracic, treated with treated with B72 |  |
| VIII | 1 | D | 13 | Femur Epiphysis |  | Head epiphysis, treated with treated with B72 | 38.05 mm |
| VIII | 1 | D | 14 | Cranial Fragment |  | adult, treated with treated with B72, treated with treated with B72 |  |


| VIII | 1 | D | 15 | Ulna Fragment | Right | Proximal Fragment, badly deteriorated, adult, treated with treated with B72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | D | 16 | Vertebra Fragment |  | anterior body and transverse process, billows on the body, covered in calcium carbonate, possible lumbar or sacral vertebra, treated with treated with B72 |
| VIII | 1 | D | 17 | Proximal Phalanx |  | adult, foot, badly deteriorated, treated with treated with B72 |
| VIII | 1 | D | 18 | Shaft Fragment |  | treated with treated with B72 |
| VIII | 1 | D | 19 | unidentified fragment |  | treated with treated with B72 |
| VIII | 1 | D | 20 | Cranial Fragment |  | adult, treated with treated with B72 |
| VIII | 1 | D | 21 | Thoracic Vertebra |  | adult, treated with treated with B72 |
| VIII | 1 | D | 22 | Thoracic Vertebra |  | billows on inferior of the body, treated with treated with B72 |
| VIII | 1 | D | 23 | Pelvis fragment |  | Part of the ischium and ilium, badly deteriorated, treated with b73, probable |

$\left.\begin{array}{ccccccc}\hline \text { VIII } & 1 & \text { D } & 24 & \text { Ilium fragment } & & \begin{array}{c}\text { adult, narrow sciatic } \\ \text { notch, treated with } \\ \text { treated with B72 }\end{array} \\ \hline \text { VIII } & 1 & \text { D } & 25 & \text { Humerus Fragment } & \text { Right } & \begin{array}{c}\text { Distal fragment, } \\ \text { trochlea is } \\ \text { symmetrical, medial } \\ \text { epiphysis is level, } \\ \text { olecranon fossa is } \\ \text { somewhat ovate }\end{array} \\ \hline \text { VII } & 1 & \text { D } & 26 & \text { Ilium fragment } & & \text { adult, crest fragment } \\ \text { 52.48, olecranon 23.04 mm }\end{array}\right]$

| VIII | 1 | D | 33 | Proximal Phalanx |  | and fire blackening |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | D | 34 | Thoracic Vertebra Fragment |  | Lamina, transverse process and articular facet fragment adult |  |
| VIII | 1 | D | 35 | Rib fragment |  | adult, shaft fragment fire blackening and calcium carbonate |  |
| VIII | 1 | D | 36 | Navicular | Right | Fire blackened |  |
| VIII | 1 | D | 37 | Rib fragment | Right | Vertebral and neck fragment, adult |  |
| VIII | 1 | D | 38 | Rib fragment |  | adult, shaft fragment fire blackening and calcium carbonate |  |
| VIII | 1 | D | 39 | Thoracic Vertebra Fragment |  | Young, body has billows pedicle is fused but line is visible |  |
| VIII | 1 | D | 40 | Thoracic Vertebra Fragment |  | Lamina fragment, adult |  |
| VIII | 1 | D | 41 | 2nd Metacarpal | Left | adult | 64.88 mm |
| VIII | 1 | D | 42 | 1st Metacarpal | Left | adult | 39.7 mm |
| VIII | 1 | D | 43 | Cuboid | Left | adult |  |
| VIII | 1 | D | 44 | Metacarpal Fragment |  | adult, distal fragment with some shaft |  |
| VIII | 1 | D | 45 | Intermediate Phalanx |  | adult, hand |  |
| VIII | 1 | D | 46 | Proximal Phalanx |  | adult, hand |  |
| VIII | 1 | D | 47 | Proximal Phalanx |  | adult, hand |  |


| VIII | 1 | D | 48 | 3rd Metatarsal | Right | adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 1 | D | 49 | 3rd Metacarpal | Right | adult |  |
| VIII | 1 | D | 50 | 2nd Metatarsal, fragment | Right | adult, proximal fragment |  |
| VIII | 1 | D | 51 | Ulna Fragment | Right | Proximal Fragment, covered in grayish calcium carbonate |  |
| VIII | 1 | D | 52 | Tibia Fragment | Right | Shaft Fragment, fire blackened |  |
| VIII | 1 | D | 53 | Tibia Fragment | Left | Shaft Fragment, fire blackened |  |
| VIII | 2 | a | 1 | Tibia Fragment | Right | Proximal and majority of the shaft (right at the flaring before the medial malleolus), most of the calcium carbonate is focused on the shaft, with more on the posterior surface, some vascularization at the tibial tuberosity | $\begin{gathered} \text { T7-6: } 2.5 \mathrm{~cm}, \mathrm{~T} 7- \\ 3: 12 \mathrm{~cm} \end{gathered}$ |
| VIII | 2 | a | 1 | molar |  | Duplicate Number |  |
| VIII | 2 | a | 2 | Tibia Fragment | Left | Proximal and shaft fragment, less than \#1, same individual as \#1, calcium carbonate mainly on the posterior surface of the shaft, some | $\begin{gathered} \text { T7-6: 2.7, T7- } \\ 5: 7.7 \mathrm{~cm}, \mathrm{~T} 7-\mathrm{T} 4: \\ 10 \mathrm{~cm} \\ \hline \end{gathered}$ |

vascularization at the tibial tuberosity

| VIII | 2 | a | 3 | Femur | Right | Complete, more of the calcium carbonate is on the posterior surface, there is taphonomic cracking of the shaft which has created a bowing affect, a shaft fragment is cemented to the neck, and there is damage to the trochanteric crest. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 4 | Scapula | Left | adult, burnt | 33.12 mm glenoid height, 25.12 mm wide |
| VIII | 2 | a | 5 | Proximal Phalanx |  | adult, burnt |  |
| VIII | 2 | a | 6 | 1st proximal phalanx |  | adult, burnt |  |
| VIII | 2 | a | 7 | Talus Fragment | Probable Right | adult, burnt |  |
| VIII | 2 | a | 8 | 1st Rib | Right | Child, burnt |  |
| VIII | 2 | a | 9 | Phalanx |  | Possible proximal of a child |  |
| VIII | 2 | a | 10 | Distal Phalanx |  | Foot, adult, burnt |  |
| VIII | 2 | a | 11 | 2nd rib | Left | Child, burnt |  |


| VIII | 2 | a | 12 | Thoracic Vertebra Fragment |  | Lamina fragment, unfused to the body, older child, burnt |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 13 | Patella | Right | adult, burnt | 41.88 mm |
| VIII | 2 | a | 14 | Vertebra Body |  | Probable Thoracic vertebra of a child, grey from burning |  |
| VIII | 2 | a | 15 | Thoracic Vertebra Fragment |  | adult, Inferior body fragment, burnt, possibly middle Thoracic |  |
| VIII | 2 | a | 16 | Proximal Phalanx |  | adult, foot |  |
| VIII | 2 | a | 17 | Proximal Phalanx |  | adult, foot |  |
| VIII | 2 | a | 18 | Proximal Phalanx |  | adult, foot |  |
| VIII | 2 | a | 19 | 1st proximal phalanx |  | Child, unfused, probably hand |  |
| VIII | 2 | a | 20 | Rib Fragment | Right | adult, upper 6, burnt |  |
| VIII | 2 | a | 21 | Scapula Fragment | Undetermined | Child, part of the lateral border and the spine |  |
| VIII | 2 | a | 22 | Thoracic Vertebra Fragment |  | Child, lamina fragment with a superior articular facet |  |
| VIII | 2 | a | 23 | Patella | Right | adult burnt | $\begin{gathered} 39.62 \text { patella } \\ \text { height } \end{gathered}$ |
| VIII | 2 | a | 24 | Proximal Phalanx |  | adult, foot, possible pathology on distal end (lytic malformation) |  |


| VIII | 2 | a | 25 | Humerus Epiphysis | Right | Child, burnt |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 26 | Metacarpal |  | Child, head not completely fused and proximal end is not fully developed |
| VIII | 2 | a | 27 | Thoracic Vertebra |  | Lamina is fused to the body, but the epiphysis line is still visible, taphonomic damage to the spine, middle Thoracic |
| VIII | 2 | a | 28 | 5th Metatarsal | Right | adult, burnt |
| VIII | 2 | a | 29 | Phalanx fragment |  | adult, proximal facet |
| VIII | 2 | a | 30 | Rib Fragment |  | Young Child, burnt |
| VIII | 2 | a | 31 | 3rd Cuneiform | Right | adult, burnt |
| VIII | 2 | a | 32 | Thoracic Vertebra Fragment |  | adult right transverse process, right superior articular facet and part of the lamina |
| VIII | 2 | a | 33 | 1st Metatarsal fragment |  | Distal end, young adult or older child, the epiphysis is fused but the line is very visible |
| VIII | 2 | a | 34 | Mandible Fragment | Right | Child, a molar had erupted and lost post mortem, a molar is in the crypt, burned |
| VIII | 2 | a | 35 | Manubrium Fragment |  | Superior portion, adult, burnt |


| VIII | 2 | a | 36 | Talus Fragment | Right | adult, burned |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 37 | Patella Fragment | Possible Right | adult (small), burnt |  |
| VIII | 2 | a | 38 | Navicular Fragment | Left | adult, concave facet with some of the other facet |  |
| VIII | 2 | a | 39 | Vertebra Body |  | Child, probable Thoracic, burnt, unfused |  |
| VIII | 2 | a | 40 | Proximal Phalanx |  | Child, unfused, probably hand |  |
| VIII | 2 | a | 41 | Lumbar Vertebra Fragment |  | Child, unfused lamina, burnt, possibly L4 or L5 |  |
| VIII | 2 | a | 42 | Thoracic Vertebra Fragment |  | Child, unfused lamina, burnt, possible middle Thoracic |  |
| VIII | 2 | a | 43 | Patella | Left | adult, burned | 46.18 mm |
| VIII | 2 | a | 44 | 1st Distal Phalanx |  | Young adult, or older child, the head does not appear fused, burned |  |
| VIII | 2 | a | 45 | Proximal Phalanx |  | adult, hand |  |
| VIII | 2 | a | 46 | Proximal Phalanx |  | adult, foot |  |
| VIII | 2 | a | 47 | Proximal Phalanx Fragment |  | Distal fragment, adult, possible foot |  |
| VIII | 2 | a | 48 | 2nd Metatarsal fragment | Right | proximal fragment, adult, burnt |  |
| VIII | 2 | a | 49 | Proximal Phalanx |  | adult, foot, burnt |  |


| VIII | 2 | a | 50 | 4th Metatarsal Fragment | Right | proximal fragment, adult, burnt |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 51 | Calcaneus | Right | Young Child (2-3), burnt | 32.27 mm length |
| VIII | 2 | a | 52 | Cervical Vertebra |  | adult, burnt, mid to lower cervical |  |
| VIII | 2 | a | 53 | Proximal Phalanx |  | adult, foot, burnt |  |
| VIII | 2 | a | 54 | Distal Phalanx |  | adult Hand, blackened |  |
| VIII | 2 | a | 55 | Intermediate Phalanx |  | adult Hand, blackened |  |
| VIII | 2 | a | 56 | Intermediate Phalanx |  | adult probable foot, blackened |  |
| VIII | 2 | a | 57 | Intermediate Phalanx |  | adult Hand, blackened |  |
| VIII | 2 | a | 58 | Scaphoid | Left | Largest scaphoid I've ever seen |  |
| VIII | 2 | a | 59 | Lunate | Left | adult, same individual as 57,59 , large person |  |
| VIII | 2 | a | 60 | Capitate | Right | adult, same as 57 and 58 |  |
| VIII | 2 | a | 61 | Capitate | Left | adult same as 57, 58, 59 |  |
| VIII | 2 | a | 62 | Ischium | Left | Child, burned |  |
| VIII | 2 | a | 63 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |  |
| VIII | 2 | a | 64 | Vertebra Body |  | Child, burned, possible Thoracic vertebra |  |


| VIII | 2 | a | 65 | Metacarpal |  | yet |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 66 | Distal Phalanx | adult, foot |  |
| VIII | 2 | a | 67 | 2nd Metacarpal <br> Fragment |  | Proximal Fragment, <br> adult, burnt, HUGE |
| VIII | 2 | a | 68 | Pubis | Right | Possible perinate, or <br> under 1 year, burnt |
| VIII | 2 | a | 69 | Intermediate Phalanx <br> (probable) | Child, proximal end <br> is not fully formed, <br> burnt |  |
| VIII | 2 | a | 70 | Scaphoid | Left | adult, small, burnt |
| VIII | 2 | a | 71 | Cervical Vertebra <br> Fragment |  | Child, pedicle fused, <br> major taphonomic <br> damage |
| VIII | 2 | a | 72 | Tibia Fragment | Left | Proximal end is <br> unfused, burned, no <br> older than 5 year |
| VIII | 2 | a | 73 | Proximal Phalanx | Older child or young <br> adult, foot |  |
| VIII | 2 | a | 74 | Cervical Vertebra |  | Lower cervical, adult, <br> burned |
| VIII | 2 | a | 75 | Cervical Vertebra <br> Fragment |  | right lamina and <br> superior articular <br> facet of an older <br> child, burned |
| VIII | 2 | a | 76 | a Rib Fragment | 77 | Ilium Fragment |


|  |  |  |  |  |  | surface is present, but burned |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 78 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |
| VIII | 2 | a | 79 | Rib Fragment | Right | Vertebral end fragment, adult, burned |
| VIII | 2 | a | 80 | Rib Fragment |  | Child, shaft fragment |
| VIII | 2 | a | 81 | Cervical Neural arch fragment | Right | Perinate to 1 year old probably, burned |
| VIII | 2 | a | 82 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |
| VIII | 2 | a | 83 | Cervical Vertebra Fragment |  | The dens from an adult C2 |
| VIII | 2 | a | 84 | Cervical Vertebra Fragment |  | Young adult of child based on the body, most of the lamina and transverse processes are gone |
| VIII | 2 | a | 85 | Phalanx |  | Child, possibly a distal hand |
| VIII | 2 | a | 86 | 1st Distal Phalanx |  | adult, foot, blackened |
| VIII | 2 | a | 87 | Coccyx |  | 1st Coccyx, unfused with the others, child |
| VIII | 2 | a | 88 | 1st proximal phalanx |  | Child, foot |
| VIII | 2 | a | 89 | Ulna Diaphysis | Possible Left | approximately 5 |
| VIII | 2 | a | 90 | Cervical Neural arch fragment | Left | Perinate most likely, burned |
| VIII | 2 | a | 91 | Intermediate Phalanx |  | Hand, probably child |


| VIII | 2 | a | Rib Fragment |  | Shaft fragment, <br> middle rib, probably <br> adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 93 | Lunate | Right | adult, burned |
| VIII | 2 | a | 94 | Rib Fragment | Sternal end, edges are <br> only slightly uneven, <br> young adult |  |
| VIII | 2 | a | 95 | Ilium Fragment | Possible Right | Perinate, appears to <br> be part of the <br> auricular facet for <br> articulation with the <br> sacrum, burned |
| VIII | 2 | a | 96 | Lumbar Vertebra <br> Fragment | Child, right portion, <br> burned |  |
| VIII | 2 | a | 97 | Metatarsal Fragment | Distal fragment, <br> adult, burned |  |
| VIII | 2 | a | 98 | Proximal Phalanx | Child, probably a <br> foot, unfused <br> epiphyses, blackened |  |
| VIII | 2 | a |  |  | Child, burned, <br> epiphyses are not well <br> formed yet |  |
| VIII | 2 | a | 100 | Metacarpal/Metatarsal | Intermediate phalanx | Cuboid |



|  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 116 | Temporal Fragment | Right | petrous portion, adult, burned |
| VIII | 2 | a | 117 | Thoracic Neural arch | Left | Probably perinate, burned |
| VIII | 2 | a | 118 | Rib Fragment |  | Shaft fragment, middle rib, child |
| VIII | 2 | a | 119 | Thoracic Vertebra Body |  | Child, burned, not fused to pedicle |
| VIII | 2 | a | 120 | 1st proximal phalanx |  | adult, foot, burned |
| VIII | 2 | a | 121 | Rib Fragment |  | Shaft Fragment, burned |
| VIII | 2 | a | 122 | Lumbar Vertebra Fragment |  | Inferior articular facet with some lamina, lipping is slight on the facet, adult, burned |
| VIII | 2 | a | 123 | Number Not assigned |  |  |
| VIII | 2 | a | 124 | Hamate | Right | adult, HUGE, burned |
| VIII | 2 | a | 125 | Thoracic Vertebra Fragment |  | lamina fragment, adult, burned, upper Thoracic |
| VIII | 2 | a | 126 | Unidentified Fragment |  | Large facet, burned, possibly from the foot, adult? |
| VIII | 2 | a | 127 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |
| VIII | 2 | a | 128 | Temporal Fragment | Left | petrous portion, adult, burned |
| VIII | 2 | a | 129 | Vertebra Body |  | Child, burned, |


| VIII | 2 | a | 130 | Metacarpal Fragment |  | possibly Thoracic |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 131 | 3rd Metatarsal <br> Fragment | Left | adult, proximal <br> fragment, burned |
| VIII | 2 | a | 132 | Metacarpal/Metatarsal |  | Child, ends not fully <br> developed |
| VIII | 2 | a | 133 | Cuboid | Right | adult, slightly burned |
| VIII | 2 | a | 134 | Neural arch | Right | Probable cervical of a <br> perinate |
| VIII | 2 | a | 135 | Lesser Multangular | Right | adult |
| VIII | 2 | a | 136 | Navicular Fragment |  | Probably a forming <br> navicular |
| VIII | 2 | a | 137 | Greater Multangular | Right | Child, not fully <br> developed |
| VIII | 2 | a | 138 | Thoracic Vertebra | Fragment | Transverse process <br> with part of the <br> superior articular <br> facet, adult |
| VIII | 2 | a | 139 | Tibia Epiphysis | Possible Left | Distal epiphysis of a <br> child |
| VIII | 2 | a | 140 | Thoracic Neural arch | Right | Perinate to very <br> young child, <br> taphonomic damage <br> to the lamina, burned |
| VIII | 2 | a | 141 | Vertebra Body |  | Child, possible <br> lumbar |
|  |  |  |  | Proximal epiphysis, <br> probably 5 years of <br> age |  |  |


| VIII | 2 | a | 143 | Cervical Neural arch | Left | Perinate to young child, burned |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 144 | Distal Phalanx |  | adult, probably the hand |
| VIII | 2 | a | 145 | Cervical Neural arch | Right | Perinate to young child, burned |
| VIII | 2 | a | 146 | Proximal Phalanx Fragment |  | distal fragment, adult, burned |
| VIII | 2 | a | 147 | Cervical Neural arch | Left | Perinate to young child, burned |
| VIII | 2 | a | 148 | Greater Multangular | Left | adult |
| VIII | 2 | a | 149 | Cervical Vertebra Fragment |  | Left portion of C1, adult, it is Huge |
| VIII | 2 | a | 150 | Lumbar Neural arch | Left | Perinate or young child |
| VIII | 2 | a | 151 | Intermediate Phalanx |  | adult, foot burned |
| VIII | 2 | a | 152 | 1st Metatarsal fragment | Undetermined | Proximal fragment, adult |
| VIII | 2 | a | 153 | Vertebra Body |  | Child, lumbar or Thoracic, burned |
| VIII | 2 | a | 154 | 1st proximal phalanx fragment |  | Child, distal fragment, epiphysis is barely fused, line clearly visible |
| VIII | 2 | a | 155 | Lunate | Left | adult, burned |
| VIII | 2 | a | 156 | Vertebra Fragment |  | Lamina fragment, adult, burned, possible cervical |


| VIII | 2 | a | 157 | 1st Metacarpal Epiphysis |  | $\begin{gathered} \text { Older child } \sim 8, \\ \quad \text { burned } \\ \hline \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 158 | Intermediate Phalanx |  | adult, foot, burned |
| VIII | 2 | a | 159 | Intermediate Phalanx |  | adult, foot, burned |
| VIII | 2 | a | 160 | Intermediate Phalanx |  | adult, foot, burned |
| VIII | 2 | a | 161 | Intermediate Phalanx |  | adult, foot, burned |
| VIII | 2 | a | 162 | Intermediate Phalanx |  | adult, foot, burned |
| VIII | 2 | a | 163 | Sesamoid |  | adult |
| VIII | 2 | a | 164 | Thoracic Neural arch | Right | Young child, burned |
| VIII | 2 | a | 165 | Coracoid Epiphysis |  | Child, unfused epiphysis surface |
| VIII | 2 | a | 166 | Thoracic Vertebra Fragment |  | adult, lamina fragment with left articular facets |
| VIII | 2 | a | 167 | Thoracic Vertebra Fragment |  | adult, lamina fragment with articular facet |
| VIII | 2 | a | 168 | Metacarpal Fragment |  | Distal fragment of just the head, adult |
| VIII | 2 | a | 169 | Metacarpal Fragment |  | Distal fragment of just the head, adult |
| VIII | 2 | a | 170 | Lumbar Neural arch | Right | Perinate or child, burned |
| VIII | 2 | a | 171 | Metacarpal Fragment |  | Distal fragment of just the head, adult |
| VIII | 2 | a | 172 | Cervical Neural arch | Undetermined | Perinate |
| VIII | 2 | a | 173 | Lunate | Left | Possibly an older child |


| VIII | 2 | a | 174 | Lumbar Vertebra Fragment |  | adult, inferior articular facet |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 175 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |  |
| VIII | 2 | a | 176 | Triquetral | Right | Child |  |
| VIII | 2 | a | 177 | 5th metatarsal Fragment |  | Distal fragment, adult, burned |  |
| VIII | 2 | a | 178 | 1st Proximal Phalanx |  | Child, foot |  |
| VIII | 2 | a | 179 | Thoracic Neural arch | Right | Perinate or young child, white from burning |  |
| VIII | 2 | a | 180 | 5th Distal and Intermediate Phalanx |  | adult, fused together |  |
| VIII | 2 | a | 181 | Intermediate Phalanx |  | adult, foot |  |
| VIII | 2 | a | 182 | Hyoid Body |  | Young Child, it may be the match for the horns found in VIII01B |  |
| VIII | 2 | a | 183 | Calcaneus | Left | young adult, or older child, burned | 66.73 mm |
| VIII | 2 | a | 184 | Talus | Right | adult, burned, grey | 62.16 mm length |
| VIII | 2 | a | 185 | Lumbar Vertebra |  | Child, Probably L5, burned, pedicle line is still visible |  |
| VIII | 2 | a | 186 | Ischium | Left | Child, burned |  |
| VIII | 2 | a | 187 | Cervical Vertebra |  | Child, mid to lower cervical, burned, bifurcated spine |  |


| VIII | 2 | a | 188 | Pubis | Right | Possibly same individual as 67, Child, burned |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 189 | 3rd Cuneiform | Left | adult, burned |  |
| VIII | 2 | a | 190 | Thoracic Vertebra Fragment |  | adult, HUGE, left transverse process and superior articular facet, part of body |  |
| VIII | 2 | a | 191 | 4th Metacarpal | Left | adult, extremely slender | 54.46 mm |
| VIII | 2 | a | 192 | 1st Proximal Phalanx |  | adult | 29.81 mm |
| VIII | 2 | a | 193 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |  |
| VIII | 2 | a | 194 | Ulna Fragment | Possible Left | Child, older than 5 years of age, distal fragment, epiphysis not yet fused |  |
| VIII | 2 | a | 195 | 3rd Metacarpal Fragment | Right | adult, possibly the huge dude, proximal fragment |  |
| VIII | 2 | a | 196 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |  |
| VIII | 2 | a | 197 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |  |
| VIII | 2 | a | 198 | 4th Metatarsal | Right | Child, head not yet fused, slightly burned |  |
| VIII | 2 | a | 199 | Intermediate phalanx |  | adult, hand, blackened | 29.45 mm |
| VIII | 2 | a | 200 | Proximal Phalanx |  | adult, hand | 33.92 mm |


| VIII | 2 | a | 201 | Intermediate Phalanx Fragment |  | adult, hand, proximal and shaft fragment, just missing the distal end, grey from burning |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 202 | 1st Distal Phalanx |  | adult, hand | 27.16 mm |
| VIII | 2 | a | 203 | Proximal Phalanx |  | adult, hand | 46.45 mm |
| VIII | 2 | a | 204 | 3rd Metacarpal Fragment | Left | Proximal and shaft fragment, adult, blackened |  |
| VIII | 2 | a | 205 | 4th Metacarpal | Left | adult, grey from burning | 61.34 mm |
| VIII | 2 | a | 206 | 2nd Metatarsal fragment | Left | adult, proximal fragment, burned |  |
| VIII | 2 | a | 207 | Proximal Phalanx |  | adult, foot, slightly burned | 28.14 mm |
| VIII | 2 | a | 208 | 1st Metacarpal | Right | adult, slightly blackened | 44.28 mm |
| VIII | 2 | a | 209 | Proximal Phalanx |  | adult, foot, slightly burned | 30.83 mm |
| VIII | 2 | a | 210 | Metacarpal Fragment |  | Child, proximal end is not fully formed, burnt, distal area is taphonomically broken |  |
| VIII | 2 | a | 211 | Rib Fragment | Possible Left | Child, Vertebral end fragment with an unfused epiphysis |  |
| VIII | 2 | a | 212 | Rib Fragment |  | adult, shaft fragment, middle rib, burned |  |


| VIII | 2 | a | 213 | Metacarpal/Metatarsal |  | Neonate, grey, burned, more likely foot | 26.66 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 214 | Metacarpal/Metatarsal |  | Neonate, grey, burned, more likely hand | 18.14 mm |
| VIII | 2 | a | 215 | Proximal Phalanx |  | adult, foot, slightly burned | 23.33 mm |
| VIII | 2 | a | 216 | Proximal Phalanx |  | adult, possible hand, slightly burned | 25.73 mm |
| VIII | 2 | a | 217 | Proximal Phalanx |  | adult, possible hand, slightly burned | 23.53 mm |
| VIII | 2 | a | 218 | Proximal Phalanx |  | adult, possible hand, slightly burned | 23.65 mm |
| VIII | 2 | a | 219 | Metatarsal Fragment |  | adult, distal fragment |  |
| VIII | 2 | a | 220 | Proximal Phalanx |  | adult, foot, grey and burned | 20.3 mm |
| VIII | 2 | a | 221 | Metatarsal Fragment |  | $\qquad$ |  |
| VIII | 2 | a | 222 | Metacarpal/Metatarsal |  | $\begin{aligned} & \text { Neonate, grey, } \\ & \text { burned, more likely } \\ & \text { foot } \end{aligned}$ | 22.72 mm |
| VIII | 2 | a | 223 | Rib Fragment |  | Sternal end, edges are only slightly uneven, young adult |  |
| VIII | 2 | a | 224 | Proximal Phalanx Fragment |  | adult, foot, slightly burned |  |
| VIII | 2 | a | 224 | Rib Fragment | Right | Child, upper 6, blackened |  |


| VIII | 2 | a | 225 | Rib Fragment | Probable Left | Child, Middle Rib |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 226 | Rib Fragment |  | adult, middle rib, shaft fragment |
| VIII | 2 | a | 227 | Fibula Fragment | Right | Distal Fragment, adult |
| VIII | 2 | a | 228 | 4th Metacarpal | Right | adult, slight blackening |
| VIII | 2 | a | 229 | Rib Fragment | Left | Child, lower 6, vertebral end |
| VIII | 2 | a | 230 | 3rd Metacarpal | Right | Child, head is not yet fused, and the proximal edge is not fully defined, blackened |
| VIII | 2 | a | 231 | Ulna Fragment | Left | Distal Fragment, adult, blackened |
| VIII | 2 | a | 232 | Rib Fragment | Left | adult, vertebral end, blackened |
| VIII | 2 | a | 233 | Rib Fragment | Right | adult, vertebral end, grey from burning |
| VIII | 2 | a | 234 | Rib Fragment | Possible Left | Sternal end, edges are only slightly uneven, interior surface is deep and relatively smooth, young adult |
| VIII | 2 | a | 235 | Rib Fragment |  | adult, probably rib 2, shaft fragment, grey and black from burning |


| VIII | 2 | a | 236 | 1st Rib |  | Left, adult, sternal end has some taphonomic damage, grayish from burning |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 237 | Rib Fragment | Right | adult, probably rib 46, slight orangish color with some grey |  |
| VIII | 2 | a | 238 | Rib Fragment | Right | adult, sternal end with most of the shaft and angle, grey from burning, some calcium carbonate, probably rib 6-8, sternal end is a little more uneven than 237, interior is still smooth with only slight pitting, young to middle aged adult. |  |
| VIII | 2 | a | 239 | Humerus Fragment | Left | Proximal Fragment with most of the shaft, massive deltoid tubercle, grayish calcium carbonate | $\begin{gathered} \hline 38.03 \mathrm{~mm} \text { head } \\ \text { diameter, H0- } \\ \mathrm{H} 1=6.23 \mathrm{~mm}, \\ \mathrm{H} 0-\mathrm{H} 2=11.92, \\ \mathrm{H} 0-\mathrm{H} 3=34.91, \\ \text { H0- } \\ \mathrm{H} 4=119.71 \mathrm{~mm} \\ \hline \end{gathered}$ |
| VIII | 2 | a | 240 | Navicular | Left | adult, taphonomic damage all around the facets, blackened |  |

Child, Shaft
fragment, with an
unfused head
adult, grey from
burning, distal end
has pathology similar

| VIII | 2 | a | 242 | Proximal Phalanx | to gout |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 243 | Proximal Phalanx | adult, probable foot, slightly grey | 23.13 mm |
| VIII | 2 | a | 244 | Metacarpal/Metatarsal | Child, not fully developed | 29.27 mm |
| VIII | 2 | a | 245 | Rib fragment | adult, shaft fragment, middle rib, burned |  |
| VIII | 2 | a | 246 | 1st Proximal Phalanx | adult, foot, large tubercle on the superior proximal surface, taphonomic damage on the plantar distal surface, black from fire | 29.5 mm |
| VIII | 2 | a | 247 | 1st Proximal Phalanx | adult, probably the mate to 246 , taphonomic damage is more sever |  |
| VIII | 2 | a | 248 | Proximal Phalanx | adult, probably foot | 27.66 mm |
| VIII | 2 | a | 249 | Proximal Phalanx | Child, hand, proximal end does not appear to be fused | 25.31 mm |
| VIII | 2 | a | 250 | Metacarpal Fragment | adult, shaft fragment |  |
| VIII | 2 | a | 251 | Intermediate Phalanx | adult, foot |  |


| VIII | 2 | a | 252 | Proximal phalanx |  | posterior surface | 30.76 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 253 | Metatarsal | Right | Child, probably fourth, grey from burning, $\sim 8$ or younger | 37.22 mm |
| VIII | 2 | a | 254 | 1st Rib | Right | Child, grey and white from burning |  |
| VIII | 2 | a | 255 | Distal Phalanx |  | adult, hand, grayish on palmar side | 18.87 mm |
| VIII | 2 | a | 256 | Proximal Phalanx |  | adult, hand, grey and black in color, distal end is rotated slightly counterclockwise | 33.61 mm |
| VIII | 2 | a | 257 | Intermediate Phalanx |  | adult, hand, blackened | 27.39 mm |
| VIII | 2 | a | 258 | Proximal Phalanx |  | adult, probably foot, grayish on superior surface | 24.78 mm |
| VIII | 2 | a | 259 | Proximal Phalanx Fragment |  | adult, probable foot, proximal fragment |  |
| VIII | 2 | a | 260 | Proximal Phalanx |  | adult, probably foot | 25.98 mm |
| VIII | 2 | a | 261 | Intermediate Phalanx |  | adult, hand, blackened | 31.06 mm |
| VIII | 2 | a | 262 | Scaphoid | Right | adult, HUGE, grayish from burning |  |
| VIII | 2 | a | 263 | 5th Metacarpal Fragment | Right | adult, proximal fragment, burned, and taphonomic damage |  |


| VIII | 2 | a | 264 | Proximal Phalanx Fragment |  | adult, hand, distal end | 45.34 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 265 | Proximal Phalanx |  | adult, Hand, blackened, taphonomic cracking |  |
| VIII | 2 | a | 266 | 2nd Metacarpal Fragment | Right | adult, proximal fragment with most of the shaft, blackened with grey calcium carbonate on the lateral and posterior surfaces |  |
| VIII | 2 | a | 267 | Humerus Fragment | Left | Perinate, proximal end with most of the shaft, grayish calcium carbonate on anterior surface |  |
| VIII | 2 | a | 268 | 4th Metatarsal Fragment | Left | adult, proximal fragment with shaft, taphonomic damage to the proximal end |  |
| VIII | 2 | a | 269 | Cervical Vertebra |  | 1st, adult, rather large |  |
| VIII | 2 | a | 270 | 5th Metatarsal | Right | adult, blackened from burning |  |
| VIII | 2 | a | 271 | 4th Metatarsal | Right | adult, black and grey from burning | 70.48 mm |
| VIII | 2 | a | 272 | 3rd Metatarsal | Right | adult, blackened from burning | 76.85 mm |
| VIII | 2 | a | 273 | Shaft Fragment |  | Child, possible perinate, unfused end, |  |

## grey from burning

| VIII | 2 | a | 274 | 5th Metatarsal | Right | adult, grey from burning and calcium carbonate on numerous surfaces | 77.37 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 275 | Femur Fragment | Left | Perinate, proximal fragment, calcium carbonate is on the anterior surface |  |
| VIII | 2 | a | 276 | Radius Fragment | Right | Child $\sim 1.5$ years old, distal fragment, calcium carbonate on all surfaces |  |
| VIII | 2 | a | 277 | Rib Fragment | Left | Vertebral end fragment, adult, burned, middle rib, calcium carbonate on the anterior surface |  |
| VIII | 2 | a | 278 | Shaft Fragment | Probable Left | Shaft Fragment, grey from burning, adult |  |
| VIII | 2 | a | 279 | Humerus Fragment | Left | adult Distal <br> Fragment, orangish discoloration, most calcium carbonate on lateral surfaces, medial epicondyle angled, trochlea symmetrical, olecranon fossa semi | 24.29 mm olecranon width, 53.04 mm epicondylar width |

triangular

| VIII | 2 | a | 280 | Proximal Phalanx |  | adult, grey burning and calcium carbonate on plantar surface | 25.6 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 281 | Cervical Neural arch | Right | Not fused to body or lamina yet, but too large to be a perinate, grey and blackened |  |
| VIII | 2 | a | 282 | Metatarsal Fragment (probably) |  | Child, proximal and shaft fragment, not fully developed |  |
| VIII | 2 | a | 283 | Metacarpal fragment (possibly) |  | Child, shaft fragment |  |
| VIII | 2 | a | 284 | Metacarpal/Metatarsal |  | Child, grey and white from burning, unfused ends | 24.45 mm |
| VIII | 2 | a | 285 | Intermediate Phalanx |  | adult, blackened from burning | 22.29 mm |
| VIII | 2 | a | 286 | Possible Vertebra fragment |  | adult? Circular facet is the only identifying feature |  |
| VIII | 2 | a | 287 | 1st Proximal Phalanx Fragment |  | Distal fragment, adult |  |


| VIII | 2 | a | 288 | Intermediate Phalanx Fragment |  | Proximal end has taphonomic damage, adult | 24.03 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 289 | Intermediate Phalanx |  | adult, taphonomic damage has vertically halved it | 28.97 mm |
| VIII | 2 | a | 290 | Vertebra Body |  | Child vertebra, possibly a lumbar due to the width |  |
| VIII | 2 | a | 291 | 5th Metatarsal Fragment | Left | Distal end, adult, white and grey from burning |  |
| VIII | 2 | a | 292 | Rib Fragment |  | Child, shaft fragment, blackened |  |
| VIII | 2 | a | 293 | Proximal Phalanx |  | Neonate, possible hand | 14.26 |
| VIII | 2 | a | 294 | Proximal Phalanx |  | Neonate, possible hand | 15.27 |
| VIII | 2 | a | 295 | Thoracic Neural arch | Left | Perinate |  |
| VIII | 2 | a | 296 | Rib Fragment |  | Child, blackened |  |
| VIII | 2 | a | 297 | Tibia Epiphysis | Possible Left | Distal epiphysis of a child | $\begin{gathered} 23.94 \mathrm{~mm} \text { lat to } \\ \text { med } \\ \hline \end{gathered}$ |
| VIII | 2 | a | 298 | Clavicle Fragment | Left | Neonate lateral fragment |  |
| VIII | 2 | a | 299 | Radius Epiphysis |  | Child | 9.42 mm |
| VIII | 2 | a | 300 | Proximal Phalanx |  | Neonate, foot | 9.13 mm |
| VIII | 2 | a | 301 | Lumbar Neural arch |  | Maybe a year old, grey from burning |  |
| VIII | 2 | a | 302 | Vertebra Fragment |  | Possible lumbar lamina with an |  |

inferior articular facet

| VIII | 2 | a | 303 | Intermediate phalanx |  | adult, slightly <br> blackened |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 304 | 5th Metacarpal <br> Fragment (possibly) | adult, shaft fragment, <br> slightly burned |  |
| VIII | 2 | a | 305 | Radius Epiphysis | Child 1.5 years of <br> age, distal epiphysis |  |
| VIII | 2 | a | 306 | Rib Fragment | adult, shaft fragment | Child |
| VIII | 2 | a | 307 | Coracoid Epiphysis | Child, distal <br> fragment, older than <br> VIII | 2 |
|  |  | a | 308 | Proximal Phalanx <br> Fragment | Child, possibly under <br> 8 |  |
| VIII years old, |  |  |  |  |  |  |


| VIII | 2 | a | 315 | Proximal Phalanx <br> Fragment |  | adult, proximal <br> fragment, blackened |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 316 | Proximal Phalanx | Child, possible foot | 25.51 mm |
| VIII | 2 | a | 317 | Ulna Fragment | Possible Right | Child $\sim 1.5$ years old, <br> proximal fragment, <br> medial surface is <br> gone, badly burned |
| VIII | 2 | a | 318 | Undetermined <br> Epiphysis Fragment | Child, Somewhat <br> ovate shape and thick |  |
| VIII | 2 | a | 319 | Metatarsal Fragment |  | Proximal fragment, <br> child, burned |
| VIII | 2 | a | 320 | Proximal Phalanx |  | Neonate-1 year, hand, <br> burned |
| VIII | 2 | a | 321 | Metatarsal Fragment |  | Proximal fragment, <br> child, burned |
| VIII | 2 | a | 322 | Capitate | Right | adult |
| VIII | 2 | a | 323 | Proximal Phalanx <br> Fragment |  | adult, proximal |
| fragment |  |  |  |  |  |  |

of the ramus

| VIII | 2 | a | 332 | Distal Phalanx |  | adult, distal portion is damaged |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 333 | Metacarpal/Metatarsal |  | Child, maybe a year old |  |
| VIII | 2 | a | 334 | Intermediate Phalanx |  | adult | 26.63 mm |
| VIII | 2 | a | 335 | Intermediate Phalanx |  | adult | 22.32 mm |
| VIII | 2 | a | 336 | Proximal Phalanx |  | Child, neonate, hand | 12.51 mm |
| VIII | 2 | a | 337 | Proximal/Intermediate Phalanx |  | Child, neonate, hand | 9.18 mm |
| VIII | 2 | a | 338 | Intermediate Phalanx |  | adult, foot |  |
| VIII | 2 | a | 339 | Proximal/Intermediate Phalanx |  | Child, neonate, hand | 11.0 mm |
| VIII | 2 | a | 340 | Proximal Phalanx |  | Child, neonate, foot |  |
| VIII | 2 | a | 341 | Thoracic Neural arch | Left | Young Child |  |
| VIII | 2 | a | 342 | Proximal Phalanx |  | Child, neonate, hand? | 14.14 mm |
| VIII | 2 | a | 343 | Vertebra Fragment |  | Unknown |  |
| VIII | 2 | a | 344 | Distal Phalanx |  | Child, possible hand | 16.84 mm |
| VIII | 2 | a | 345 | Undetermined Epiphysis |  | Roundish and thick, possible trochanter |  |
| VIII | 2 | a | 346 | Distal Phalanx (Probably) |  | Young child, grey from burning, taphonomic damage | 13.18 mm |
| VIII | 2 | a | 347 | Distal Phalanx |  | adult, foot | 9.78 mm |
| VIII | 2 | a | 348 | Proximal Phalanx |  | adult hand, posterior surface grey from burning |  |


|  |  |  |  |  | Neonate, some <br> taphonomic damage <br> to the ends |  | 22.35 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 349 | Metacarpal/Metatarsal |  | Horn of a child, <br> smaller end is <br> fractured |  |
| VIII | 2 | a | 350 | Hyoid Fragment | Possible Left |  | Perinate to young <br> child, burned |
| VIII | 2 | a | 351 | Cervical Neural arch |  |  | Neonate |

$\left.\begin{array}{lccccccc}\text { VIII } & 2 & \text { a } & 361 & \begin{array}{c}\text { 2nd Metacarpal } \\ \text { Fragment }\end{array} & \text { Right } & \text { adult, proximal } \\ \text { fragment, burned }\end{array}\right]$

| VIII | 2 | a | 372 | Vertebra Body Fragment | Child, burned, one pedicle is partly fused, line visible, probable Thoracic |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 373 | Lumbar Vertebra Fragment | adult, anterior portion of the body, some lytic activity on the body, burned |
| VIII | 2 | a | 374 | Lumbar Vertebra Fragment | adult, anterior portion of the body, some lytic activity on the body, burned |
| VIII | 2 | a | 375 | Thoracic Vertebra | adult, grey from burning, inferior portion of the body is only surface without calcium carbonate, demi facets are roughly the same size, middle Thoracic |
| VIII | 2 | a | 376 | Thoracic Vertebra | adult, upper Thoracic, slightly burned, inferior demi facets are slightly larger, upper Thoracic |
| VIII | 2 | a | 377 | Thoracic Vertebra | adult, upper Thoracic, slightly burned, inferior demi facets are slightly larger, upper Thoracic, anterior inferior |

portion of the body has an indentation (abnormality)

| VIII | 2 | a | 378 | Thoracic Vertebra |  | adult, upper Thoracic, superior articular facet larger than inferior, slightly burned, anterior inferior portion of body has indentation, superior articulation to 377 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 379 | Lumbar Vertebra |  | adult, possible L4 or L5, body fused, line barely visible, slightly burned, calcium carbonate on superior surface |
| VIII | 2 | a | 380 | Thoracic Vertebra |  | adult, only one demi facet mid body, body semi lytic, body line visible |
| VIII | 2 | a | 381 | Rib | Left | adult, lower 6, sternal end rim is smooth, no projections, interior surface is not very deep, but is smooth, some calcium carbonate on the |

interior posterior surface

| VIII | 2 | a | 382 | Rib Fragment | Left | adult, Lower 6, vertebral end fragment, calcium carbonate on interior posterior surface. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 383 | Humerus Fragment | Right | adult, distal end, hole through the olecranon fossa, olecranon fossa is more ovate, trochlea is asymmetrical, medial epicondyle somewhat level | 24.54 mm fossa width, epicondylar width greater than 55.97 mm |
| VIII | 2 | a | 384 | Thoracic Vertebra |  | Child, billows on body, inferior burned, pedicle lines still visible, mid Thoracic, demi facets of roughly equal size |  |
| VIII | 2 | a | 385 | 1st Distal Phalanx | Left | adult, foot | 26.11 mm |
| VIII | 2 | a | 386 | Frontal Fragment |  | adult, burned and blackened, slight modification, lytic activity noticeable on the interior surface |  |
| VIII | 2 | a | 387 | 1st Distal Phalanx |  | Child, foot | 13.64 mm |


| VIII | 2 | a | 388 | 5th Metatarsal | Left | adult, blackened from burning | 76.02 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 389 | Rib Fragment | Left | adult, sternal end, grey from burning, sternal end is semi wavy, some lytic activity on interior surface |  |
| VIII | 2 | a | 390 | Humerus Fragment | Left | adult, large burned, damage to medial epicondyle area so measurements were not taken |  |
| VIII | 2 | a | 391 | Proximal Phalanx Fragment |  | adult, hand, distal fragment |  |
| VIII | 2 | a | 392 | Femur Fragment | Left | adult, calcium carbonate on head and shaft, proximal end fragment, large muscle attachment right under the midpoint of the trochanteric crest | 40.62 mm head diameter |
| VIII | 2 | a | 393 | Ulna Fragment | Left | adult, proximal fragment, calcium carbonate on medial surface, large muscle attachments |  |


| VIII | 2 | a | 394 | 5th Metacarpal | Right | adult, large muscle attachment on lateral distal end widens the shaft, grey and blackened | 55.93 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 395 | 1st Metacarpal | Right | adult, large muscle attachments at distal shaft end widens the shaft, slight discoloration from burning | 50.06 mm |
| VIII | 2 | a | 396 | Proximal Phalanx |  | adult, hand | 42.86 mm |
| VIII | 2 | a | 397 | Intermediate Phalanx |  | adult, foot | 16.07 mm |
| VIII | 2 | a | 398 | Ilium Fragment | Left | Child, badly burned, most of crest is gone |  |
| VIII | 2 | a | 399 | 5th Metatarsal | Right | adult, proximal end is damaged, burned | 58.07 mm |
| VIII | 2 | a | 400 | Sacral Vertebra |  | Child, probably the first, lamina in process of fusing to other lamina |  |
| VIII | 2 | a | 401 | Fibula Fragment |  | Shaft fragment |  |
| VIII | 2 | a | 402 | Ulna Fragment | Right | Mate to 393, proximal fragment, calcium carbonate on medial surface, huge muscle attachments |  |
| VIII | 2 | a | 403 | Tibia Fragment | Left | Child, shaft fragment, burned, $\sim 1.5$ years old |  |


| VIII | 2 | a | 404 | Clavicle Fragment | Right | Child, burned | 72.36 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 405 | 2nd Metatarsal | Left | adult, burned | 72.84 mm |
| VIII | 2 | a | 406 | Clavicle Fragment | Left | Child, older than 404, shaft fragment | 74.16 mm is fragment length |
| VIII | 2 | a | 407 | Rib Fragment | Left | adult, vertebral end, blackened |  |
| VIII | 2 | a | 408 | Metatarsal Fragment (probably) |  | Child, proximal fragment and shaft, distal end not fully formed |  |
| VIII | 2 | a | 409 | 1st Metacarpal fragment |  | adult, distal fragment, rib fragments fused to the shaft |  |
| VIII | 2 | a | 410 | Metacarpal Fragment |  | Child, taphonomic damage to the distal and proximal ends |  |
| VIII | 2 | a | 411 | Navicular | Left | adult, damaged |  |
| VIII | 2 | a | 412 | Rib Fragment |  | adult, upper 6 rib, sternal end, rim is relatively flat and the sternal facet is not deep or smooth, the cortical layer of bone over the surface of the rib is gone in numerous areas |  |
| VIII | 2 | a | 413 | Radius Fragment | Right | Child, distal and shaft fragment |  |
| VIII | 2 | a | 414 | Metatarsal Fragment |  | Child, mostly shaft fragment |  |


| VIII | 2 | a | 415 | Rib Fragment | Probable Right | Child, blackened |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 416 | Intermediate Phalanx Fragment |  | adult, hand, distal end |  |
| VIII | 2 | a | 417 | Metatarsal Fragment |  | adult, distal fragment, burned |  |
| VIII | 2 | a | 418 | Distal Phalanx |  | adult, hand | 18.45 mm |
| VIII | 2 | a | 419 | Neural arch Fragment | Left | Perinate, possible Thoracic or Lumbar vertebra |  |
| VIII | 2 | a | 420 | Thoracic Vertebra Fragment |  | adult, transverse process with articular facet |  |
| VIII | 2 | a | 421 | Rib Fragment |  | Child, arch fragment |  |
| VIII | 2 | a | 422 | Intermediate Phalanx Fragment |  | adult, proximal fragment |  |
| VIII | 2 | a | 423 | Shaft Fragment |  | adult, burned, morphological damage from heat |  |
| VIII | 2 | a | 424 | Radius | Right | adult, burned, became fragmentary during analysis, attempt was made to repair with treated with B72, head was deteriorated prior, length is a very close estimate taken after repair | 24 cm |
| VIII | 2 | a | 425 | Thoracic Vertebra Body |  | Child, Burned, unfused |  |


| VIII | 2 | a | 426 | Cervical Vertebra Body |  | Child, Burned, unfused |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 427 | Thoracic Neural arch | Left | Child, part of the body appears either deformed or fused at the pedicle area |  |
| VIII | 2 | a | 428 | Cervical Vertebra Body |  | Child, Burned, unfused |  |
| VIII | 2 | a | 429 | Intermediate Phalanx |  | Child Hand, possibly 8 yrs or younger | 13.17 mm |
| VIII | 2 | a | 430 | Cervical Neural arch | Left | Perinate |  |
| VIII | 2 | a | 431 | Proximal Phalanx |  | Child Hand, possibly 8 yrs or younger | 15.81 mm |
| VIII | 2 | a | 432 | Lunate |  | Child Hand, possibly 8 yrs or younger |  |
| VIII | 2 | a | 433 | Proximal Phalanx |  | Child Hand, possibly 8 yrs or younger | 10.93 mm |
| VIII | 2 | a | 434 | Metacarpal/Metatarsal Head |  | Child, unfused head |  |
| VIII | 2 | a | 435 | Proximal Phalanx |  | Child Hand, possibly 8 yrs or younger | 16.51 mm |
| VIII | 2 | a | 436 | Intermediate Phalanx |  | Child Hand, possibly 8 yrs or younger | 10.67 mm |
| VIII | 2 | a | 437 | Pisiform | Right | adult |  |
| VIII | 2 | a | 438 | Distal Phalanx |  | adult, foot |  |
| VIII | 2 | a | 439 | Metatarsal Head |  | Child, unfused head |  |
| VIII | 2 | a | 440 | Metatarsal Head |  | Child, unfused head |  |
| VIII | 2 | a | 441 | Cervical Vertebra Body |  | Child, Burned, unfused |  |


| VIII | 2 | a | 442 | Intermediate Phalanx |  | adult, foot |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 443 | Intermediate Phalanx |  | adult, foot |  |
| VIII | 2 | a | 444 | Proximal Phalanx Fragment |  | Child Hand, distal fragment, possibly 8 yrs or younger |  |
| VIII | 2 | a | 445 | Sacral Vertebra Fragment |  | Child, unfused, probably a lower vertebra of a child 5-8 yrs old |  |
| VIII | 2 | a | 446 | Cervical Neural arch | Right | Perinate, burned |  |
| VIII | 2 | a | 447 | Thoracic Vertebra Fragment |  | adult, right lamina fragment and transverse process with a facet on it |  |
| VIII | 2 | a | 448 | 1st Distal Phalanx |  | adult, hand, taphonomic damage at the distal end, blackened |  |
| VIII | 2 | a | 449 | Proximal Phalanx |  | Child Hand, possibly 8 yrs or younger | 13.81 mm |
| VIII | 2 | a | 450 | Lunate | Right | adult, grey and covered with some calcium carbonate, rib fused to it |  |
| VIII | 2 | a | 451 | Intermediate Phalanx |  | adult, foot |  |
| VIII | 2 | a | 452 | Distal Phalanx |  | Child, possible 1st hand phalanx | 17.77 mm |
| VIII | 2 | a | 453 | Possible Navicular Fragment |  | Child, smooth facets similar to a navicular but underdeveloped |  |

margins

| VIII | 2 | a | 454 | Capitate | Left | Child, not fully developed |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 455 | Metacarpal/Metatarsal Fragment |  | Head distal fragment, adult |
| VIII | 2 | a | 456 | Metacarpal Fragment |  | adult, proximal fragment, facet only |
| VIII | 2 | a | 457 | Rib Fragment | Probably Right | Child, arch fragment with some of the shaft, upper 6, grey and black from burning |
| VIII | 2 | a | 458 | Rib Fragment | Probably Right | Child, arch fragment with some of the shaft, upper 6, grey and black from burning |
| VIII | 2 | a | 459 | Pisiform | Left | adult, possibly the same as 437 |
| VIII | 2 | a | 460 | Metacarpal Fragment |  | Distal head unfused |
| VIII | 2 | a | 461 | Thoracic Vertebra Body |  | Child, unfused, grey from burning |
| VIII | 2 | a | 462 | Distal Phalanx |  | adult, foot |
| VIII | 2 | a | 463 | Proximal Phalanx Fragment |  | adult or older child, distal fragment of the foot |
| VIII | 2 | a | 464 | Rib Fragment |  | Child, Vertebral end fragment with an unfused epiphysis |


| VIII | 2 | a | 465 | Rib Fragment |  | grey from burning |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 466 | Rib Fragment |  | adult, shaft fragment |
| VIII | 2 | a | 467 | Rib Fragment |  | adult, shaft fragment |
| VIII | 2 | a | 468 | Vertebra Body Fragment |  | Possible Thoracic or lumbar fragment from an adult, badly deteriorated, lytic activity on surface of body |
| VIII | 2 | a | 469 | Rib Fragment |  | adult, shaft fragment, some fire blackening |
| VIII | 2 | a | 470 | Proximal Phalanx Fragment |  | adult, foot, proximal fragment of just the facet |
| VIII | 2 | a | 471 | Rib Fragment |  | adult, shaft fragment, some fire blackening |
| VIII | 2 | a | 472 | Ilium Fragment | Left | Fragment of a young child, under 5 most likely, auricular surface is present |
| VIII | 2 | a | 473 | Talus Fragment | Right | Child, burned, possibly close to 5 years of age |
| VIII | 2 | a | 474 | Talus Fragment | Probable Left | adult, burned, facets on plantar side are visible |
| VIII | 2 | a | 475 | Fibula Fragment | Left | Distal Fragment, adult |


| VIII | 2 | a | 476 | Navicular Fragment | Probable Left | Burned and deteriorated, adult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 477 | Thoracic Vertebra Fragment |  | Body fragment, adult, demi facets are just barely visible, body is semi lytic |
| VIII | 2 | a | 478 | Patella Fragment | Left | Badly burned, adult, edges deteriorated |
| VIII | 2 | a | 479 | 2nd Cuneiform | Probable Right | adult, burned, slightly deteriorated |
| VIII | 2 | a | 480 | Humerus Epiphysis | Left | Proximal head epiphysis already fused to the greater and lesser trochanter |
| VIII | 2 | a | 481 | Unidentified Fragment |  |  |
| VIII | 2 | a | 482 | Vertebra Fragment |  | Body Fragment, Thoracic or lumbar of an adult |
| VIII | 2 | a | 483 | Talus Fragment | Right | adult, burned, probably not the same individual as 474 |
| VIII | 2 | a | 484 | Thoracic Vertebra Fragment |  | Body fragment, adult, demi facets are just barely visible, body is semi lytic |
| VIII | 2 | a | 485 | 2nd Cuneiform | Probable Left | adult, burned, slightly deteriorated, probable mate to 479 |


| VIII | 2 | a | 486 | Vertebra Fragment |  | Body fragment, adult, thickness suggests Thoracic |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 487 | Lumbar Vertebra Fragment |  | adult, superior articular facet and a transverse process |
| VIII | 2 | a | 488 | 3rd Cuneiform | Undetermined | adult, facets are too badly burned to identify |
| VIII | 2 | a | 489 | Vertebra Fragment |  | Body fragment, adult, thickness suggests Thoracic |
| VIII | 2 | a | 490 | Vertebra Fragment |  | Body fragment, adult, thickness suggests Thoracic |
| VIII | 2 | a | 491 | Unidentified Fragment |  |  |
| VIII | 2 | a | 492 | Lumbar Vertebra Fragment |  | adult, facet fragment |
| VIII | 2 | a | 493 | Thoracic Vertebra Fragment |  | Lamina fragment with part of a transverse process, burned, adult |
| VIII | 2 | a | 494 | Femur Epiphysis (probably) |  | Head epiphysis, burned |
| VIII | 2 | a | 495 | Cuboid | Possible Right | adult, burned, large facet is the only real marker |
| VIII | 2 | a | 496 | Lumbar Vertebra Fragment |  | articular Facet, adult, burned |


| VIII | 2 | a | 497 | Vertebra Fragment |  | Body fragment, adult, only cortical bone left, no cortical |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 498 | Tibia Epiphysis | Possible Left | Proximal Facet | 27.84 mm |
| VIII | 2 | a | 499 | Vertebra Fragment |  | Body Fragment, undeterminable, adult, burned |  |
| VIII | 2 | a | 500 | Unidentified Fragment |  |  |  |
| VIII | 2 | a | 501 | Vertebra Fragment |  | Child, burned, and missing much of it |  |
| VIII | 2 | a | 502 | Tibia Fragment | Right | adult, proximal , badly deteriorated due to burning |  |
| VIII | 2 | a | 503 | Proximal Phalanx Fragment |  | adult Hand, proximal fragment |  |
| VIII | 2 | a | 504 | Thoracic Vertebra Fragment |  | adult body fragment with the left pedicle, burned |  |
| VIII | 2 | a | 505 | Calcaneus Fragment | Left | adult, burned, cannot take length measurement |  |
| VIII | 2 | a | 506 | Lumbar Fragment |  | Child, everything is fused, but small in size, burned and badly deteriorated |  |
| VIII | 2 | a | 507 | Head Fragment |  | adult, undeterminable if it is femur or humerus, burned |  |
| VIII | 2 | a | 508 | Talus Fragment | Right | adult, burned | 58.04 mm |


| VIII | 2 | a | 509 | Unidentified Fragment |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | a | 510 | Femur Epiphysis |  | Head, proximal <br> epiphysis |
| VIII | 2 | a | 511 | Talus Fragment | Right | adult, burned, <br> proximal end |
| VIII | 2 | a | 512 | Patella Fragment | Possible Right | adult, badly burned, <br> and much of one of <br> the facets (probable <br> medial) is mostly <br> gone |
| VIII | 2 | a | 513 | Femur Fragment |  | Right |

\(\left.$$
\begin{array}{cccccc}\text { VIII } & 2 & \text { a } & 520 & \text { Coccyx Fragment } & \begin{array}{c}\text { adult, two fused, and } \\
\text { fragmentary from } \\
\text { burning }\end{array} \\
\text { VIII } & 2 & \text { a } & 521 & \text { 1st Metacarpal fragment } & \begin{array}{c}\text { Child, shaft with } \\
\text { proximal epiphysis, } \\
\text { which is fused but } \\
\text { line is visible }\end{array} \\
\hline \text { VIII } & 2 & \text { a } & 522 & \begin{array}{c}\text { Vertebra Body } \\
\text { Fragment }\end{array} & \begin{array}{c}\text { Child, burned, } \\
\text { possible Thoracic } \\
\text { vertebra based on size }\end{array} \\
\hline \text { VIII } & 2 & \text { a } & 523 & \text { Femur Fragment } & \begin{array}{c}\text { adult, condyle } \\
\text { fragment, burned }\end{array}
$$ <br>
\hline VIII \& 2 \& a \& 524 \& Unidentified Fragment \& <br>
\hline VIII \& 2 \& a \& 525 \& Proximal Phalanx \& Child, maybe 8 or <br>

younger\end{array}\right]\)| VIII |
| :--- |
| 2 |


|  |  |  |  |  |  | on the interior, expanded diploë (more noticeable at the suture line |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | B | 3 | Unidentified Fragment |  | Possibly from the cranium (maxilla or zygomatic maybe) |
| VIII | 2 | B | 4 | Rib Fragment |  | adult, burned, middle rib, shaft fragment |
| VIII | 2 | B | 5 | 3rd Metacarpal <br> Fragment (probably) | Possible right | Shaft fragment with the general shape of the proximal end, adult, burned |
| VIII | 2 | B | 6 | Unidentified Fragment |  | Slightly burned |
| VIII | 2 | B | 7 | Sphenoid Fragment (Probably) |  | Burned, adult, cranial $\qquad$ |
| VIII | 2 | B | 8 | Rib Fragment |  | adult, burned, middle rib, shaft fragment |
| VIII | 2 | B | 9 | Metacarpal Fragment |  | adult, burned, distal head and shaft |
| VIII | 2 | B | 10 | Vertebra Fragment |  |  |
| VIII | 2 | B | 11 | Rib Fragment | Right | Vertebral end fragment, adult, burned, upper rib |
| VIII | 2 | B | 12 | Distal Phalanx |  | adult, foot, taphonomic damage to eh proximal end |
| VIII | 2 | B | 13 | Rib Fragment | Left | Vertebral end fragment, adult, |

burned, upper rib

| VIII | 2 | B | 14 | Proximal Phalanx |  | adult, foot, burned |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | B | 15 | Proximal Phalanx |  | adult, foot, burned |
| VIII | 2 | B | 16 | 2nd Cuneiform | Left | adult, burned |
| VIII | 2 | B | 17 | 2nd Cuneiform | Right | adult, burned |
| VIII | 2 | B | 18 | Capitate | Left | adult, burned |
| VIII | 2 | B | 19 | 3rd Cuneiform | Right | adult, slightly burned |
| VIII | 2 | B | 20 | Navicular Fragment | Left | adult, burned, taphonomic damage |
| VIII | 2 | B | 21 | 3rd Cuneiform | Left | adult, burned |
| VIII | 2 | B | 22 | Scapula Fragment (Probable) | Undetermined | Probable coracoid process |
| VIII | 2 | B | 23 | Cuboid | Left | adult, burned |
| VIII | 2 | B | 24 | Thoracic Vertebra Fragment |  | adult, burned, most of the body and some of the pedicle is preserved |
| VIII | 2 | B | 25 | Ischium Fragment | Left | Most of the ischial tuberosity and some of the lunate surface, adult, burned |
| VIII | 2 | B | 26 | Frontal Fragment |  | Fragment has part of the supraorbital torus and the frontal sinus, adult, burned |
| VIII | 2 | B | 27 | Frontal Fragment |  | Has rest of frontal crest, cross mends with \#1, adult, burned |


| VIII | 2 | B | 28 | Frontal Fragment |  | Superior portion of <br> the left orbit, <br> rounded, possible <br> male, adult, burned |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | B | 29 | Radius Fragment | Right | Shaft fragment just <br> below the tuberosity, <br> adult, burned |
| VIII | 2 | B | 30 | Radius Fragment | Left | distal fragment, adult, <br> burned |
| VIII | 2 | B | 31 | 2nd Metacarpal | Right | adult, slightly burned, <br> very large proximal <br> lateral facet |
| VIII | 2 | B | 32 | Thoracic Vertebra |  | adult, but the body <br> epiphysis line is still <br> visible, burned, <br> middle Thoracic |
| VIII | 2 | B | 33 | Rib | Right | adult, upper 6, burnt |
| VIII | 2 | B | 34 | 3rd cuneiform | Right | adult, burned |


|  |  |  |  |  |  | process, cross mends with 38 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | B | 41 | Thoracic Vertebra |  | adult, upper Thoracic, left transverse process slightly burned |  |
| VIII | 2 | B | 42 | Lumbar Vertebra |  | Probably L2, adult, burned |  |
| VIII | 2 | B | 43 | Thoracic Vertebra Fragment |  | Body with the superior articular facets, adult, burned |  |
| VIII | 2 | B | 44 | Calcaneus | Right | adult, slightly burned | 80.41 mm length |
| VIII | 2 | B | 45 | 4th tarsal fragment | Possible Left | Distal facet morphology suggests left, while lateral and medial suggests right |  |
| VIII | 2 | B | 46 | 5th Metacarpal | Right | adult, slightly burned on the proximal end |  |
| VIII | 2 | B | 47 | 3rd Metacarpal | Left | adult, slightly burned and blackened |  |
| VIII | 2 | B | 48 | 2nd Metacarpal | Left | adult, completely grey from burning |  |
| VIII | 2 | B | 49 | Thoracic Vertebra Fragment |  | Left superior articular facet and transverse process, facet on process, slightly burned |  |
| VIII | 2 | B | 50 | 5th Metatarsal Fragment | Right | proximal end, burned, adult |  |
| VIII | 2 | B | 51 | Intermediate Phalanx |  | adult, hand, burned |  |


| VIII | 2 | B | 52 | 1st Distal Phalanx <br> Fragment |  | adult, damage to the <br> proximal end |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 2 | B | 53 | Proximal Phalanx |  | adult, foot |
| VIII | 2 | B | 54 | Cuboid | adult, burned, mate to |  |
| VIII | 2 | B | 55 | Cuboid | Right | adult, burned, mate to <br> 54 |
| VIII | 2 | B | 56 | Thoracic Vertebra <br> Fragment |  | Body fragment, demi <br> facets are roughly <br> similar in size, mid <br> Thoracic, adult, <br> burned |
| VIII | 2 | B | 57 | Vertebra Body |  | adult, burned, small, <br> possible Thoracic or <br> cervical |
| VIII | 2 | B | 58 | Unidentified Fragment |  |  |
| VIII | 2 | B | 59 | Navicular |  | Right |



| VIII | 4 | 11 | Rib Fragment | coloring with some orange |
| :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 12 | Rib Fragment | adult, shaft fragment, middle rib, grayish coloring with some orange |
| VIII | 4 | 13 | Scapula Fragment | Coracoid process |
| VIII | 4 | 14 | Ilium Fragment | adult Crest fragment, grayish black color |
| VIII | 4 | 15 | Vertebra fragment | adult, grayish coloring, transverse process with an articular facet (probable Thoracic) |
| VIII | 4 | 16 | Vertebra fragment | adult, grayish coloring, transverse process with an articular facet (probable Thoracic) |
| VIII | 4 | 17 | Cranial Fragment | grayish coloring |
| VIII | 4 | 18 | Temporal Fragment | Part of the zygomatic process and the mandibular fossa are Left $\quad$ visible |
| VIII | 4 | 19 | Rib Fragment | adult, shaft fragment, middle rib, grayish coloring |


| VIII | 4 | 20 | Vertebra fragment |  | Probable cervical, articular facet present along with what appears to be part of a transverse foramen, grayish coloring |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 21 | Vertebra fragment |  | Probable lumbar based on the vertical positioning of the articular facet, adult, grayish coloring. |
| VIII | 4 | 22 | Radius Fragment | Undetermined | Shaft fragment of an adult, grayish coloring |
| VIII | 4 | 23 | Hamate | Left | adult, grayish coloring |
| VIII | 4 | 24 | Rib Fragment |  | adult, shaft fragment, middle rib, grayish coloring with some orange |
| VIII | 4 | 25 | Rib Fragment |  | adult, shaft fragment, middle rib, grayish coloring with some orange |
| VIII | 4 | 26 | Rib Fragment | Left | adult, grayish coloring, probably one of the upper six ribs due to the angling |
| VIII | 4 | 27 | Ilium Fragment |  |  |


| VIII | 4 | 28 | Temporal Fragment | Right | dark grayish coloring, mandibular fossa present, adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 29 | Distal Phalanx |  | adult, grayish coloring, hand | 18.44 mm |
| VIII | 4 | 30 | Greater Multangular | Right | grayish coloring |  |
| VIII | 4 | 31 | Possible Scapula Fragment |  | Grayish coloring, possibly part of the glenoid fossa with some of the surrounding area. |  |
| VIII | 4 | 32 | Rib Fragment |  | adult, shaft fragment, middle rib, grayish coloring with some orange |  |
| VIII | 4 | 33 | Rib Fragment |  | adult, shaft fragment, middle rib, grayish coloring with some orange |  |
| VIII | 4 | 34 | Frontal Fragment |  | adult, frontal crest on the interior |  |
| VIII | 4 | 35 | Lunate | Right | Grayish color |  |
| VIII | 4 | 36 | Radius Fragment | Right | Most of the bone, just missing the head, grayish calcium carbonate adult, epiphysis is fused but line is visible | estimated 24 cm , 0.745 is the ratio against the femur according to Genoves 1967, femur formula $\mathrm{S}=2.26(\mathrm{~F})+$ $66.379+/-3.417$ |


| VIII | 4 | 37 | Tibia Fragment | Left | almost complete shaft fragment of an adult, grayish coloring | 26.4 cm long |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 38 | Shaft Fragment |  | Probable the Right Tibia, grayish coloring |  |
| VIII | 4 | 39 | Shaft Fragment |  | Probable the Right Tibia, grayish coloring |  |
| VIII | 4 | 40 | Cranial Fragment |  | Grayish in color |  |
| VIII | 4 | 41 | Cervical Fragment |  | adult, part of the body and one of the transverse processes, determined to be cervical do to the body shape and height |  |
| VIII | 4 | 42 | Rib Fragment |  | Shaft Fragment |  |
| VIII | 4 | 43 | Shaft Fragment | Undetermined | Too small to determine which bone, grayish color |  |
| VIII | 4 | 44 | Shaft Fragment | Undetermined | Too small to determine which bone, grayish color |  |
| VIII | 4 | 45 | Vertebra fragment? |  | Possible anterior portion of a vertebra body |  |
| VIII | 4 | 46 | Rib Fragment |  | Shaft fragment, adult, grayish color |  |
| VIII | 4 | 47 | Thoracic Vertebra |  | adult, grayish color, |  |


|  |  |  |  | two demi facets |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 48 | Cranial Fragment |  | Grayish color |  |
| VIII | 4 | 49 | Rib Fragment | Right | angle and part of the shaft, orangish discoloration |  |
| VIII | 4 | 50 | Number Unassigned |  |  |  |
| VIII | 4 | 51 | Radius Fragment | Left | Proximal fragment with head and tuberosity, taphonomic breakage to the head, grayish color |  |
| VIII | 4 | 52 | Rib Fragment |  | adult, grayish color |  |
| VIII | 4 | 53 | Cervical Fragment | right portion | Part of the body, transverse process with transverse foramen, right lamina with articular facets |  |
| VIII | 4 | 54 | Ulna Fragment | Left | Proximal fragment, grayish in color |  |
| VIII | 4 | 55 | Temporal Fragment | Left | $\begin{gathered} \text { Grayish color, } \\ \text { zygomatic process } \\ \text { present } \end{gathered}$ |  |
| VIII | 4 | 56 | Lesser Multangular | Left | adult, grayish in color |  |
| VIII | 4 | 57 | Rib Fragment | Left | Shaft Fragment, orangish coloration |  |
| VIII | 4 | 58 | Clavicle Fragment | Right | Lateral fragment, grayish in color |  |
| VIII | 4 | 59 | Proximal Phalanx |  | Hand, probably the second, grayish | 31.2 mm |


|  |  |  |  | coloring |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 60 | Proximal Phalanx |  | Hand, grayish coloring | 44.63 mm |
| VIII | 4 | 61 | Proximal Phalanx |  | Hand, grayish coloring | 39.6 mm |
| VIII | 4 | 62 | Proximal Phalanx |  | Hand, probably the first, grayish coloring | 31.23 mm |
| VIII | 4 | 63 | Intermediate Phalanx |  | Hand, grayish coloring | 21.19 mm |
| VIII | 4 | 64 | Capitate | Left | Grayish and orange discoloration |  |
| VIII | 4 | 65 | Capitate | Right | Grayish and orange discoloration |  |
| VIII | 4 | 66 | 1st Metacarpal | Undetermined | Grayish coloring, deterioration of the proximal end prevents siding |  |
| VIII | 4 | 67 | Intermediate Phalanx |  | Hand, grayish and orangish coloring |  |
| VIII | 4 | 68 | Rib Fragment |  | Shaft fragment, grayish coloring |  |
| VIII | 4 | 69 | Cranial Fragment |  | Probable Temporal Bone |  |
| VIII | 4 | 70 | Vertebra Body Fragment |  | Body Fragment |  |
| VIII | 4 | 71 | Intermediate Phalanx |  | grayish orange color, adult, possible foot | 21.96 mm |
| VIII | 4 | 72 | Rib Fragment |  | Shaft Fragment |  |
| VIII | 4 | 73 | Lunate | Left | Grayish color |  |


| VIII | 4 | 74 | Cuneiform Fragment |  | to the facets |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 75 | Triquetral | Left |  |  |
| VIII | 4 | 76 | Intermediate Phalanx |  | Probable hand, grayish color | 18.82 mm |
| VIII | 4 | 77 | Vertebra Fragment |  |  |  |
| VIII | 4 | 78 | Femur Fragment | Possible Right | Distal fragment, anterior surface badly deteriorated, fire blackened |  |
| VIII | 4 | 79 | Sacral vertebra |  | First sacral vertebra, fire blackened |  |
| VIII | 4 | 80 | Ischium Fragment | Left | acetabulum partly present |  |
| VIII | 4 | 81 | Mandible Fragment | Right | adult, inferior portion, fire blackened |  |
| VIII | 4 | 82 | Parietal Fragment | Probable Right | adult, taphonomic cracking, fire blackened |  |
| VIII | 4 | 83 | Manubrium |  | adult, rather large, possibly burned, sternal end does not appear as though it fused to the sternum |  |
| VIII | 4 | 84 | Humerus Fragment |  | Shaft fragment, adult, grayish color, taphonomic cracking |  |


| VIII | 4 | 85 | Frontal Fragment | Right portion | adult, rounded supraorbital, possible male, cranial modification (flattening of the front) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 86 | Radius Fragment | Possible Right | Shaft Fragment |
| VIII | 4 | 87 | Rib Fragment | Right | vertebral end, grayish and friable |
| VIII | 4 | 88 | Cave Formation |  |  |
| VIII | 4 | 89 | Clavicle Fragment | Right | Lateral fragment, grayish in color |
| VIII | 4 | 90 | Thoracic Vertebra |  | Epiphysis on the body is fused, line still visible, rim around the superior surface of the body still |
| VIII | 4 | 91 | Ilium Fragment | Possible Left | Crest fragment |
| VIII | 4 | 92 | Ilium Fragment | Left | Narrow Sciatic notch, adult, grayish coloring |
| VIII | 4 | 93 | Thoracic Vertebra |  | adult, upper Thoracic, one large demi facet |
| VIII | 4 | 94 | Cervical Vertebra |  | Broken transverse processes, orangish staining on the spinous process, lower cervical |
| VIII | 4 | 95 | Humerus Fragment | Left | Shaft fragment, grayish coloring |


| VIII | 4 | 96 | Humerus Fragment | Right | Distal fragment, olecranon fossa is triangular shaped, medial epicondyle is level, trochlea is somewhat symmetrical |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 97 | Humerus Fragment | Undetermined | head fragment |
| VIII | 4 | 98 | Thoracic Vertebra Fragment |  | Body fragment, grayish in color, badly deteriorated |
| VIII | 4 | 99 | Maxilla Fragment |  | Small fragment with two root sockets |
| VIII | 4 | 100 | Rib Fragment |  | Shaft fragment, Upper 6, slight orangish staining |
| VIII | 4 | 101 | Rib Fragment |  | Middle Rib,, orangish coloring, fire blackening |
| VIII | 4 | 102 | Frontal Fragment | Left portion | See other Frontal description |
| VIII | 4 | 103 | Ulna Fragment | Probable Right | Distal Ulna shaft fragment, grayish, taphonomic cracking |
| VIII | 4 | 104 | Ulna Fragment | Left | Distal Fragment |
| VIII | 4 | 105 | Lumbar Vertebra Fragment |  | L1 or L2, posterior portion of lamina |
| VIII | 4 | 106 | Humerus Fragment | Left | Distal fragment, see other humerus descriptions |


| VIII | 4 | 107 | Patella | Left | Grayish coloring | 35.13 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 108 | Scaphoid | Left | Grayish color |  |
| VIII | 4 | 109 | 1st Metacarpal | Left | grayish calcium carbonate on posterior surface, some fire blackening |  |
| VIII | 4 | 110 | Intermediate Phalanx |  | Calcium carbonate on the on posterior, orangish discoloration on palmar surface |  |
| VIII | 4 | 111 | Cervical Vertebra |  | Middle cervical, orangish discoloration |  |
| VIII | 4 | 112 | Temporal Fragment |  | petrous portion |  |
| VIII | 4 | 113 | Scapula Fragment | Right | Glenoid and part of the lateral border, orangish discoloration | 38.36 mm height, width cannot be measured |
| VIII | 4 | 114 | Humerus Fragment |  | treated with treated with B72, Head fragment, fire blackened |  |
| VIII | 4 | 115 | Possible Femur Fragment |  | Condyle fragment, fire blackened |  |
| VIII | 4 | 116 | Thoracic Vertebra |  | treated with treated with B72, Lower Thoracic vertebra, lower part of lamina is orangish color |  |


| VIII | 4 | 117 | Tibia Fragment | Right | treated with treated with B72, Proximal fragment, fire blackened |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 118 | Vertebra Fragment |  | treated with treated with B72, body fragment, grayish in color, badly deteriorated, possible cervical or Thoracic |
| VIII | 4 | 119 | Possible Femur Fragment |  | treated with treated with B72, Condyle fragment, fire blackened |
| VIII | 4 | 120 | Tibia Fragment | Left | treated with treated with B72, Distal fragment, badly deteriorated, fire blackened |
| VIII | 4 | 121 | Vertebra Fragment |  | treated with treated with B72, Body fragment, fire blackened, anterior portion, possible lumbar |
| VIII | 4 | 122 | Femur Fragment | Left | treated with treated with B72, Proximal fragment with head and tuberosity, taphonomic breakage to the head, blackish |


| VIII | 4 | 123 | Vertebra Fragment | treated with treated with B72, Body fragment, inferior portion of the body, probable lumbar |
| :---: | :---: | :---: | :---: | :---: |
| VIII | 4 | 124 | Possible Femur Fragment | treated with treated with B72, Condyle fragment, fire blackened |
| VIII | 4 | 125 | Lumbar Vertebra | treated with treated with B72, Probably L1 or L2, badly treated, fire blackened |
| VIII | 4 | 126 | Rib Fragment | Shaft fragment, middle rib, orangish color |
| VIII | 4 | 127 | Intermediate Phalanx fragment | Hand, proximal facet |
| VIII | 4 | 128 | Rib Fragment | Shaft fragment, orangish coloration and fire blackening |
| VIII | 4 | 129 | Rib Fragment | Shaft fragment, fire blackened |
| VIII | 4 | 130 | Vertebra Fragment | transverse process with facet |
| VIII | 4 | 131 | Vertebra Fragment | transverse process |

$\left.\left.\begin{array}{llccc}\hline \text { VIII } & 4 & 132 & \begin{array}{c}28 \text { unidentifiable } \\ \text { fragments }\end{array} & \begin{array}{c}\text { orangish discoloration }\end{array} \\ \hline \text { frany are shaft } \\ \text { fragments with } \\ \text { grayish coloring } \\ \text { and/or fire }\end{array}\right\} \begin{array}{c}\text { blackening. Have a } \\ \text { dozen or so may have } \\ \text { been burned }\end{array}\right]$

| VIII | 5 | C | 1 | humerus fragment |
| :--- | :--- | :--- | :--- | :---: |
| VIII | 5 | C | 2 | lunate |
| VIII | 5 | C | 3 | greater multangular |
| VIII | 5 | C | 4 | hamate fragment |
| VIII | 5 | C | 5 | metacarpal fragment |
| VIII | 5 | C | 6 | proximal metatarsal |
|  |  |  |  | fourth metacarpal |
| VIII | 5 | C | 7 | fragment |
| VIII | 5 | C | 8 | femur fragment |
| VIII | 5 | C | 9 | femur fragment |
| VIII | 5 | C | 10 | femur fragment |
| VIII | 5 | C | 11 | greater multangular |
| VIII | 5 | C | 12 | scaphoid |
| VIII | 5 | C | 13 | capitate |
| VIII | 5 | C | 14 | fibula fragment |
| VIII | 5 | C | 15 | os coxa fragment |
| VIII | 5 | C | 16 | fibula fragment |
| VIII | 5 | C | 17 | femur fragment |
|  |  |  |  | third cuneiform |
| VIII | 5 | C | 18 | fragment |
| VIII | 5 | C | 19 | proximal pedal phalanx |
| fragment |  |  |  |  |
| VIII | 5 | C | 20 | metacarpal/metatarsal |
| VIII | 5 | C | 21 | cagment |
| VIII | 5 | C | 22 | unidentified fragment |
| VIII | 5 | C | 23 | mandible fragment |
| VIII | 5 | D | 1 | femur fragment |


| VIII | 5 | D | 2 | fifth metatarsal |
| :--- | :---: | :---: | :---: | :---: |
| VIII | 5 | D | 3 | Proximal manual <br> phalanx |
| VIII | 5 | D | 4 | intermediate manual <br> phalanx |
| VIII | 5 | D | 5 | metacarpal fragment |
| VIII | 5 | D | 6 | Proximal manual <br> phalanx |
| VIII | 5 | D | 7 | proximal pedal phalanx |
| VIII | 5 | D | 8 | intermediate pedal <br> phalanx |
| VIII | 5 | D | 9 | Proximal manual <br> phalanx |
| VIII | 5 | D | 10 | intermediate pedal <br> phalanx |
| VIII | 5 | D | 11 | proximal pedal phalanx |
| VIII | 5 | D | 12 | distal pedal phalanx |
| VIII | 5 | D | 13 | proximal pedal phalanx <br> fragment |
| VIII | 5 | D | 14 | intermediate manual <br> phalanx |
| VIII | 5 | D | intermediate pedal <br> phalanx |  |
| VIII | 5 | D | 16 | Proximal manual <br> phalanx fragment |


| VIII | 5 | D | 17 | intermediate manual <br> phalanx |
| :--- | :--- | :--- | :--- | :---: |
| VIII | 5 | D | 18 | fifth metacarpal |
| VIII | 5 | D | 19 | third metatarsal <br> fragment |
| VIII | 5 | D | 20 | metatarsal fragment |
| VIII | 5 | D | 21 | intermediate manual <br> phalanx |
| VIII | 5 | D | 22 | first cuneiform |
| VIII | 5 | D | 23 | third cuneiform |
| VIII | 5 | D | 24 | second cuneiform |
| VIII | 5 | D | 25 | capitate |
| VIII | 5 | D | 26 | patella |
| VIII | 5 | D | 27 | hyoid body |
| VIII | 5 | D | 28 | proximal manual <br> phalanx |
| VIII | 5 | D | 29 | intermediate pedal <br> phalanx |
| VIII | 5 | D | 30 | unidentified fragment |
| VIII | 5 | D | 31 | distal manual phalanx |
| VIII | 5 | D | 32 | third metatarsal |
| VIII | 5 | D | 33 | fragment |


| VIII | 5 | D | 38 | first cuneiform fragment |
| :---: | :---: | :---: | :---: | :---: |
| VIII | 5 | D | 39 | parietal fragment |
| VIII | 5 | D | 40 | unidentified fragments |
| VIII | 5 | D | 41 | long bone fragments |
| VIII | 5 | E | 1 | tibia fragment |
| VIII | 5 | E | 2 | distal manual phalanx |
| VIII | 5 | E | 3 | distal pedal phalanx |
| VIII | 5 | E | 4 | distal manual phalanx |
| VIII | 5 | E | 5 | Proximal manual phalanx |
| VIII | 5 | E | 6 | Proximal manual phalanx |
| VIII | 5 | E | 7 | Proximal manual phalanx |
| VIII | 5 | E | 8 | proximal pedal phalanx |
| VIII | 5 | E | 9 | Proximal manual phalanx |
| VIII | 5 | E | 10 | tibia fragment |
| VIII | 5 | E | 11 | femur fragment |
| VIII | 5 | E | 12 | parietal fragment |
| VIII | 5 | E | 13 | calcaneus |
| VIII | 5 | E | 14 | talus |
| VIII | 5 | E | 15 | Proximal manual phalanx |
| VIII | 5 | E | 16 | first metacarpal |


| VIII | 5 | E | 17 | Proximal manual phalanx |
| :---: | :---: | :---: | :---: | :---: |
| VIII | 5 | E | 18 | proximal metatarsal |
| VIII | 5 | E | 19 | distal pedal phalanx |
| VIII | 5 | E | 20 | intermediate manual phalanx |
| VIII | 5 | E | 21 | intermediate manual phalanx |
| VIII | 5 | E | 22 | intermediate manual phalanx |
| VIII | 5 | E | 23 | navicular |
| VIII | 5 | E | 24 | cuboid |
| VIII | 5 | E | 25 | scaphoid |
| VIII | 5 | E | 26 | capitate |
| VIII | 5 | E | 27 | triquetral |
| VIII | 5 | E | 28 | triquetral |
| VIII | 5 | E | 29 | second cuneiform |
| VIII | 5 | E | 30 | intermediate manual phalanx |
| VIII | 5 | E | 31 | humerus |
| VIII | 5 | E | 32 | mandible |
| VIII | 5 | E | 33 | manubrium |
| VIII | 5 | E | 34 | ilium fragment |
| VIII | 5 | E | 35 | vertebra |
| VIII | 5 | E | 36 | patella |
| VIII | 5 | E | 37 | radius fragment |
| VIII | 5 | E | 38 | capitate |
| VIII | 5 | E | 39 | hamate |


| VIII | 5 | E | 40 | pisiform |
| :--- | :--- | :--- | :--- | :---: |
| VIII | 5 | E | 41 | rib fragment |
| VIII | 5 | E | 42 | metacarpal fragment |
| VIII | 5 | E | 43 | metatarsal fragment |
| VIII | 5 | E | 44 | metatarsal fragment |
| VIII | 5 | E | 45 | metacarpal fragment |
| VIII | 5 | E | 46 | fifth metatarsal <br> fragment |
| VIII | 5 | E | 47 | second metatarsal <br> fragment |
| VIII | 5 | E | 48 | third metacarpal |
| VIII | 5 | E | 49 | fourth metatarsal <br> fragment |
| VIII | 5 | E | 50 | fifth metacarpal <br> fragment |
| VIII | 5 | E | 51 | third metatarsal |
| VIII | 5 | E | 52 | femur fragment |
| VIII | 5 | E | 53 | metacarpal fragment |
| VIII | 5 | E | 54 | humerus fragment |
| VIII | 5 | E | 55 | tibia fragment |
| VIII | 5 | E | 56 | rib fragment |
| VIII | 5 | E | 57 | rib fragment |
| VIII | 5 | E | 58 | lumbar vertebra <br> fragment |
| VIII | 5 | E | 59 | lumbar vertebra <br> fragment |
| VIII | 5 | E | 60 | metacarpal/metatarsal <br> fragment |


| VIII | 5 | E | 61 | unidentified fragment |
| :--- | :--- | :--- | :--- | :---: |
| VIII | 5 | E | 62 | premolar |
| VIII | 5 | E | 63 | canine |
| VIII | 5 | E | 64 | premolar |
| VIII | 5 | E | 65 | premolar |
| VIII | 5 | E | 66 | pisiform |
| VIII | 5 | E | 67 | molar |
| VIII | 5 | E | 68 | molar |
| VIII | 5 | E | 69 | incisor |
| VIII | 5 | E | 70 | canine |
| VIII | 5 | E | 71 | premolar |
|  |  |  |  |  |
| VIII | 5 | E | 72 | sacral vertebra fragment |
| VIII | 5 | E | 73 | sacral vertebra fragment |
| VIII | 5 | E | 74 | radius fragment |
| VIII | 5 | E | 75 | radius fragment |
| VIII | 5 | E | 76 | humerus fragment |
| VIII | 5 | E | 77 | patella |
| VIII | 5 | E | 78 | thoracic vertebra |
| VIII | 5 | E | 79 | humeragment |
| VIII | 5 | E | 80 | ulnagment fragment |
| VIII | 5 | E | 81 | tibia fragment |
| VIII | 5 | E | 82 | tibia fragment |
| VIII | 5 | E | 83 | thoracic vertebra |


| VIII | 5 | E | 84 | lumbar vertebra fragment |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 5 | E | 85 | maxilla fragment |  |  |  |
| VIII | 5 | E | 86 | ischium fragment |  |  |  |
| VIII | 5 | E | 87 | pubic fragment |  |  |  |
| VIII | 5 | E | 88 | pubic fragment |  |  |  |
| VIII | 5 | E | 89 | tibia fragment |  |  |  |
| VIII | 5 | E | 90 | unidentified fragments |  |  |  |
| VIII | 7 | a | 1 | femur | left | subadult, all epiphyses unfused | 20.5 cm length |
| VIII | 7 | a | 2 | ulna fragment | right | proximal fragment, probable adult |  |
| VIII | 7 | a | 3 | femur epiphysis |  | subadult, unable to side due to deterioration | 43.12 mm wide |
| VIII | 7 | a | 4 | femur epiphysis |  | subadult, unable to side due to deterioration | 43.02 mm wide |
| VIII | 7 | a | 5 | talus | left | subadult, young child roughly 2-3 years of age based in size |  |
| VIII | 7 | a | 6 | fibula fragments | probable right | subadult, broke in transit | 16 cm long |
| VIII | 7 | a | 7 | proximal pedal phalanx |  | adult | 25.8 mm |
| VIII | 7 | a | 8 | proximal manual phalanx |  | adult | 35.13 mm |


| VIII | 7 | a | 9 | proximal manual <br> phalanx |  | adult | adult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |

$\left.\begin{array}{ccccccc} & & & & & \begin{array}{c}\text { adult, probable } \\ \text { lumbar or lower } \\ \text { thoracic body }\end{array} \\ \text { VIII } & 7 & \text { a } & \text { vagment with another } \\ \text { unknown bone calcite } \\ \text { on top of it }\end{array}\right]$

|  |  |  |  |  | possible subadult |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 29 | radius fragment | undetermined | shaft fragment |  |
| VIII | 7 | a | 30 | radius fragment | undetermined | shaft fragment |  |
| VIII | 7 | a | 31 | 6 os coxae fragments | undetermined | badly deteriorated |  |
| VIII | 7 | a | 32 | humerus fragment | right | distal fragment with just the fossa, which Is indeterminate in shape |  |
| VIII | 7 | a | 33 | proximal manual phalanx |  |  | 41 mm |
| VIII | 7 | a | 34 | proximal manual phalanx |  |  | 40.7 mm |
| VIII | 7 | a | 35 | third metacarpal fragment | right | proximal fragment |  |
| VIII | 7 | a | 36 | second metacarpal fragment | left | proximal fragment |  |
| VIII | 7 | a | 37 | first metacarpal | right |  |  |
| VIII | 7 | a | 38 | third metacarpal fragment | left | proximal fragment |  |
| VIII | 7 | a | 39 | trapezoid | left | adult |  |
| VIII | 7 | a | 40 | triquetral | right | adult |  |
| VIII | 7 | a | 41 | hamate | right | adult |  |
| VIII | 7 | a | 42 | first metacarpal fragment |  | subadult, unfused proximal end |  |
| VIII | 7 | a | 43 | metacarpal |  | subadult |  |
| VIII | 7 | a | 44 | metacarpal |  | subadult |  |
| VIII | 7 | a | 45 | metacarpal |  | subadult |  |
| VIII | 7 | a | 46 | metatarsal fragment |  |  |  |


| VIII | 7 | a | 47 | metatarsal fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 48 | metatarsal fragment | subadult, proximal <br> end unfused |
| VIII | 7 | a | 49 | metatarsal fragment | subadult, proximal <br> end unfused |
| VIII | 7 | a | 50 | tibia fragments | subadult, distal <br> fragment, unfused |
| VIII | 7 | a | 51 | femur fragment | probably pedal |
| VIII | 7 | a | 52 | distal phalanx | probably pedal |
| VIII | 7 | a | 53 | distal phalanx | first manual subadult |
| VIII | 7 | a | 54 | distal phalanx | probable manual <br> phalanx, possibly <br> interproximal |
| VIII | 7 | a | 55 | phalanx fragment | subadult, head <br> epiphysis, possibly <br> humerus |
| VIII | 7 | a | 56 | epiphysis | condyle fragment |
| VIII | 7 | a | 57 | probable femur |  |
| fragment | probable femur | condyle fragment | subadult, shaft |  |  |
| VIII | 7 | a | 58 | fragment | pragment |

$\left.\begin{array}{ccccccc}\text { VIII } & 7 & \text { a } & 65 & \text { rib fragment } & \text { right } & \text { vertebral end, } \\ \text { vabadult }\end{array}\right]$

| VIII | 7 | a | 76 | frontal fragments | left | adult, has part of the left supraorbital margin, which is blunt |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 77 | fibula fragments | left | adult, distal end with part of the shaft |  |
| VIII | 7 | a | 78 | talus | right | adult | 56.32 mm length, 44.04 mm width |
| VIII | 7 | a | 79 | thoracic vertebra fragment |  | adult, lower thoracic, probably 6-10, transverse processes broken |  |
| VIII | 7 | a | 80 | calcaneus fragment | right | adult, calcite on pedal surface | 78.23 mm length |
| VIII | 7 | a | 81 | ulna fragment | probable left | adult shaft fragment |  |
| VIII | 7 | a | 82 | femur fragment | undetermined | adult, head fragment, covered in calcite |  |
| VIII | 7 | a | 83 | tibia fragment | right | proximal posterior fragment, adult, covered in calcite |  |
| VIII | 7 | a | 84 | tibia fragment | possible left | distal anterior fragment, adult, covered in calcite |  |
| VIII | 7 | a | 85 | calcaneus fragment | left | adult, badly deteriorated | 78.87 mm length |
| VIII | 7 | a | 86 | tibia fragment | probable left | distal fragment of the shaft, covered in calcite |  |
| VIII | 7 | a | 87 | femur fragment | undetermined | distal fragment of a condyle |  |


| VIII | 7 | a | 88 | sesamoid |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 89 | femur fragment | undetermined | proximal fragment of just the head, badly deteriorated, cannot take measurement |  |
| VIII | 7 | a | 90 | distal manual phalanx |  | probably the first, adult | 19.69 mm |
| VIII | 7 | a | 91 | proximal pedal phalanx |  | adult | 28.53 mm |
| VIII | 7 | a | 92 | second cuneiform | probable right | adult |  |
| VIII | 7 | a | 93 | rib fragment | undetermined | child |  |
| VIII | 7 | a | 94 | first metatarsal | right | adult, calcite on all surfaces | 61.09 mm |
| VIII | 7 | a | 95 | occipital fragment | right | adult, occipital condyle present |  |
| VIII | 7 | a | 96 | rib fragment | undetermined | adult, covered in calcite |  |
| VIII | 7 | a | 97 | carpal fragment | undetermined | adult, distal and shaft fragment, calcite covered |  |
| VIII | 7 | a | 98 | clavicle fragment | left | lateral fragment with coracoid process, gracile is size |  |
| VIII | 7 | a | 99 | humerus fragment | undetermined | shaft fragments, adult |  |
| VIII | 7 | a | 100 | radius fragment | undetermined | shaft fragment |  |
| VIII | 7 | a | 101 | humerus fragment | undetermined | well defined deltoid attachment |  |
| VIII | 7 | a | 102 | calcaneus fragment | undetermined | posterior surface of the calcaneus, adult |  |
| VIII | 7 | a | 103 | cranial fragment | undetermined | adult, badly |  |


|  |  |  |  |  | deteriorated |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 104 | cranial fragment | undetermined | adult, badly <br> deteriorated |
| VIII | 7 | a | 105 | cranial fragment | undetermined | adult, badly <br> deteriorated |
| VIII | 7 | a | 106 | cranial fragment | undetermined | adult, badly <br> deteriorated |
| VIII | 7 | a | 107 | tibia fragment | undetermined | adult, covered in <br> calcite |
| VIII | 7 | a | 108 | humerus fragment | probable left | distal portion right <br> above the fossa |
| VIII | 7 | a | 109 | metacarpal/metatarsal |  |  |
| fragment | undetermined | shaft fragment, <br> covered in calcite |  |  |  |  |
| VIII | 7 | a | 110 | clavicle fragment | undetermined | shaft fragment, <br> covered in calcite |
| VIII | 7 | a | 111 | femur fragment |  | adult, fragment of the <br> trochanteric crest and <br> part of the neck, <br> covered in calcite |
|  |  |  |  |  |  | foramen ovale is <br> present on the <br> fragment |


| VIII | 7 | a | 114 | canine | undetermined | permanent, adult, dental wear score $2 / 3$ | 8.37 mm anterior to posterior, 8.6 mm lingual to labial, 9.8 mm crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 115 | premolar |  | first upper, no root | 7.02 mm anterior <br> to posterior, 9.47 mm lingual to labial, 8.44 mm crown height |
| VIII | 7 | a | 116 | premolar |  | first upper, no root | 7.27 mm anterior <br> to posterior, <br> 10.10 mm lingual to labial, 8.17 mm height |
| VIII | 7 | a | 117 | premolar |  | first lower, no root | 6.38 mm anterior to posterior, 9.37 mm lingual to labial, 7.88 mm height |
| VIII | 7 | a | 118 | canine |  | deciduous, lower, left |  |
| VIII | 7 | a | 119 | canine |  | deciduous, upper, left |  |
| VIII | 7 | a | 120 | incisor |  | deciduous, left second lower |  |
| VIII | 7 | a | 121 | incisor |  | deciduous, right second lower |  |
| VIII | 7 | a | 122 | incisor |  | deciduous, left first lower |  |
| VIII | 7 | a | 123 | incisor |  | deciduous, right first lower |  |


| VIII | 7 | a | 124 | molar |  | deciduous, lower right first molar |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 125 | canine |  | upper right, attempted Ik modification |
| VIII | 7 | a | 126 | molar |  | right lower second, huge caries that dominates the anterior lingual cusp |
| VIII | 7 | a | 127 | incisor |  | upper left, dentine exposed |
| VIII | 7 | a | 128 | root fragment |  |  |
| VIII | 7 | a | 129 | 15 unidentified fragments |  |  |
| VIII | 7 | a | 130 | shaft fragment | undetermined | subadult, possible humerus or femur shaft fragment, possibly as young as a perinate, calcite |
| VIII | 7 | a | 131 | tibia fragment | right | subadult, shaft fragment, possibly as old as 5 years, calcite, most on the posterior surface |
| VIII | 7 | a | 132 | rib fragment | left | subadult, upper rib, vertebral end, calcite |
| VIII | 7 | a | 133 | rib fragment | left | subadult, lower rib, vertebral end, calcite |
| VIII | 7 | a | 134 | rib fragment | undetermined | subadult, mid rib, shaft, calcite |
| VIII | 7 | a | 135 | rib fragment | undetermined | subadult, upper rib, |

shaft, calcite

|  |  |  |  | shaft, calcite |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 136 | rib fragment | left | subadult, upper rib, <br> shaft, calcite |
| VIII | 7 | a | 137 | rib fragment | undetermined | subadult, mid rib, <br> shaft, calcite |
| VIII | 7 | a | 138 | rib fragment | undetermined | subadult, mid rib, <br> shaft, calcite |
| VIII | 7 | a | 139 | scapula fragment | undetermined | subadult, coracoid, <br> unfused, young child |
| VIII | 7 | a | 140 | ischium fragment, <br> calcite | right | subadult, over 1, but <br> under 5 most likely |
| VIII | 7 | a | 141 | cranial fragment |  | subadult, calcite |


|  |  |  |  |  | fragment, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 153 | radius fragment |  | subadult, shaft fragment, calcite |
| VIII | 7 | a | 154 | metatarsal fragment |  | subadult, shaft fragment, calcite |
| VIII | 7 | a | 155 | metatarsal fragment |  | subadult, shaft fragment, calcite |
| VIII | 7 | a | 156 | radius fragment |  | subadult, shaft fragment, calcite |
| VIII | 7 | a | 157 | epiphysis | undetermined | subadult, possible tibia distal epiphysis?? |
| VIII | 7 | a | 158 | ulna fragment | undetermined | subadult, proximal epiphysis of the olecranon, probably older than 5 but younger than 9 |
| VIII | 7 | a | 159 | rib fragment | undetermined | subadult, mid rib, shaft, calcite |
| VIII | 7 | a | 160 | rib fragment | undetermined | subadult, mid rib, shaft, calcite |
| VIII | 7 | a | 161 | 44 unidentified fragments |  |  |
| VIII | 7 | a | 162 | femur fragment | undetermined | adult, shaft fragment, completely covered with calcite |
| VIII | 7 | a | 163 | occipital fragment |  | adult, inferior portion of the occipital , interior is heavily coated with calcite |


| VIII | 7 | , | 164 | cranial fragments |  | adult, six small cranial fragments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 165 | femur fragment | undetermined | subadult, around 1.5 years old, calcite on carbon, shaft fragment |
| VIII | 7 | a | 166 | humerus fragment | right | subadult roughly 1.5 years old, distal shaft fragment, distal epiphysis is unfused, carbon and calcite on the anterior surface |
| VIII | 7 | a | 167 | rib fragment | undetermined | subadult, probably the 1.5 year old, shaft fragment, mid rib, calcite and carbon |
| VIII | 7 | a | 168 | rib fragment | undetermined | subadult, probably the 1.5 year old, shaft fragment, mid rib, calcite and carbon |
| VIII | 7 | a | 169 | rib fragment | right | subadult, probably the 1.5 year old, sternal fragment, mid rib, calcite and carbon |
| VIII | 7 | a | 170 | rib fragment | right | subadult, probably the 1.5 year old, shaft fragment, mid rib, |

calcite and carbon

| VIII | 7 | a | 171 | rib fragment | undetermined | subadult, probably the <br> 1.5 year old, shaft <br> fragment, mid rib, <br> calcite and carbon |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 172 | rib fragment | undetermined | subadult, probably the <br> 1.5 year old, shaft <br> fragment, mid rib, <br> calcite and carbon |
| VIII | 7 | a | 173 | rib fragment | undetermined | subadult, probably the <br> 1.5 year old, shaft <br> fragment, upper rib, <br> calcite and carbon |
| VIII | 7 | a | 174 | shaft fragment | undetermined | possibly the 1.5 year <br> old subadult |
| VIII | 7 | a | 175 | shaft fragment | undetermined | possibly the 1.5 year <br> old subadult |
| VIII | 7 | a | 176 | rib fragment | undetermined | subadult, probably the <br> 1.5 year old, sternal <br> fragment, mid rib, <br> calcite and carbon |
| VIII | 7 | a | 177 | rib fragment | undetermined | subadult, probably the <br> 1.5 year old, sternal <br> fragment, mid rib, <br> calcite and carbon |
|  |  |  |  |  |  | subadult, probably the <br> 1.5 year old, shaft <br> fragment, mid rib, <br> calcite and carbon |


| VIII | 7 | a | 179 | rib fragment | undetermined | subadult, probably the 1.5 year old, shaft fragment, mid rib, calcite and carbon |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 180 | tarsal (probably) | undetermined | subadult, probably the 1.5 year old, either the talus or the calcaneus fragment |
| VIII | 7 | a | 181 | lumbar body |  | subadult, probably the 1.5 year old |
| VIII | 7 | a | 182 | sacral body |  | subadult, probably the 1.5 year old |
| VIII | 7 | a | 183 | vertebra body |  | either lower thoracic or upper lumbar, probably the 1.5 year old, other unidentified fragments are stuck to the vertebra body with calcite |
| VIII | 7 | a | 184 | ulna fragment | probable right | subadult, probably the 1.5 year old, proximal medial fragment, some calcite and carbon |
| VIII | 7 | a | 185 | neural arch | right | lumbar, subadult, probably the 1.5 |
| VIII | 7 | a | 186 | neural arch | left | lumbar, subadult, probably the 1.5 |
| VIII | 7 | a | 187 | neural arch | right | lumbar, subadult, probably the 1.5 |


| VIII | 7 | a | 188 | neural arch | right | cervical, subadult, probably the 1.5 year old |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 189 | neural arch | right | cervical, subadult, probably the 1.5 year old |
| VIII | 7 | a | 190 | neural arch | left | thoracic, subadult, probably the 1.5 year old |
| VIII | 7 | a | 191 | neural arch | right | thoracic, subadult, probably the 1.5 year old |
| VIII | 7 | a | 192 | neural arch | right | cervical, subadult, probably the 1.5 year old |
| VIII | 7 | a | 193 | phalanx | undetermined | probably the first digit, unsure if it is pedal or manual, probably the 1.5 year old |
| VIII | 7 | a | 194 | neural arch fragment | undetermined | probably lumbar or thoracic, probably the 1.5 year old |
| VIII | 7 | a | 195 | neural arch fragment | undetermined | probably lumbar or thoracic, probably the 1.5 year old |
| VIII | 7 | a | 196 | incisor | right | upper, complete, central |
| VIII | 7 | a | 197 | incisor | left | upper, complete, central |


| VIII | 7 | a | 198 | incisor | right | upper, complete, lateral |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 199 | incisor | left | lower, complete, lateral |
| VIII | 7 | a | 200 | canine | undetermined | lower, root only partially formed, root formation indicates 1 yr 1 month to 1 year 3 months |
| VIII | 7 | a | 201 | canine | undetermined | upper, root only partially formed, 1 yr 1 month to 1 year 3 months |
| VIII | 7 | a | 202 | canine | undetermined | upper, root only partially formed, 1 yr 1 month to 1 year 3 months |
| VIII | 7 | a | 203 | molar | undetermined | lower, root formation not complete, 1 yr 2 weeks to 1 yr 2months |
| VIII | 7 | a | 204 | molar | undetermined | upper, root formation only partial, 1 yr 2 months |
| VIII | 7 | a | 205 | molar | undetermined | upper, root formation only partial, 1 yr 2 months |
| VIII | 7 | a | 206 | molar | right | lower first, permanent, probably belongs to the 1 yr |


|  |  |  |  |  |  | old since only part of the crown has developed |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | a | 207 | molar | left | lower first, permanent, probably belongs to the 1 yr old since only part of the crown has developed |  |
| VIII | 7 | a | 208 | molar | right | upper, undetermined if it is the first or second, probably the 1 yr old, because of crown development |  |
| VIII | 7 | a | 209 | unidentified fragments |  | 40 unidentified fragment, some of them belong to the 1 year old |  |
| VIII | 7 | B | 1 | humerus fragment | right | adult, distal fragment, spool shaped, tighter trochlear notch |  |
| VIII | 7 | B | 2 | skull fragment |  | covered in calcite and disfigured morphologically due to taphonomic processes |  |
| VIII | 7 | B | 3 | unidentifiable long bone fragments |  |  |  |
| VIII | 7 | B | 4 | interproximal palmar phalanx |  | possible adult | 27.88 mm |


| VIII | 7 | B | 5 | interproximal palmar phalanx fragment | possible subadult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | B | 6 | interproximal palmar phalanx fragment | possible subadult |  |
| VIII | 7 | B | 7 | interproximal palmar phalanx fragment | possible subadult |  |
| VIII | 7 | B | 8 | interproximal palmar phalanx fragment | possible subadult |  |
| VIII | 7 | B | 9 | distal manual phalanx | probably an older child, first digit, age 8-15 closer to 8 | 19.21 mm |
| VIII | 7 | B | 10 | distal manual phalanx | probably an older child, first digit, age 8-15 closer to 8 | 16.41 mm |
| VIII | 7 | B | 11 | distal pedal phalanx | probably an older child, first digit, age 8-15 closer to 8 | 19.52 mm |
| VIII | 7 | B | 12 | distal pedal phalanx | probably an older child, first digit, age 8-15 closer to 8 | 20.17 mm |
| VIII | 7 | B | 13 | distal pedal phalanx | probably an older child, 5th digit age 8 15 , closer to 8 | 11.63 mm |
| VIII | 7 | B | 14 | pedal phalanx | probably interproximal of an older child | 12.5 mm |
| VIII | 7 | B | 15 | pedal phalanx | probably interproximal of an older child | 11.34 mm |
| VIII | 7 | B | 16 | pedal phalanx | probably | 10.67 mm |

interproximal of an older child

| VIII | 7 | B | 17 | proximal pedal phalanx |  | older child, first digit | 14.8 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | B | 18 | temporal fragment | probable right | tympanic portion |  |
| VIII | 7 | B | 19 | trapezoid | left | adult |  |
| VIII | 7 | B | 20 | probable lunate | undetermined | adult |  |
| VIII | 7 | B | 21 | rib fragment | undetermined | subadult, shaft fragment |  |
| VIII | 7 | B | 22 | distal phalanx |  | probable manual | 16.62 mm |
| VIII | 7 | B | 23 | proximal manual phalanx fragment |  | proximal portion |  |
| VIII | 7 | B | 24 | manual phalanx fragment |  | distal portion |  |
| VIII | 7 | B | 25 | manual phalanx fragment |  | distal portion |  |
| VIII | 7 | B | 26 | rib fragment |  | shaft fragment of a subadult |  |
| VIII | 7 | B | 27 | metacarpal or metatarsal fragment |  | subadult |  |
| VIII | 7 | B | 28 | phalanx |  | probably distal pedal of a young child | 5.82 mm |
| VIII | 7 | B | 29 | first metacarpal fragment | undetermined | subadult, unfused proximal end, so closer to 8 years of age |  |
| VIII | 7 | B | 30 | epiphysis |  | unknown |  |
| VIII | 7 | B | 31 | epiphysis |  | circular in shape |  |
| VIII | 7 | B | 32 | epiphysis |  | circular in shape |  |


| VIII | 7 | B | 33 | epiphysis | bulbous |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | B | 34 | epiphysis | bulbous |  |
| VIII | 7 | B | 35 | 7 unidentified fragments |  |  |
| VIII | 7 | C | 1 | cranial fragment | unknown fragment |  |
| VIII | 7 | C | 2 | tibia fragment | distal fragment, adult, poor condition, calcite |  |
| VIII | 7 | C | 3 | occipital fragment | adult, calcite |  |
| VIII | 7 | C | 4 | occipital fragment | subadult, basiooccipital portion, possible perinate |  |
| VIII | 7 | C | 5 | cervical vertebra | C2 adult, some calcite |  |
| VIII | 7 | C | 6 | thoracic vertebra | damage to the body, lower thoracic, subadult, pedicle line is visible |  |
| VIII | 7 | C | 7 | rib fragment | adult, shaft fragment, calcite, lower rib |  |
| VIII | 7 | C | 8 | rib fragment | adult, shaft fragment, calcite, lower rib |  |
| VIII | 7 | C |  | rib fragment | adult, shaft fragment, calcite, mid rib |  |
| VIII | 7 | C | 10 | rib fragment | adult, shaft fragment, calcite, mid rib |  |
| VIII | 7 | C | 11 | intermediate manual phalanx | adult, calcite | 27.09 mm |
| VIII | 7 | C | 12 | intermediate manual phalanx | adult, calcite | 18.05 mm |


| VIII | 7 | C | 13 | first proximal pedal phalanx |  | adult, calcite | 30.88 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 14 | proximal manual phalanx |  | adult, calcite | 36.02 mm |
| VIII | 7 | C | 15 | lunate | left | adult, calcite |  |
| VIII | 7 | C | 16 | trapezium | right | adult, calcite |  |
| VIII | 7 | C | 17 | trapezoid | right | adult, calcite |  |
| VIII | 7 | C | 18 | intermediate manual phalanx |  | adult, calcite | 28.17 mm |
| VIII | 7 | C | 19 | cranial fragment |  | adult, calcite |  |
| VIII | 7 | C | 20 | mandible fragment |  | adult, anterior portion, post mortem loss, crypt empty, calcite |  |
| VIII | 7 | C | 21 | patella | right | possible subadult, calcite | 32.68 mm height, <br> 38.51 mm width |
| VIII | 7 | C | 22 | rib fragment | undetermined | adult, shaft fragment, calcite, mid rib |  |
| VIII | 7 | C | 23 | rib fragment | undetermined | adult, shaft fragment, calcite, mid rib |  |
| VIII | 7 | C | 24 | rib fragment | undetermined | adult, shaft fragment, calcite, mid rib |  |
| VIII | 7 | C | 25 | rib fragment | undetermined | adult, shaft fragment, calcite, lower rib |  |
| VIII | 7 | C | 26 | rib fragment | undetermined | adult, shaft fragment, calcite, mid rib |  |
| VIII | 7 | C | 27 | rib fragment | undetermined | adult, shaft fragment, calcite, lower rib |  |
| VIII | 7 | C | 28 | rib fragment | undetermined | adult, shaft fragment, |  |

calcite, mid rib

| VIII | 7 | C | 29 | rib fragment | right | adult, shaft fragment, <br> calcite, upper rib |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 30 | clavicle fragment | right | subadult, perinate <br> possibly, lateral <br> fragment |
| VIII | 7 | C | 31 | first distal pedal <br> phalanx |  | adult, calcite |


| VIII | 7 | C | 43 | fifth metatarsal | left | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 44 | navicular | left | adult, calcite |
| VIII | 7 | C | 45 | os coxa fragment | undetermined | sciatic notch fragment, adult, calcite |
| VIII | 7 | C | 46 | os coxa fragment | undetermined | lunate surface fragment, possible adult, calcite |
| VIII | 7 | C | 47 | cervical vertebra fragment |  | body fragment, adult, calcite, lower cervical, adult |
| VIII | 7 | C | 48 | cervical vertebra fragment |  | body fragment, adult, calcite, upper cervical, adult |
| VIII | 7 | C | 49 | thoracic vertebra fragment |  | body fragment, adult, calcite, upper thoracic, adult |
| VIII | 7 | C | 50 | humerus fragments | undetermined | distal portion above the trochlea and fossa, possible subadult, calcite |
| VIII | 7 | C | 51 | radius fragments | undetermined | proximal fragment, adult, badly deteriorated |
| VIII | 7 | C | 52 | rib fragments | possible left | adult, mid rib, calcite |
| VIII | 7 | C | 53 | rib fragments | right | first rib, adult, calcite, damage to vertebral and sternal ends |


| VIII | 7 | C | 54 | mandible fragments |  | subadult, adult incisors have crown development, along with a canine, it appears that the right lateral incisor is rotated 90 degrees posteriorly, deciduous molar with broken roots present, second deciduous molar erupted but not in crypt, young child 6 year +/- 24 months |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 55 | rib fragments | right | adult, lower ribs, shaft fragments, calcite |
| VIII | 7 | C | 56 | lumbar fragments |  | adult, most of the vertebra, but very fragmentary, possibly L4, calcite |
| VIII | 7 | C | 57 | tibia fragments | right | shaft fragment and a large shaft fragment with the distal facet, covered in calcite, adult |
| VIII | 7 | C | 58 | temporal fragments | possible left | adult, petrous portion fragments, calcite |
| VIII | 7 | C | 59 | occipital fragment |  | subadult, basiooccipital portion, unfused sphenoid |


|  |  |  |  |  |  | occipital suture, under 18 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 60 | metacarpal fragments |  | adult, proximal fragments, badly damaged |  |
| VIII | 7 | C | 61 | rib fragments | right | adult, upper rib, shaft fragments, calcite |  |
| VIII | 7 | C | 62 | rib fragments | possible right | subadult, first rib, calcite |  |
| VIII | 7 | C | 63 | rib fragments | undetermined | subadult, mid rib, calcite, badly damaged |  |
| VIII | 7 | C | 64 | rib fragments | possible left | possible subadult, upper rib, possibly the second, calcite |  |
| VIII | 7 | C | 65 | sphenoid fragments |  | right wind portion, adult, some calcite |  |
| VIII | 7 | C | 66 | cranial fragments | undetermined | adult, calcite, badly damaged |  |
| VIII | 7 | C | 67 | cranial fragments | undetermined | adult, calcite, badly damaged |  |
| VIII | 7 | C | 68 | shaft fragment | undetermined | undetermined because of their condition |  |
| VIII | 7 | C | 69 | rib fragments | undetermined | subadult, vertebral end fragments, badly damaged |  |
| VIII | 7 | C | 70 | first proximal manual phalanx fragment |  | adult, proximal fragment, calcite | 42.17 mm |
| VIII | 7 | C | 71 | first metacarpal | right | adult, calcite |  |
| VIII | 7 | C | 72 | metatarsal fragment | undetermined | adult, distal fragment, |  |

$\left.\begin{array}{cccccc}\hline & & & & \text { calcite } \\ \text { VIII } & 7 & \text { C } & 73 & \text { proximal pedal phalanx } & \text { adult, calcite }\end{array} \quad 24.42 \mathrm{~mm}, ~ \begin{array}{c}\text { incomplete body } \\ \text { fragment (possibly } \\ \text { the rest of 75), mid } \\ \text { cervical adult }\end{array}\right]$

| VIII | 7 | C | 81 | rib fragment | right | first rib, adult, calcite, damage to vertebral and sternal ends |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 82 | rib fragment | right | adult, upper rib, shaft fragments, calcite, healed fracture has changed the morphological shape of the bone |
| VIII | 7 | C | 83 | rib fragment |  | adult, shaft fragment, calcite |
| VIII | 7 | C | 84 | rib fragment |  | adult, vertebral end fragment, calcite |
| VIII | 7 | C | 85 | tibia fragment | possible right | adult, distal fragment, calcite |
| VIII | 7 | C | 86 | zygomatic fragment | right | possible subadult, calcite, most of the bone |
| VIII | 7 | C | 87 | thoracic vertebra fragment |  | possible subadult, fragment of the lamina with one superior articular facet |
| VIII | 7 | C | 88 | radius fragments | left | two shaft fragments (one has the distal portion of the tuberosity, calcite (thicker on lateral surface, adult |
| VIII | 7 | C | 89 | cranial fragment | undetermined | adult, calcite |


| VIII | 7 | C | 90 | cranial fragment | undetermined | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 91 | cranial fragment | undetermined | adult, calcite |
| VIII | 7 | C | 92 | vertebra fragment |  | perinate, vertebra body, unfused, probably lumbar |
| VIII | 7 | C | 93 | vertebra fragment |  | perinate, vertebra body, unfused, probably cervical |
| VIII | 7 | C | 94 | cervical vertebra fragment |  | adult, calcite, lamina fragment with superior and inferior articular facet |
| VIII | 7 | C | 95 | thoracic vertebra fragment |  | adult, partial body fragment with left costal facet, probably T10 or 11 |
| VIII | 7 | C | 96 | radius fragment | undetermined | adult, shaft fragment, calcite |
| VIII | 7 | C | 97 | shaft fragment | undetermined | undetermined, adult, calcite |
| VIII | 7 | C | 98 | humerus fragment | undetermined | subadult, shaft fragment, calcite, unable to give more precise age due to fragmentary nature |
| VIII | 7 | C | 99 | fifth metatarsal fragment | possible left | proximal and shaft fragment with damage to the distal area, adult, calcite |


| VIII | 7 | C | 100 | vertebra fragment |  | vertebra body, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 101 | rib fragment | left | sternal end, subadult, <br> calcite |
| VIII | 7 | C | 102 | frontal fragment |  | subadult, right portion <br> above the orbit |
| VIII | 7 | C | 103 | clavicle fragment | right | shaft fragment, adult, <br> calcite |
| VIII | 7 | C | 104 | metatarsal fragment | undetermined | distal head fragment, <br> adult |
| VIII | 7 | C | 105 | fibula fragment | undetermined | shaft fragment, adult, <br> calcite |
| VIII | 7 | C | 106 | shaft fragment | undetermined | possible adult, calcite |
| VIII | 7 | C | 107 | shaft fragment | undetermined | possible adult, calcite |
| VIII | 7 | C | 108 | radius fragment | undetermined | adult, shaft fragment, <br> calcite |
|  |  |  |  |  |  | subadult based on the <br> openness of the <br> sutures on the <br> fragment |
| VIII | 7 | C | 109 | occipital fragment |  | adult calcite |
| VIII | 7 | C | 110 | cranial fragment | undetermined | adult calcite |
| VIII | 7 | C | 111 | cranial fragment | undetermined | adt |
| VIII | 7 | C | 112 | parietal fragment | undetermined | adult calcite, sutures <br> still somewhat open |
| VIII | 7 | C | 113 | parietal fragment | undetermined | adult calcite |
| VIII | 7 | C | 114 | parietal fragment | undetermined | subadult |
| VIII | 7 | C | 115 | cranial fragment | undetermined | adult calcite |
| VIII | 7 | C | 116 | parietal fragment | undetermined | subadult |


| VIII | 7 | C | 117 | parietal fragments | left | adult, calcite, together <br> the fragments form <br> most of the parietal |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 118 | occipital fragments |  | adult, calcite, together <br> the fragments form <br> most of the occipital |
| VIII | 7 | C | 119 | temporal fragments | undetermined | adult, calcite, petrous <br> portion |
| VIII | 7 | C | 120 | cranial fragments | undetermined | adult, calcite |
| VIII | 7 | C | 121 | cranial fragments | undetermined | adult, calcite |
| VIII | 7 | C | 122 | parietal fragment | undetermined | adult calcite |
| VIII | 7 | C | 123 | parietal fragment | undetermined | adult calcite |
| VIII | 7 | C | 124 | capitate | left | adult calcite |
| VIII | 7 | C | 125 | cervical vertebra |  | fragment |
| VIII | 7 | C | 126 | neural arch |  | fragment, adult, |
| falcite |  |  |  |  |  |  |


| VIII | 7 | C | 133 | frontal fragment |  | subadult, left portion above the eye, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 134 | occipital fragment |  | subadult calcite |  |
| VIII | 7 | C | 135 | parietal fragment | undetermined | subadult calcite |  |
| VIII | 7 | C | 136 | cranial fragment |  | subadult calcite |  |
| VIII | 7 | C | 137 | cranial fragment |  | subadult calcite |  |
| VIII | 7 | C | 138 | cranial fragment |  | subadult calcite |  |
| VIII | 7 | C | 139 | cranial fragment |  | subadult calcite |  |
| VIII | 7 | C | 140 | cranial fragment |  | subadult calcite |  |
| VIII | 7 | C | 141 | parietal fragment | undetermined | subadult calcite |  |
| VIII | 7 | C | 142 | cranial fragment |  | subadult calcite |  |
| VIII | 7 | C | 143 | hyoid fragment | right | greater horn, unfused, subadult, calcite |  |
| VIII | 7 | C | 144 | manual phalanx |  | subadult, proximal end unfused | 20.46 mm |
| VIII | 7 | C | 145 | intermediate phalanx fragment |  | adult, calcite, damage to the proximal end |  |
| VIII | 7 | C | 146 | first distal pedal phalanx |  | subadult, epiphyses are unfused, calcite | 9.76 mm |
| VIII | 7 | C | 147 | distal manual phalanx |  | adult, calcite | 16.85 mm |
| VIII | 7 | C | 148 | cervical vertebra fragments |  | right lamina fragment and spinous process fragment, lower cervical, adult, calcite |  |
| VIII | 7 | C | 149 | vertebra fragment |  | subadult, lamina fragment, broken off, possibly cervical or thoracic |  |
| VIII | 7 | C | 150 | humerus fragment |  | subadult, distal shaft |  |

\(\left.$$
\begin{array}{ccccccc}\hline \text { VIII } & 7 & \text { C } & 151 & \text { shaft fragment } & & \text { fragment, calcite } \\
\hline \text { VIII } & 7 & \text { C } & 152 & \text { shaft fragment } & & \text { calcite } \\
\hline \text { VIII } & 7 & \text { C } & 153 & \text { shaft fragment } & & \begin{array}{c}\text { calcite, possible } \\
\text { subadult humerus }\end{array} \\
\hline \text { VIII } & 7 & \text { C } & 154 & \text { shaft fragment } & & \begin{array}{c}\text { calcite, possible ulna } \\
\text { fragment }\end{array}
$$ <br>
\hline VIII \& 7 \& C \& 155 \& zygomatic fragment \& undetermined \& calcite, possible <br>

radius fragment\end{array}\right]\)| adult, calcite |
| :---: |

calcite

| VIII | 7 | C | 164 | sacrum fragment |  | subadult, unfused body and one lateral portion of the lamina unfused to any of the other sacral bodies, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 165 | vertebra fragment |  | perinate, cervical vertebra body unfused |
| VIII | 7 | C | 166 | metacarpal fragment | undetermined | shaft fragment, adult, calcite |
| VIII | 7 | C | 167 | humerus fragment |  | shaft fragment, subadult, calcite |
| VIII | 7 | C | 168 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 7 | C | 169 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 7 | C | 170 | radius fragment | undetermined | distal end, subadult, calcite |
| VIII | 7 | C | 171 | pisiform | undetermined | adult, calcite |
| VIII | 7 | C | 172 | proximal manual phalanx | undetermined | subadult, proximal end is broken, distal end has not finished forming, calcite |
| VIII | 7 | C | 173 | intermediate phalanx fragment | undetermined | possible pedal, adult, calcite |
| VIII | 7 | C | 174 | metatarsal | undetermined | perinate, proximal and distal ends have |


|  |  |  |  |  |  | not formed yet, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 175 | metatarsal | undetermined | perinate, proximal and distal ends have not formed yet, calcite |
| VIII | 7 | C | 176 | shaft fragment | undetermined | probably a perinate <br> fibula end, calcite |
| VIII | 7 | C | 177 | rib fragment | undetermined | subadult, sternal end fragment |
| VIII | 7 | C | 178 | cuneiform | undetermined | adult, badly deteriorated, calcite |
| VIII | 7 | C | 179 | incisor | right | first upper, no crown development yet, $\sim 4$ years +/-12 months |
| VIII | 7 | C | 180 | phalanx |  | adult, proximal end, possibly the first distal manual phalanx |
| VIII | 7 | C | 181 | 115 unidentified fragments |  |  |
| VIII | 7 | C | 182 | parietal fragment | undetermined | from skull deposit, adult, calcite, suture on the exterior is not fully closed |
| VIII | 7 | C | 183 | parietal fragment | undetermined | from skull deposit, adult, calcite |
| VIII | 7 | C | 184 | cranial fragment | undetermined | from skull deposit, adult, calcite |
| VIII | 7 | C | 185 | cranial fragment | undetermined | from skull deposit, adult, calcite |


| VIII | 7 | C | 186 | cranial fragment | undetermined | from skull deposit, <br> adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 187 | temporal fragment | left | from skull deposit, <br> mastoid process is <br> about a 4, possible <br> male, calcite, adult |
| VIII | 7 | C | 188 | temporal fragment | probable right | from skull deposit, <br> petrous portion, adult, <br> calcite |
| VIII | 7 | C | 189 | cranial fragment | undetermined | from skull deposit, <br> adult, calcite |
| VIII | 7 | C | 190 | cranial fragment | undetermined | from skull deposit, <br> adult, calcite |
| VIII | 7 | C | 191 | cranial fragment | undetermined | from skull deposit, <br> adult, calcite |
| VIII | 7 | C | 192 | cranial fragment | undetermined | from skull deposit, <br> adult, calcite |
| VIII | 7 | C | 193 | cranial fragment | undetermined | from skull deposit, <br> adult, calcite |
| VIII | 7 | C | 194 | sphenoid fragment |  | from skull deposit, <br> adult, calcite, |
| VIII | 7 | C | 195 | sphenoid fragment |  | from skull deposit, <br> adult, calcite |
| VIII | 7 | C | 196 | cranial fragments | undetermined | from skull deposit, <br> adult, calcite |
| VIII | 7 | C | 197 | cranial fragments | undetermined | from skull deposit, <br> adult, calcite |
| VIII | 7 | C | 198 | radius fragment | possible right | b72, adult, distal <br> fragment, calcite |


| VIII | 7 | C | 199 | first metacarpal fragment | undetermined | b72, adult, distal fragment, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 200 | ilium fragment | undetermined | b72, adult, calcite |
| VIII | 7 | C | 201 | ilium fragment | undetermined | b72, adult, calcite |
| VIII | 7 | C | 202 | temporal fragments | undetermined | b72, adult, calcite |
| VIII | 7 | C | 203 | vertebra fragment |  | b72, body fragment, adult, calcite, possible lumbar |
| VIII | 7 | C | 204 | vertebra fragment |  | b72, body fragment, adult, calcite, possible thoracic |
| VIII | 7 | C | 205 | vertebra fragment |  | b72, body fragment, adult, calcite, possible lumbar or sacral |
| VIII | 7 | C | 206 | vertebra fragment |  | b72, body fragment, adult, possible lumbar |
| VIII | 7 | C | 207 | cervical vertebra |  | b72, adult, calcite, mid cervical |
| VIII | 7 | C | 208 | cervical vertebra fragment |  | b72, body fragment, adult, calcite, mid cervical |
| VIII | 7 | C | 209 | humerus fragment | undetermined | b72, head fragment, adult, calcite |
| VIII | 7 | C | 210 | femur fragment | undetermined | b72, subadult, head fragment |
| VIII | 7 | C | 211 | humerus fragment | undetermined | b72, head fragment, adult, calcite, not the same as 209 |
| VIII | 7 | C | 212 | vertebra fragment |  | b72, adult, calcite, body fragment |


| VIII | 7 | C | 213 | radius fragment | possible right | b72, possible subadult, distal fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 214 | vertebra fragment |  | b72, adult, lamina fragment, probably thoracic, calcite |
| VIII | 7 | C | 215 | vertebra fragment |  | b72, adult, lamina fragment, probably thoracic, calcite |
| VIII | 7 | C | 216 | vertebra fragment |  | b72, adult, lamina fragment, probably lumbar, with superior and inferior articular facets, calcite |
| VIII | 7 | C | 217 | vertebra fragment |  | b72, probable subadult lamina fragment, calcite, possible thoracic |
| VIII | 7 | C | 218 | pubis | right | b72, perinate |
| VIII | 7 | C | 219 | metacarpal fragment | undetermined | b72, possible adult, proximal end, too much damage to determine side or number, calcite |
| VIII | 7 | C | 220 | vertebra fragment |  | b72, adult, lamina fragment with one inferior and superior articular facet of a cervical |


| VIII | 7 | C | 221 | os coxa fragment | possible right | b72, portion between the ischium and the pubis, calcite, adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 222 | os coxa fragment |  | b72, adult, calcite, possible ilium fragment |  |
| VIII | 7 | C | 223 | mandible fragment |  | b72, adult, anterior portion, no teeth in crypts, but a root is present |  |
| VIII | 7 | C | 224 | ischium fragment | undetermined | b72, adult, calcite |  |
| VIII | 7 | C | 225 | second cuneiform | right | b72, calcite, adult |  |
| VIII | 7 | C | 226 | 9 unidentified fragments |  | b72 |  |
| VIII | 7 | C | 227 | molar | left | lower first molar, just the crown |  |
| VIII | 7 | C | 228 | humerus fragment | left | adult, distal fragment, triangular fossa, level medial epicondyle, spool like and the trochlear angle is wide. The distal end is damaged to the point where it prevents measurements, taphonomic damage |  |
| VIII | 7 | C | 229 | third metacarpal | left | possible subadult due to size, complete | 58.53 mm |
| VIII | 7 | C | 230 | first metatarsal | left | adult, complete | 56.58 mm |


| VIII | 7 | C | 231 | proximal manual phalanx | undetermined | adult, complete | 40.85 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 232 | proximal manual phalanx | undetermined | adult, complete | 42.94 mm |
| VIII | 7 | C | 233 | sacrum fragment |  | adult, most of the sacrum, with damage to the inferior and alas. Lytic, but much of it may be taphonomic, narrow, may be male |  |
| VIII | 7 | C | 234 | lumbar |  | adult, damage to the transverse processes, micro and macro porosity, probably L3 |  |
| VIII | 7 | C | 235 | first metacarpal | right | adult, complete, discolored on the medial aspect | 48.02 mm |
| VIII | 7 | C | 236 | fifth metacarpal | right | adult, calcite | 53.56 mm |
| VIII | 7 | C | 237 | proximal manual phalanx | undetermined | adult, calcite | 45.62 mm |
| VIII | 7 | C | 238 | proximal manual phalanx | undetermined | adult, calcite | 36.2 mm |
| VIII | 7 | C | 239 | cervical vertebra |  | possible subadult,, damage to the transverse processes, lower cervical |  |
| VIII | 7 | C | 240 | thoracic vertebra fragment |  | possible subadult, body and right pedicle with facets |  |


| VIII | 7 | C | 241 | second metacarpal | right | adult, calcite | 68.08 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 242 | third metacarpal | left | adult, badly deteriorated head and distal end, insect activity | 61.67 mm |
| VIII | 7 | C | 243 | fourth metacarpal fragment | left | adult, head broken off |  |
| VIII | 7 | C | 244 | fifth metatarsal fragment | right | adult, proximal fragment |  |
| VIII | 7 | C | 245 | proximal manual phalanx | undetermined | subadult, unfused proximal epiphysis | 20.16 mm |
| VIII | 7 | C | 246 | intermediate manual phalanx | undetermined | adult | 23.19 mm |
| VIII | 7 | C | 247 | proximal manual phalanx | undetermined | adult, first digit, insect activity | 29.14 mm |
| VIII | 7 | C | 248 | proximal pedal phalanx | undetermined | possible subadult due to size, complete | 21.46 mm |
| VIII | 7 | C | 249 | Cervical vertebra fragment |  | adult, blackened, left portion of C1 |  |
| VIII | 7 | C | 250 | Cervical vertebra |  | adult, lower cervical vertebra |  |
| VIII | 7 | C | 251 | intermediate manual phalanx |  | adult, damage to the distal end, calcite | 27.95 mm |
| VIII | 7 | C | 252 | metacarpal | undetermined | adult, possibly the fifth based on size, blackened, damage to the proximal facets | 52.98 mm |
| VIII | 7 | C | 253 | intermediate manual phalanx |  | adult, calcite mostly on the manual surface | 26.43 mm |


| VIII | 7 | C | 254 | third metatarsal fragment | right | adult, calcite, proximal fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 255 | first cuneiform | right | adult, blackened |  |
| VIII | 7 | C | 256 | talus | right | possible adult | 43.51 mm length, <br> 36.74 mm width |
| VIII | 7 | C | 257 | sternum fragment |  | subadult, blackened |  |
| VIII | 7 | C | 258 | rib fragment | left | vertebral end fragment, probable subadult, blackened, mid rib |  |
| VIII | 7 | C | 259 | rib fragment | right | vertebral end fragment, probable subadult, blackened, mid rib |  |
| VIII | 7 | C | 260 | rib fragment | undetermined | shaft fragment, subadult, calcite |  |
| VIII | 7 | C | 261 | rib fragment | undetermined | shaft fragment, subadult, calcite |  |
| VIII | 7 | C | 262 | shaft fragments | undetermined | possibly a subadult femur or humerus, hard to determine due to taphonomic damage |  |
| VIII | 7 | C | 263 | vertebra fragment |  | transverse process probably of a thoracic vertebra, adult, calcite and blackened |  |
| VIII | 7 | C | 264 | ilium fragment | right | perinate, damage to the blade, slightly blackened |  |


| VIII | 7 | C | 265 | radius fragment | undetermined | proximal head fragment only, adult, calcite and blackened | 24.59 mm head diameter |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 266 | scapula fragment | left | adult, blackened, coracoid process only |  |
| VIII | 7 | C | 267 | sacral lamina | right | child 1-2 years of age, unfused first sacral lamina |  |
| VIII | 7 | C | 268 | vertebra fragment |  | left lamina fragment of a cervical or thoracic vertebra, possibly from a subadult, blackened |  |
| VIII | 7 | C | 269 | vertebra fragment |  | thoracic or lumbar fragment of the lamina with facets, probably lumbar, adult, blackened |  |
| VIII | 7 | C | 270 | radius fragment | right | adult, distal fragment, blackened |  |
| VIII | 7 | C | 271 | fibula fragment | probable right | adult, proximal end, blackened |  |
| VIII | 7 | C | 272 | rib fragments | undetermined | shaft fragments, possibly two from a subadult, blackened |  |
| VIII | 7 | C | 273 | shaft fragment | undetermined | possible adult, blackened |  |
| VIII | 7 | C | 274 | tibia fragment | undetermined | proximal end, blackened, badly deteriorated |  |


| VIII | 7 | C | 275 | possible clavicle fragment | right | perinate, lateral shaft end, if not a clavicle then it is an upper rib fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 276 | possible clavicle fragment | left | adult, lateral fragment, blackened, morphology is distorted due to cracking |
| VIII | 7 | C | 277 | vertebra fragment |  | body fragment, adult, blackened, possible thoracic based on size |
| VIII | 7 | C | 278 | possible manubrium fragment |  | adult, superior lateral fragment, blackened |
| VIII | 7 | C | 279 | possible rib fragment | undetermined | adult, shaft fragment, blackened, morphology has changed due to cracking |
| VIII | 7 | C | 280 | lamina fragment | right | subadult, probable thoracic or lumbar vertebra of a perinate, blackened |
| VIII | 7 | C | 281 | lamina fragment | undetermined | subadult, blackened, articular facet present, possible thoracic |
| VIII | 7 | C | 282 | tibia fragment | left | adult, proximal fragment, badly deteriorated, needs conservation, treated |

with treated with B72

| VIII | 7 | C | 283 | calcaneus fragment | right | adult, mostly the posterior portion, carbon and calcite, treated with treated with B72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 284 | tibia fragment | left | adult, proximal fragment, badly deteriorated, needs conservation, treated with treated with B72 |
| VIII | 7 7 | C | 285 | os coxa fragment | right | adult, part of the lunate surface and ischium, , treated with treated with B72 |
| VIII | 7 | C | 286 | patella | left | adult, badly deteriorated, cannot measure, treated with treated with B72 |
| VIII | 7 | C | 287 | patella fragments | right | adult, badly deteriorated, cannot measure, treated with treated with B72 |
| VIII | 7 | C | 288 | lumbar vertebra fragment |  | adult, body fragment, insect activity, some macroporosity, treated with treated |


| VIII | 7 | C | 289 | lumbar vertebra | adult, body slightly damaged, probably L2, treated with treated with B72 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 290 | lumbar vertebra fragment | adult, body fragment, insect activity, some macroporosity, treated with treated with B72 |
| VIII | 7 | C | 291 | thoracic vertebra fragment | adult, body, treated with treated with B72 |
| VIII | 7 | C | 292 | thoracic vertebra fragment | adult, mid thoracic, transverse processes are broken off, calcite and carbon, treated with treated with B72 |
| VIII | 7 | C | 293 | cervical vertebra fragment | adult, right portion of body and some of the right transverse process, upper cervical, treated with treated with B72 |
| VIII | 7 | C | 294 | vertebra fragment | adult, spine fragment with inferior articular facets, either cervical or thoracic, calcite and carbon, treated |

with treated with B72

| VIII | 7 | C | 295 | humerus fragment | undetermined | age unknown, most of the cortical layer is gone, shaft fragment, badly weathered appearance, treated with treated with B72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 296 | tibia fragment | probable left | adult, distal fragment, badly deteriorated, calcite, treated with treated with B72 |
| VIII | 7 | C | 297 | ilium fragment | undetermined | age unknown, most of the cortical layer is gone, shaft fragment, badly weathered appearance, treated with treated with B72 |
| VIII | 7 | C | 298 | ilium fragment | undetermined | age unknown, most of the cortical layer is gone, shaft fragment, badly weathered appearance, treated with treated with B72 |


| VIII | 7 | C | 299 | ilium fragment | undetermined | age unknown, most of the cortical layer is gone, shaft fragment, badly weathered appearance, treated with treated with B72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 300 | ilium fragment | undetermined | age unknown, most of the cortical layer is gone, shaft fragment, badly weathered appearance, treated with treated with B72 |
| VIII | 7 | C | 301 | ilium fragment | undetermined | age unknown, most of the cortical layer is gone, shaft fragment, badly weathered appearance, treated with treated with B72 |
| VIII | 7 | C | 302 | ilium fragment | undetermined | age unknown, most of the cortical layer is gone, shaft fragment, badly weathered appearance, treated with treated with B72 |
| VIII | 7 | C | 303 | femur fragment | undetermined | probable adult, head and part of the neck, badly deteriorated, treated with treated with B72 |


| VIII | 7 | C | 304 | tibia fragment | right | adult, proximal fragment, badly deteriorated, treated with treated with B72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 305 | ulna fragment | right | adult, proximal fragment of just the olecranon, badly deteriorated, treated with treated with B72 |
| VIII | 7 | C | 306 | cuboid | left | adult, badly deteriorated, treated with treated with B72 |
| VIII | 7 | C | 307 | third cuneiform fragment | right | adult, superior fragment, badly deteriorated, treated with treated with B72 |
| VIII | 7 | C | 308 | first cuneiform fragment | undetermined | adult, inferior fragment, badly deteriorated, treated with treated with B72 |
| VIII | 7 | C | 309 | cervical vertebra |  | adult, damage to the body, lower cervical, calcite and carbon, treated with treated with B72 |
| VIII | 7 | C | 310 | talus fragment | right | adult, lateral portion, calcite and carbon, treated with treated with B72 |


| VIII | 7 | C | 311 | tibia fragment (probable) | undetermined | subadult, morphology is slightly altered by taphonomy, treated with treated with B72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | C | 312 | humerus fragment (probably) | undetermined | possible subadult, morphology is slightly altered by taphonomy, treated with treated with B72 |
| VIII | 7 | C | 313 | talus fragments | undetermined | possible adult, badly deteriorated, treated with treated with B72 |
| VIII | 7 | C | 314 | unidentified fragment |  | treated with treated with B72 |
| VIII | 7 | D | 1 | thoracic vertebra body |  | unfused body, around 2-4 years of age (VIII7D numbers 187 were found in the alcove) |
| VIII | 7 | D | 2 | thoracic vertebra body |  | unfused body, around 2-4 years of age |
| VIII | 7 | D | 3 | thoracic vertebra body |  | unfused body, around 2-4 years of age |
| VIII | 7 | D | 4 | thoracic vertebra body |  | unfused body, around 2-4 years of age |
| VIII | 7 | D | 5 | first metacarpal | undetermined | subadult, probably around 8 years of life, some calcite |


| VIII | 7 | D | 6 | proximal pedal phalanx | undetermined | subadult, proximal end is not fused yet |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 7 | metatarsal | undetermined | perinate or slightly older, covered in grey calcium carbonate |
| VIII | 7 | D | 8 | metacarpal | undetermined | subadult, unfused head and base is under developed, probably around 5 years of |
| VIII | 7 | D | 9 | talus | left | adult, covered in grayish calcite |
| VIII | 7 | D | 10 | calcaneus | left | subadult, small, covered in grayish calcite |
| VIII | 7 | D | 11 | lumbar vertebra body |  | subadult, probably 24 years over age |
| VIII | 7 | D | 12 | lumbar vertebra body |  | subadult, probably 2 4 years over age, calcite |
| VIII | 7 | D | 13 | thoracic vertebra body |  | subadult, probably 2 - <br> 4 years over age |
| VIII | 7 | D | 14 | thoracic vertebra body |  | subadult, probably 24 years over age |
| VIII | 7 | D | 15 | lumbar vertebra |  | subadult, just fused to body, line still visible, calcite, probably 2-4 or slightly older |
| VIII | 7 | D | 16 | lumbar vertebra |  | subadult, just fused to body, line still visible, |

calcite, probably 2-4 or slightly older

| VIII | 7 | D | 17 | patella | left | possible subadult | 35.58 mm height, <br> 34.81 mm width |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 18 | patella | right | possible subadult | 36.61 mm height, <br> 34.78 mm width |
| VIII | 7 | D | 19 | rib fragment | undetermined | subadult, shaft fragment, calcite |  |
| VIII | 7 | D | 20 | rib fragment | undetermined | subadult, shaft fragment, calcite |  |
| VIII | 7 | D | 21 | rib | left | first rib, subadult, probably a perinate, calcite |  |
| VIII | 7 | D | 22 | rib fragment | right | subadult, lower rib, vertebral end, calcite |  |
| VIII | 7 | D | 23 | pubis | probable left | subadult, probably around 5 years of age |  |
| VIII | 7 | D | 24 | sacral vertebra |  | subadult, probably mid sacral, calcite, body is fused to the lamina |  |
| VIII | 7 | D | 25 | talus | left | adult, damage to the superior facet, calcite | 47.80 mm length, 36.67 mm width |
| VIII | 7 | D | 26 | cuboid | left | adult, calcite |  |
| VIII | 7 | D | 27 | navicular | left | adult, damage to the plantar aspect |  |
| VIII | 7 | D | 28 | proximal pedal phalanx | undetermined | subadult, unfused proximal epiphysis | 24.37 mm |
| VIII | 7 | D | 29 | pubis | probable right | subadult, probably the mate to number 23 |  |


| VIII | 7 | D | 30 | ischium | left | subadult, probably around 5 years of age |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 31 | frontal fragment | right | subadult, fragment with the supraorbital ridge, young child, calcite |
| VIII | 7 | D | 32 | tibia fragment | possible left | subadult, probably around 5 years of age, calcite, posterior superior fragment |
| VIII | 7 | D | 33 | rib fragment | left | subadult, calcite, vertebral end fragment with most of the shaft present |
| VIII | 7 | D | 34 | fifth metatarsal | right | subadult, head is unfused, aprox 15 years of age, calcite |
| VIII | 7 | D | 35 | tibia epiphysis | left | subadult, probably 5 years of age or younger, calcite |
| VIII | 7 | D | 36 | tibia epiphysis | right | subadult, probably closer to 9 years of age, lots of calcite |
| VIII | 7 | D | 37 | shaft fragment | undetermined | subadult, possible humerus or femur shaft fragment, calcite |
| VIII | 7 | D | 38 | shaft fragment | undetermined | subadult, possible humerus or femur shaft fragment, calcite |
| VIII | 7 | D | 39 | shaft fragment | undetermined | possible subadult, |


|  |  |  |  |  |  | possible femur, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 40 | radius fragment | right | proximal fragment, subadult, probably around 1.5 years old, calcite |  |
| VIII | 7 | D | 41 | fibula fragment | undetermined | shaft fragment, subadult, probably around 1.5 years of age |  |
| VIII | 7 | D | 42 | fourth metatarsal fragment | right | proximal fragment with half of the shaft, calcite |  |
| VIII | 7 | D | 43 | metacarpal fragment | undetermined | shaft fragment, calcite, probable adult |  |
| VIII | 7 | D | 44 | sacral vertebra |  | subadult, lower sacral, calcite |  |
| VIII | 7 | D | 45 | metatarsal | undetermined | subadult, possible perinate, calcite | 25.1 mm |
| VIII | 7 | D | 46 | proximal manual phalanx | undetermined | subadult, possible perinate, calcite | 20.03 mm |
| VIII | 7 | D | 47 | distal manual phalanx | undetermined | subadult, probably around 2-5 years of age | 13.9 mm |
| VIII | 7 | D | 48 | second cuneiform | left | adult, calcite |  |
| VIII | 7 | D | 49 | femur epiphysis | undetermined | subadult around five years of age, distal epiphysis |  |
| VIII | 7 | D | 50 | fifth metatarsal fragment | left | probable subadult, proximal fragment |  |

with most of the shaft

| VIII | 7 | D | 51 | calcaneus epiphysis | undetermined | probably around 8 years of age, posterior epiphysis, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 52 | proximal pedal phalanx | undetermined | subadult, calcite, proximal end is not yet fused |  |
| VIII | 7 | D | 53 | metacarpal fragment | undetermined | subadult, probably perinate, calcite |  |
| VIII | 7 | D | 54 | rib fragment | right | subadult, probably perinate, calcite, vertebra end fragment |  |
| VIII | 7 | D | 55 | lumbar neural arch | left | subadult, unfused to the body, probably around 2-4 years of age, calcite |  |
| VIII | 7 | D | 56 | cervical vertebra fragment |  | subadult based on size, lamina fragment |  |
| VIII | 7 | D | 57 | lumbar neural arch | left | subadult, unfused to the body, probably around 2-4 years of age, calcite |  |
| VIII | 7 | D | 58 | proximal pedal phalanx | undetermined | subadult, first digit, calcite | 15.93 mm |
| VIII | 7 | D | 59 | first metacarpal | undetermined | subadult, calcite, probably 1-2 years of age | 15.88 mm |
| VIII | 7 | D | 60 | proximal pedal phalanx fragment | undetermined | possible adult, distal fragment |  |


| VIII | 7 | D | 61 | first metacarpal fragment | undetermined | subadult, probably around 8 years of life, some calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 62 | cervical vertebra fragment |  | probable subadult, lamina fragment, calcite |
| VIII | 7 | D | 63 | femur epiphysis | undetermined | subadult, probably around 8 years of life, some calcite |
| VIII | 7 | D | 64 | greater multangular fragment | right | possible subadult |
| VIII | 7 | D | 65 | rib fragment | undetermined | subadult, sternal end fragment, mid rib |
| VIII | 7 | D | 66 | rib fragment | left | subadult, vertebral end fragment, calcite |
| VIII | 7 | D | 67 | rib fragment | left | subadult, mid to lower rib, shaft fragment, calcite |
| VIII | 7 | D | 68 | rib fragment | undetermined | subadult, mid to lower rib, shaft fragment, calcite |
| VIII | 7 | D | 69 | shaft fragment | undetermined | subadult, probably 1.5 years old, shaft fragment of a radius or ulna |
| VIII | 7 | D | 70 | metatarsal fragment | undetermined | subadult, possible perinate, proximal fragment |

subadult, second deciduous molar present, first permanent molar is in the crypt along with the second molar.
Child is 4-5 years old
plus or minus 1 year, buccal carries on the second deciduous

| VIII | 7 | D | 71 | maxilla fragment | left | molar |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 72 | vertebral body |  | subadult, anterior portion of the body, based on the height, it is probably a thoracic or lumbar vertebra, calcite |
| VIII | 7 | D | 73 | basio cranial | left | subadult, probably four or under calcite and carbon |
| VIII | 7 | D | 74 | sternal fragment |  | subadult, unfused |
| VIII | 7 | D | 75 | canine | probable left | upper canine, age cannot be determined due to quantity of calcite around the CEJ |
| VIII | 7 | D | 76 | cranial fragment | undetermined | subadult, calcite |
| VIII | 7 | D | 77 | rib fragment | undetermined | subadult, shaft fragment, mid rib, calcite |


| VIII | 7 | D | 78 | rib fragment | undetermined | subadult, shaft fragment, mid rib, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 79 | fibula epiphysis | right | subadult, distal epiphysis, under 15 years of age |
| VIII | 7 | D | 80 | vertebra body fragment |  | subadult, damage to the posterior aspect, calcite and carbon, probably a thoracic or lumbar |
| VIII | 7 | D | 81 | ulna epiphysis | left | subadult, under 15 years, proximal epiphysis calcite |
| VIII | 7 | D | 82 | cuneiform fragment | undetermined | subadult, second or third cuneiform, probably around 8 years of age |
| VIII | 7 | D | 83 | calcaneus fragment | probable right | subadult, lateral portion, distal epiphysis is not fused, calcite |
| VIII | 7 | D | 84 | rib fragment | undetermined | subadult, vertebral end, calcite |
| VIII | 7 | D | 85 | rib fragment | undetermined | subadult, shaft fragment |
| VIII | 7 | D | 86 | frontal fragment | undetermined | subadult, fragment with the supraorbital ridge, young child, calcite |


| VIII | 7 | D | 87 | unidentified fragments |  | some are subadult, 8 fragments, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 88 | proximal manual phalanx fragment | undetermined | adult, most of the phalanx, some damage to the distal end |
| VIII | 7 | D | 89 | rib fragment | possible left | adult, shaft fragment |
| VIII | 7 | D | 90 | capitate | right | adult, some blackening |
| VIII | 7 | D | 91 | cranial fragment | undetermined | possible subadult based on the thinness |
| VIII | 7 | D | 92 | cranial fragment | undetermined | possible subadult based on the thinness |
| VIII | 7 | D | 93 | parietal fragment | undetermined | subadult, suture appears to have been completely open, grey calcite covered |
| VIII | 7 | D | 94 | cranial fragment | undetermined | possible subadult based on the thinness, calcite covered |
| VIII | 7 | D | 95 | vertebra fragment |  | possible subadult, blackened, lamina fragment of a lower thoracic or possibly a lumbar |
| VIII | 7 | D | 96 | hamate | left | adult, blackened, some damage on the posterior surface |
| VIII | 7 | D | 97 | metacarpal fragment | undetermined | possible adult, proximal fragment, |


|  |  |  |  |  |  | blackened and damaged |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 98 | rib fragment | right | adult, vertebral end fragment, calcite |  |
| VIII | 7 | D | 99 | temporal fragment | undetermined | adult, badly damaged tympanic portion |  |
| VIII | 7 | D | 100 | maxilla fragment | possible right | adult, |  |
| VIII | 7 | D | 101 | femur fragment | undetermined | subadult, proximal fragment with and unfused epiphysis, possibly around 5 years of age based on size |  |
| VIII | 7 | D | 102 | unidentified fragments |  | 35+ unidentified fragments |  |
| VIII | 7 | D | 103 | proximal pedal phalanx | undetermined | subadult, unfused proximal end, probably around 8 years of age based on the size, first digit | 23.65 mm |
| VIII | 7 | D | 104 | proximal pedal phalanx | undetermined | subadult, unfused proximal end, probably around 8 years of age based on the size | 19.1 mm |
| VIII | 7 | D | 105 | distal pedal phalanx | undetermined | subadult, the proximal epiphysis is not completely fused, no more than 15 years of age | 21.72 mm |


| VIII | 7 | D | 106 | first metacarpal | undetermined | subadult, not a new born, maybe only a year or two | 16.54 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 107 | proximal manual phalanx | undetermined | subadult, not a new born, maybe only a year or two | 18.83 mm |
| VIII | 7 | D | 108 | proximal pedal phalanx | undetermined | subadult, unfused proximal end, probably around 8 years of age based on the size | 15.94 mm |
| VIII | 7 | D | 109 | metacarpal epiphysis | undetermined | subadult, under 15 years of age, distal epiphysis, calcite |  |
| VIII | 7 | D | 110 | metacarpal epiphysis | undetermined | subadult, under 15 years of age, distal epiphysis, calcite |  |
| VIII | 7 | D | 111 | metatarsal epiphysis | undetermined | subadult, under 15 years of age, distal epiphysis, calcite |  |
| VIII | 7 | D | 112 | vertebral body |  | subadult, calcite and carbon blackened, probably thoracic |  |
| VIII | 7 | D | 113 | vertebral body |  | subadult, calcite and carbon blackened, probably thoracic, damage to the anterior portion of the body |  |
| VIII | 7 | D | 114 | neural arch | left | subadult, thoracic, |  |

calcite

| calcite |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 115 | thoracic vertebra fragment |  | fused lamina unfused to the body, probably $4-5$ years of age, calcite |
| VIII | 7 | D | 116 | neural arch | left | subadult, thoracic, calcite |
| VIII | 7 | D | 117 | cervical vertebra fragment |  | possible subadult, possibly C 1 or C 2 based upon the relationship of the superior and inferior articular facets |
| VIII | 7 | D | 118 | third cuneiform fragment | right | adult, dorsal fragment, not the mate to 120 |
| VIII | 7 | D | 119 | navicular | left | possible subadult, based on size, calcite |
| VIII | 7 | D | 120 | third cuneiform fragment | left | adult, dorsal fragment, smaller than the 118 one, so it is not a pair |
| VIII | 7 | D | 121 | femur fragment | undetermined | adult head fragment, small fragment |
| VIII | 7 | D | 122 | first cuneiform fragment | right | possible subadult, calcite, damage to the plantar surface |
| VIII | 7 | D | 123 | mandible fragment | undetermined | adult, mandibular condyle fragment |


| VIII | 7 | D | 124 | vertebral body |  | subadult, 2-4 years old, calcite, probable lumbar |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 125 | thoracic vertebra fragment |  | subadult, lamina <br> fused, transverse process seems underdeveloped, based on size, possibly around 5 years, mid thoracic |
| VIII | 7 | D | 126 | neural arch | left | subadult, neonate, probably thoracic |
| VIII | 7 | D | 127 | thoracic vertebra fragment |  | subadult, calcite, probably had a fused lamina, now broken, fusion of body unknown, upper thoracic |
| VIII | 7 | D | 128 | vertebral body |  | subadult, calcite, probably thoracic, 2-4 years of age |
| VIII | 7 | D | 129 | neural arch | right | subadult, lower lumbar, 2-4 years old probably, calcite |
| VIII | 7 | D | 130 | neural arch | left | subadult, mid lumbar, 2-4 years old probably, calcite |
| VIII | 7 | D | 131 | vertebral body |  | subadult, probably the lumbar vertebra, calcite |


| VIII | 7 | D | 132 | vertebral body |  | subadult, probably the lumbar vertebra, calcite, damage to the posterior margin |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 133 | cervical vertebra fragment |  | possible adult fragment with transverse foramen |
| VIII | 7 | D | 134 | neural arch | right | subadult, upper to mid thoracic, 2-4 years old |
| VIII | 7 | D | 135 | neural arch | left | possible neonate or subadult 2-4 years old, some damage |
| VIII | 7 | D | 136 | neural arch | undetermined | subadult, possible thoracic neural arch, too much damage to side, probably 2-4 years old |
| VIII | 7 | D | 137 | distal pedal phalanx | undetermined | subadult, probably around 5 years old, calcite |
| VIII | 7 | D | 138 | vertebral body fragment |  | subadult, 2-4 years of age, possibly a lumbar vertebra based on thickness |
| VIII | 7 | D | 139 | metacarpal fragment | undetermined | subadult, unfused end on a small shaft fragment |
| VIII | 7 | D | 140 | rib fragment | left | subadult, vertebral end fragment, calcite |


| VIII | 7 | D | 141 | first metacarpal fragment | undetermined | subadult, probably 2 - <br> 4 years of age based on the size, distal fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 142 | manual phalanx | undetermined | subadult, probably 2 4 years of age based on the size, probably first digit | 8.34 mm |
| VIII | 7 | D | 143 | intermediate manual phalanx |  | subadult, possibly 5-8 years of age based on size | 13.23 mm |
| VIII | 7 | D | 144 | metatarsal | undetermined | neonate, unfused proximal and distal ends | 15.63 mm |
| VIII | 7 | D | 145 | distal manual phalanx | undetermined | subadult, probably 2 - <br> 4 years of age | 8.65 mm |
| VIII | 7 | D | 146 | intermediate manual phalanx | undetermined | subadult, based on unfused proximal end, possibly as old as 15 years | 10.25 mm |
| VIII | 7 | D | 147 | neural arch fragment | undetermined | subadult, 2-4 years, transverse process fragment |  |
| VIII | 7 | D | 148 | neural arch fragment | undetermined | subadult, 2-4 years, pedicle fragment |  |
| VIII | 7 | D | 149 | neural arch fragment | undetermined | subadult, 2-4 years, superior articular facet and part of the lamina fragment |  |


| VIII | 7 | D | 150 | neural arch fragment | right | possible neonate or subadult 2-4 years old, some damage, thoracic vertebra |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 151 | scapula fragment | undetermined | subadult, 2-4 years of age, unfused coracoid |  |
| VIII | 7 | D | 152 | scapula fragment | undetermined | subadult, 2-4 years of age, unfused coracoid |  |
| VIII | 7 | D | 153 | scapula fragment | undetermined | subadult, 2-4 years of age, unfused coracoid |  |
| VIII | 7 | D | 154 | cervical vertebra fragment |  | subadult 3-4 years old, first cervical, lamina part |  |
| VIII | 7 | D | 155 | epiphysis | undetermined | subadult, possible neonate calcaneus |  |
| VIII | 7 | D | 156 | sesamoid or epiphysis | undetermined | subadult |  |
| VIII | 7 | D | 157 | epiphysis fragment | undetermined | subadult |  |
| VIII | 7 | D | 158 | epiphysis | undetermined | subadult, possible distal epiphysis of a left radius |  |
| VIII | 7 | D | 159 | epiphysis | undetermined | subadult, possible proximal epiphysis of a radius |  |
| VIII | 7 | D | 160 | molar | right | first, lower, X groove pattern | 12.47 mm anterior to posterior, 11.48 mm buccal to lingual, 8.16 mm crown height |


| VIII | 7 | D | 161 | premolar | possible right | second lower, root missing | 8.18 mm anterior <br> to posterior, 8.67 mm buccal to lingual, 9.88 mm crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 162 | unidentified fragments |  | 13 unidentified fragments |  |
| VIII | 7 | D | 163 | ulna fragments | left | adult, proximal and shaft fragments, grayish calcite, needs conservation |  |
| VIII | 7 | D | 164 | fibula fragment | probable left | adult, proximal fragment with a few short shaft fragments, needs conservation |  |
| VIII | 7 | D | 165 | ulna fragments | undetermined | probable adult, shaft fragments, needs conservation |  |
| VIII | 7 | D | 166 | cranial fragments | undetermined | probable adult, needs conservation, possible temporal fragments |  |
| VIII | 7 | D | 167 | parietal fragment | undetermined | probable adult, covered in calcite |  |
| VIII | 7 | D | 168 | parietal fragment | undetermined | probable adult, covered in calcite |  |
| VIII | 7 | D | 169 | cranial fragment | undetermined | probable adult, taphonomic cracking |  |
| VIII | 7 | D | 170 | calcaneus fragment | right | adult, posterior fragment, evidence of burning |  |


| VIII | 7 | D | 171 | cervical vertebra |  | adult, damage to the transverse processes |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 172 | radius fragment | undetermined | adult, proximal fragment of the head and part of the shaft, the radial tuberosity is absent |
| VIII | 7 | D | 173 | humerus fragment | left | adult, distal fragment with part of the trochlea and the medial epicondyle |
| VIII | 7 | D | 174 | talus | right | adult, damage to the medial, lateral, and distal portions of the bone |
| VIII | 7 | D | 175 | femur fragment | undetermined | adult, head fragment |
| VIII | 7 | D | 176 | proximal manual phalanx fragment | undetermined | adult, distal end with most of the shaft, calcite and carbon |
| VIII | 7 | D | 177 | rib fragment |  | adult, shaft fragment, upper rib |
| VIII | 7 | D | 178 | rib fragment |  | adult, shaft fragment |
| VIII | 7 | D | 179 | rib fragment |  | adult, neck fragment |
| VIII | 7 | D | 180 | zygomatic fragment | left | adult, most of the zygomatic, some blackening and flaking |
| VIII | 7 | D | 181 | frontal fragment | left | adult, part of the supraorbital area, some blackening and |

flaking

| VIII | 7 | D | 182 | unidentified fragments |  | 8 unidentified fragments |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 183 | molar | right | first lower, root broken off, some calcite | 12.81 mm anterior to posterior, 11.83 mm lingual to buccal, 9.88 mm crown height |
| VIII | 7 | D | 184 | molar | left | possible third lower, root broken off, some damage to the buccal anterior portion of the crown | 11.79 mm anterior to posterior, 10.19 mm lingual to buccal, 6.67 mm crown height |
| VIII | 7 | D | 185 | molar | left | possible third lower | 11.68 mm anterior to posterior, 9.82 mm lingual to buccal, 6.45 ch |
| VIII | 7 | D | 186 | molar | left | upper, probably third, some calcite, intact | 10.44 mm anterior to posterior, 11.48 mm lingual to buccal, 6.44 mm crown height |
| VIII | 7 | D | 187 | molar | left | possible second lower, root broke off, some calcite | $\begin{gathered} 11.74 \mathrm{~mm} \\ \text { anterior to } \\ \text { posterior, } 10.95 \\ \hline \end{gathered}$ |


|  |  |  |  |  |  |  | mm lingual to buccal, 7.62 mm crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 188 | molar | left | first lower, no root, some calcite | 12.53 mm anterior to posterior, 12.17 mm lingual to buccal, 7.59 mm crown height |
| VIII | 7 | D | 189 | molar | left | probable lower third, no root some calcite | 10.13 mm anterior to posterior, 9.48 mm lingual to buccal, 6.85 mm crown height |
| VIII |  | D | 190 | canine | right | upper, rather large, tip of root broken, calcite, buccal surface caries right above the anterior surface rim of calculus which is slightly above the CEJ | 9.33 mm anterior <br> to posterior, 9.94 <br> mm lingual to buccal, 13.31 mm crown height |
| VIII | 7 | D | 191 | canine | left | lower, calcite, intact | 6.41 mm anterior <br> to posterior, 6.08 mm lingual to buccal, 8.81 mm crown height |
| VIII | 7 | D | 192 | incisor | left | lower, calcite and shoveling | 6.05 mm anterior to posterior, 5.6 mm lingual to |


|  |  |  |  |  |  |  | buccal, 10.41 mm crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 193 | incisor | possible left | upper first probably, root broken, calcite and other fragments around the CEJ, pronounced shoveling | 8.30 mm anterior to posterior, 6.04 mm lingual to buccal, 11.2 mm crown height |
| VIII | 7 | D | 194 | canine | right | lower, calcite, complete | 7.46 mm anterior to posterior, 6.45 mm lingual to buccal, 7.16 mm crown height |
| VIII | 7 | D | 195 | incisor | right | first upper, calcite, complete | 9.47 mm anterior <br> to posterior, 7.8 mm lingual to buccal, 12.85 mm crown height |
| VIII | 7 | D | 196 | incisor | left | possible second, upper, worn, calcite on anterior surface prevents crown measurement | 7.87 mm anterior to posterior, 6.08 mm lingual to buccal, |
| VIII | 7 | D | 197 | premolar | left | first lower, root broken off, calcite | 8.34 mm anterior <br> to posterior, <br> 10.54 mm lingual to buccal, 9.03 mm crown height |
| VIII | 7 | D | 198 | canine | right | upper, no root, calcite prevents crown height measurement | 8.37 mm anterior to posterior, 8.98 mm lingual to buccal |


| VIII | 7 | D | 199 | premolar | left | first lower, no root, calcite, broke during analysis | 7.55 mm anterior to posterior, 8.52 mm lingual to buccal |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 7 | D | 200 | incisor | undetermined | possibly second upper, no root, calcite | 7.15 mm anterior <br> to posterior, 6.54 mm lingual to buccal, 12.48 mm crown height |
| VIII | 7 | D | 201 | canine | left | lower, calcite, broken root tip | 6.16 mm anterior to posterior, 5.2 mm lingual to buccal, 7.2 mm crown height |
| VIII | 7 | D | 202 | molar | right | first lower deciduous, root broken off, minimal wear | 9.38 mm anterior <br> to posterior, 7.56 mm lingual to buccal, 5.98 mm crown height |
| VIII | 8 | a | 1 | third metatarsal | right | adult | 73.18 mm |
| VIII | 8 | a | 2 | third metatarsal | left | sub adult, unfused head | 48.41 mm |
| VIII | 8 | a | 3 | proximal pedal phalanx |  | adult | 28.44 mm |
| VIII | 8 | a | 4 | proximal pedal phalanx |  | adult | 27.2 mm |
| VIII | 8 | a | 5 | distal phalanx |  | adult, probably hand |  |
| VIII | 8 | a | 6 | distal phalanx |  | adult, probably hand |  |
| VIII | 8 | a | 7 | distal phalanx |  | possible subadult, probably foot |  |


| VIII | 8 | a | 8 | distal phalanx | adult, probably foot |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 9 | proximal pedal phalanx | subadult, unfused |
| VIII | 8 | a | 10 | proximal pedal phalanx | subadult, unfused |
| VIII | 8 | a | 11 | proximal pedal phalanx | subadult, unfused proximal end |
| VIII | 8 | a | 12 | proximal manual phalanx | subadult, proximal end broken |
| VIII | 8 | a | 13 | distal pedal phalanx | subadult, probably the first |
| VIII | 8 | a | 14 | epiphysis | subadult |
| VIII | 8 | a | 15 | epiphysis | subadult |
| VIII | 8 | a | 16 | vertebra epiphysis | subadult, possible cervical |
| VIII | 8 | a | 17 | lunate | right adult |
| VIII | 8 | a | 18 | hyoid fragment | subadult, unfused horn of the hyoid |
| VIII | 8 | a | 19 | metacarpal | subadult, unfused head and base |
| VIII | 8 | a | 20 | metacarpal | subadult, unfused head and base |
| VIII | 8 | a | 21 | metatarsal | subadult, possibly the fourth, unfused head and base |
| VIII | 8 | a | 22 | fifth metatarsal | subadult, unfused head and base |
| VIII | 8 | a | 23 | epiphysis | looks like a transverse process |


| VIII | 8 | a | 24 | manual phalanx |  | subadult, unfused |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 25 | pedal phalanx |  | subadult, unfused |  |
| VIII | 8 | a | 26 | epiphysis |  | possible vertebra |  |
| VIII | 8 | a | 27 | ilium | left | subadult, 3-9 years of age, probably around 5 years, badly deteriorated, prevents measurements |  |
| VIII | 8 | a | 28 | femur epiphysis | left | subadult, over 5 years old, probably closer to 9 years of age, badly deteriorated |  |
| VIII | 8 | a | 29 | calcaneus fragment | left | adult, blackened, medial fragment |  |
| VIII | 8 | a | 30 | lumbar vertebra |  | adult, probably L3, blackened and some damage throughout |  |
| VIII | 8 | a | 31 | talus fragment | right | adult, blackened, medial fragment |  |
| VIII | 8 | a | 32 | calcaneus fragment | right | adult, blackened, medial fragment |  |
| VIII | 8 | a | 33 | first metatarsal fragment | left | adult, distal fragment, blackened |  |
| VIII | 8 | a | 34 | humerus epiphysis | undetermined | subadult, possibly around 9 years of age, distal epiphysis, blackened, about 4 cm wide |  |
| VIII | 8 | a | 35 | proximal pedal phalanx | undetermined | adult, distal end has remodeling | 24.02 mm |


|  |  |  |  |  |  | suggestive of gout or arthritis, blackened |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 36 | proximal pedal phalanx | undetermined | adult, base has an anteriorly enlarged facet, blackened | 21.64 mm |
| VIII | 8 | a | 37 | proximal pedal phalanx | undetermined | adult, blackened, medial fragment | 25.02 mm |
| VIII | 8 | a | 38 | distal pedal phalanx | undetermined | adult, first digit, blackened | 23.07 mm |
| VIII | 8 | a | 39 | proximal pedal phalanx fragment | undetermined | adult, distal fragment, blackened |  |
| VIII | 8 | a | 40 | intermediate manual phalanx | undetermined | adult, blackened, slight damage to the palmar proximal surface | 26.77 mm |
| VIII | 8 | a | 41 | intermediate pedal phalanx | undetermined | adult, blackened | 11.7 mm |
| VIII | 8 | a | 42 | patella | left | adult, blackened | 39.29 mm height, 41.87 mm est. width |
| VIII | 8 | a | 43 | first metacarpal | undetermined | subadult, probably around 8 or younger, blackened | 18.54 mm |
| VIII | 8 | a | 44 | first metacarpal | undetermined | subadult, probably around 8 or younger, blackened | 17.95 mm |
| VIII | 8 | a | 45 | proximal manual phalanx | undetermined | subadult, probably around 8 or younger, blackened | 27.41 mm |


| VIII | 8 | a | 46 | proximal manual phalanx | undetermined | subadult, probably around 8 or younger, blackened, slight damage to the proximal end | 20.3 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 47 | proximal manual phalanx | undetermined | subadult, probably around 8 or younger, blackened | 14.87 mm |
| VIII | 8 | a | 48 | metatarsal | undetermined | subadult, probably around 8 or younger, blackened, head and proximal epiphysis is unfused | 30.03 mm |
| VIII | 8 | a | 49 | metatarsal | undetermined | subadult, probably around 8 or younger, blackened, head and proximal epiphysis is unfused | 29.64 mm |
| VIII | 8 | a | 50 | metatarsal | undetermined | subadult, probably around 8 or younger, blackened, head and proximal epiphysis is unfused, damage to the distal end. |  |
| VIII | 8 | a | 51 | metacarpal | undetermined | subadult, probably around 8 or younger, blackened | 24.12 mm |
| VIII | 8 | a | 52 | sacrum fragment | undetermined | adult, blackened, superior portion os S1, ala broken off |  |


| VIII | 8 | a | 53 | cranial fragments | undetermined | adult, blackened, badly deteriorated, |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 54 | femur epiphysis | undetermined | subadult, damage to one of the margins prevents measurement, probably around 5 years of age |
| VIII | 8 | a | 55 | sacral neural arch | undetermined | subadult |
| VIII | 8 | a | 56 | sacral neural arch and body |  | subadult, possible adolescent, lower sacral |
| VIII | 8 | a | 57 | sacral neural arch | undetermined | subadult |
| VIII | 8 | a | 58 | thoracic body |  | subadult, unfused, under 5 or 6 years of age |
| VIII | 8 | a | 59 | lumbar body |  | subadult, under 4 years of age |
| VIII | 8 | a | 60 | greater horn | probable left | probable subadult |
| VIII | 8 | a | 61 | rib | right | subadult, probably young, mid rib |
| VIII | 8 | a | 62 | rib fragment | right | subadult, probably young, lower rib, vertebral end |
| VIII | 8 | a | 63 | rib fragment | right | subadult, probably young, lower rib, neck and shaft fragment |
| VIII | 8 | a | 64 | hyoid body |  | probable subadult |
| VIII | 8 | a | 65 | hyoid body |  | probable subadult |

subadult, not

| VIII | 8 | a | 66 | metacarpal/metatarsal | undetermined | completely formed |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 67 | metacarpal epiphysis | undetermined |  |  |
| VIII | 8 | a | 68 | metatarsal epiphysis | undetermined | subadult, head epiphysis |  |
| VIII | 8 | a | 69 | proximal manual phalanx | undetermined | subadult, proximal end is unfused, palmar proximal surface I missing, blackened |  |
| VIII | 8 | a | 70 | tibia epiphysis (probable) | undetermined | subadult, distal epiphysis, probably around 5 years of age |  |
| VIII | 8 | a | 71 | humerus epiphysis | undetermined | subadult, probably around 5 years of age, blackened |  |
| VIII | 8 | a | 72 | sacral fragment | undetermined | subadult |  |
| VIII | 8 | a | 73 | sacral fragment | undetermined | subadult |  |
| VIII | 8 | a | 74 | unidentified fragments | undetermined | 6 fragments, possibly os coxa or cranial fragments of a subadult? |  |
| VIII | 8 | a | 75 | molar | left | lower third molar, tips of roots broken off, carries in distal groove on occlusal surface | 10.69 mm anterior to posterior, 10.63 mm lingual to buccal, 6.12 mm crown height |
| VIII | 8 | a | 76 | molar | right | second lower, no root, carries on the buccal | $10.59 \mathrm{~mm}$ |


7.03 mm anterior
to posterior, 8.33
possible second
upper, wear on cusps,
root intact, some
calcite possible second, upper, calculus $\quad 7.11 \mathrm{~mm}$ anterior around the tooth at to posterior, 6.54 the CEJ, enamel mm lingual to defect 2.21 mm up buccal, 8.69 mm

| VIII | 8 | a | 82 | incisor | left | from CEJ | crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 83 | canine | left | upper, broken root, some calcite | 7.33 mm anterior to posterior, 7.79 mm lingual to buccal, 11 mm crown height |
| VIII | 8 | a | 84 | incisor | undetermined | lower, calculus on anterior and lingual surface, slight line of dentine due to wear | 5.87 mm anterior to posterior, 6.08 mm lingual to buccal, 7.56 mm crown height |
| VIII | 8 | a | 85 | incisor | undetermined | lower, calculus on medial and lateral surfaces, root tip broken | 5.55 mm anterior <br> to posterior, 5.06 mm lingual to buccal, 7.75 mm crown height |
| VIII | 8 | a | 86 | incisor | undetermined | lower, root tip broken, linear enamel defect 4.53 mm above CEJ (slight | 5.43 mm anterior to posterior, 5.68 mm lingual to buccal, 10.48 mm |


|  |  |  |  |  |  | indentation and color change) | crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 87 | incisor | undetermined | upper deciduous, possibly the second, calcite | 5.18 mm anterior to posterior, 4.6 mm lingual to buccal, 5.79 mm crown height |
| VIII | 8 | a | 88 | canine | right | upper deciduous | 7.27 mm anterior <br> to posterior, 6.45 mm lingual to buccal, 6.67 mm crown height |
| VIII | 8 | a | 89 | incisor | undetermined | lower, calculus completely covers the lingual surface, and wraps around to the anterior at the CEJ | 5.4 mm anterior to posterior, 5.41 mm lingual to buccal, 7.95 mm crown height |
| VIII | 8 | a | 90 | incisor | undetermined | probably upper, broken crown | 7.29 mm anterior to posterior |
| VIII | 8 | a | 91 | canine | left | lower, possible deciduous, root broken | 7.37 mm anterior to posterior, <br> $5.79 \mathrm{lb}, 7.02 \mathrm{~mm}$ crown height |
| VIII | 8 | a | 92 | distal manual phalanx | undetermined | adult, slight calcite | 14.2 mm |
| VIII | 8 | a | 93 | molar fragment | undetermined | well worn crown fragment |  |
| VIII | 8 | a | 94 | premolar fragment | undetermined | mostly lingual crown fragment |  |
| VIII | 8 | a | 95 | incisor fragment | undetermined | upper occlusal |  |


|  |  |  |  |  | fragment |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 96 | root fragment | undetermined |  |  |
| VIII | 8 | a | 97 | incisor | left | first upper, root broken, some calcite, enamel broken at CEJ on anterior surface and lateral edge | 7.32 mm lingual <br> to buccal 10.23 ch |
| VIII | 8 | a | 98 | incisor | undetermined | lower deciduous, complete, some calcite | 4.12 mm anterior to posterior, <br> 4.1 mm lingual to buccal 5.4ch |
| VIII | 8 | a | 99 | incisor | right | possible second, upper, root broken off | 6.84 mm anterior to posterior, 6.23 mm lingual to buccal 10.72ch |
| VIII | 8 | a | 100 | molar | left | upper third, heavily worn | 9.53 mm anterior to posterior, 11.32 mm lingual to buccal 5.98 ch , 13.04ch |
| VIII | 8 | a | 101 | premolar | left | first, upper, no root | 7.67 mm anterior to posterior, 9.78 mm lingual to buccal 8.87 ch |
| VIII | 8 | a | 102 | premolar | left | second, lower, complete | 7.87 mm anterior to posterior, 8.05 mm lingual to buccal 7.61 ch , 15.37 root |
| VIII | 8 | a | 103 | premolar | right | upper first, no root | 7.45 mm anterior |


|  |  |  |  |  |  |  | to posterior, 10.19 mm lingual to buccal 9.72ch |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 104 | incisor | undetermined | lower, modified with a possible E | 5.73 mm anterior to posterior, 5.66 mm lingual to buccal 9.84ch |
| VIII | 8 | a | 105 | incisor | undetermined | upper, possible lateral, modified with a E design, some calculus around CEJ | 7.39 mm anterior to posterior, 6.93 mm lingual to buccal 8.07 ch |
| VIII | 8 | a | 106 | incisor | undetermined | stalagmite walkway, lower incisor, modified with a v like incision in the center of the tooth at an angle, calculus on lingual surface, that wraps around the tooth at the CEJ | 5.94 mm anterior <br> to posterior, 5.94 mm lingual to buccal 8.55 ch |
| VIII | 8 | a | 107 | incisor | left | stalagmite walkway, probably an upper lateral incisor, modified with an Ik motif, calculus around the medial and lateral sides at the CEJ | 7.45 mm anterior to posterior, 6.23 mm lingual to buccal 8.58ch, 11.72 root |


| VIII | 8 | a | 108 | incisor | left | stalagmite walkway, lower incisor, modified with a v like incision in the center of the tooth at an angle, calculus on a side at the CEJ | 6.62 mm anterior to posterior, 6.24 mm lingual to buccal 9.24ch, 11.11 root |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | a | 109 | incisor | undetermined | stalagmite walkway, probably an upper lateral incisor, modified with an Ik motif, calculus around the CEJ | 7.32 mm anterior to posterior, 5.56 mm lingual to buccal 7.4ch |
| VIII | 8 | a | 110 | canine | left | stalagmite walkway, upper, modified with an Ik motif, slight calculus on anterior at CEJ | 8.88 mm anterior to posterior, 8.32 mm lingual to buccal 9.27 ch |
| VIII | 8 | C | 1 | epiphysis |  | unknown epiphysis, badly deteriorated |  |
| VIII | 8 | C | 1 | distal manual phalanx | undetermined | adult, calcite, possibly the first digit | 21.92 |
| VIII | 8 | C | 2 | intermediate manual phalanx | undetermined | adult, calcite and carbon | 23.33 |
| VIII | 8 | C | 3 | proximal pedal phalanx | undetermined | adult, calcite | 22.8 |
| VIII | 8 | C | 4 | intermediate manual phalanx | undetermined | subadult, proximal end is unfused, calcite and carbon | 19.21 |


| VIII | 8 | C | 5 | ulna fragment | left | subadult, probably around 15 years of age (or it is badly deteriorated) calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 6 | radius fragment | left | subadult, unfused proximal epiphysis, under 15 probably closer to 9 |  |
| VIII | 8 | C | 7 | talus | right | adult, damage to the medial aspect and anterior facet prevents measurement, calcite and carbon |  |
| VIII | 8 | C | 8 | first cuneiform | left | adult, blackened, slight damage to the palmar proximal surface |  |
| VIII | 8 | C | 9 | thoracic vertebra |  | adult, blackened, mid thoracic |  |
| VIII | 8 | C | 10 | talus | right | adult, blackened, damage to the anterior facet and lateral styloid |  |
| VIII | 8 | C | 11 | patella | left | adult, calcite | 37.74h, 39.66w |
| VIII | 8 | C | 12 | cuboid | right | adult, calcite |  |
| VIII | 8 | C | 13 | rib fragment | left | subadult, mid rib blackened, shaft fragment |  |


| VIII | 8 | C | 14 | rib fragment | right | subadult, upper rib, blackened, shaft fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 15 | rib fragment |  | subadult, vertebral end, blackened |  |
| VIII | 8 | C | 16 | clavicle fragment | right | subadult, lateral fragment, taphonomic damage, blackened |  |
| VIII | 8 | C | 17 | proximal pedal phalanx | undetermined | adult, first digit, blackened | 27.53 |
| VIII | 8 | C | 18 | proximal manual phalanx | undetermined | subadult, proximal epiphysis is unfused, probably around 8 years of age | 32.94 |
| VIII | 8 | C | 19 | proximal manual phalanx | undetermined | subadult, proximal epiphysis is unfused, probably around 8 years of age, damage to the proximal margin | 33.27 |
| VIII | 8 | C | 20 | proximal manual phalanx fragment | undetermined | adult, calcite, damage to the proximal end and the distal end |  |
| VIII | 8 | C | 21 | humerus epiphysis | right | subadult, proximal epiphysis, under 15, probably closer to 9 , blackened |  |
| VIII | 8 | C | 22 | sacral vertebra |  | subadult, probably a lower sacral, blackened, damage to |  |

the right transverse
portion

| VIII | 8 | C | 23 | vertebra fragment | lamina fragment with articular facets, possible subadult, probable lumbar, blackened |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 24 | fourth metatarsal fragment | left | adult proximal fragment, calcite |  |
| VIII | 8 | C | 25 | third metatarsal fragment | right | adult proximal fragment, calcite |  |
| VIII | 8 | C | 26 | third metatarsal fragment | right | adult, proximal and shaft fragment, blackened |  |
| VIII | 8 | C | 27 | metacarpal fragment | undetermined | adult, distal fragment, blackened |  |
| VIII | 8 | C | 28 | metacarpal | undetermined | subadult, possible perinate, slightly blackened | 26.83 |
| VIII | 8 | C | 29 | metatarsal | undetermined | subadult, possible perinate, blackened | 33.44 |
| VIII | 8 | C | 30 | second metacarpal fragment | left | possible adult, calcite, proximal fragment with half of the shaft |  |

$\left.\begin{array}{ccccccc}\text { VIII } & 8 & \text { C } & \text { fifth metatarsal } & & & \begin{array}{c}\text { adult, proximal and } \\ \text { shaft fragment, } \\ \text { blackened }\end{array} \\ \text { VIII } & 8 & \text { C } & 32 & \text { ischium fragment } & \text { right } & \text { right }\end{array} \begin{array}{c}\text { subadult, probably } \\ \text { under 5 years of age }\end{array}\right]$

| VIII | 8 | C | 41 | proximal pedal phalanx | undetermined | subadult, proximal epiphysis is unfused, blackened, first digit | 14.13 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 42 | rib fragment | left | subadult, blackened, upper rib neck and shaft fragment, possible perinate |  |
| VIII | 8 | C | 43 | rib fragment | right | subadult, blackened, upper rib neck and shaft fragment, possible perinate |  |
| VIII | 8 | C | 44 | rib fragment | undetermined | subadult, blackened, shaft fragment |  |
| VIII | 8 | C | 45 | rib fragment | undetermined | subadult, blackened, shaft fragment |  |
| VIII | 8 | C | 46 | rib fragment | undetermined | subadult, blackened, shaft fragment |  |
| VIII | 8 | C | 47 | patella | right | subadult, some calcite | 28.85h, 26.95w |
| VIII | 8 | C | 48 | capitate | right | adult, blackened |  |
| VIII | 8 | C | 49 | scaphoid | left | adult, blackened |  |
| VIII | 8 | C | 50 | first cuneiform | left | adult, blackened |  |
| VIII | 8 | C | 51 | intermediate manual phalanx | undetermined | subadult, proximal epiphysis is unfused, under 8 years of age, probably close to 5 years | 14.25 |


| VIII | 8 | C | 52 | proximal manual phalanx | undetermined | subadult, damage to the proximal and distal ends prevents measurement, under 8 years, probably closer to 5, blackened |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 53 | distal manual phalanx | undetermined | subadult, blackened | 12.3 |
| VIII | 8 | C | 54 | proximal pedal phalanx | undetermined | subadult, blackened, epiphysis unfused, under 8 , probably closer to 5, first digit | 14.68 |
| VIII | 8 | C | 55 | proximal pedal phalanx | undetermined | adult, calcite | 24 |
| VIII | 8 | C | 56 | neural arch | right | subadult, cervical, mid, calcite |  |
| VIII | 8 | C | 57 | thoracic vertebra fragment |  | probable subadult, transverse processes are not fully developed, blackened |  |
| VIII | 8 | C | 58 | cervical vertebra fragment |  | part of the body and left transverse process and superior articular facet |  |
| VIII | 8 | C | 59 | neural arch | right | subadult, thoracic vertebra, blackened |  |
| VIII | 8 | C | 60 | cervical vertebra fragment |  | probable adult, left lamina and articular facets |  |
| VIII | 8 | C | 61 | neural arch | left | subadult C1, calcite |  |
| VIII | 8 | C | 62 | neural arch | right | subadult, thoracic |  |

$\left.\begin{array}{ccccccc}\text { VIII } & 8 & \text { C } & \text { cervical vertebra } \\ \text { fragment }\end{array} \quad \begin{array}{c}\text { probable adult, left } \\ \text { lamina and articular } \\ \text { facets, grayish calcite }\end{array}\right]$

| VIII | 8 | C | 71 | tibia fragment | probable left | adult, distal fragment, calcite and blackening |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 72 | talus | right | adult, calcite and carbon, lateral styloid is broken off | 58.081 |
| VIII | 8 | C | 73 | metatarsal fragment | undetermined | adult, distal fragment with most of the shaft, blackened |  |
| VIII | 8 | C | 74 | second metacarpal | left | adult, blackened, defined muscle attachment on the palmar surface | 59.28 |
| VIII | 8 | C | 75 | fourth metatarsal | left | adult, blackened | 64.01 |
| VIII | 8 | C | 76 | fibula fragment | left | subadult, probably around 15 years of age (or it is badly deteriorated) blackened |  |
| VIII | 8 | C | 77 | unidentified fragments | left | subadult, shaft fragment, blackened, over 5 years of age based on size |  |
| VIII | 8 | C | 78 | long bone fragments | undetermined | possible adult shaft fragments, badly deteriorated, 2 pieces |  |


| VIII | 8 | C | 79 | humerus fragment | undetermined | subadult, probably 1.5 years old based on the size, blackened |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 80 | rib fragment | undetermined | shaft fragment, subadult |  |
| VIII | 8 | C | 81 | clavicle fragment | left | subadult, older child, lateral fragment, taphonomic damage, blackened |  |
| VIII | 8 | C | 82 | pubis | left | subadult, probably around 5 years of age, calcite covered |  |
| VIII | 8 | C | 83 | fifth metatarsal | right | adult, blackened | 68.43 |
| VIII | 8 | C | 84 | third metacarpal | right | adult, broken in two calcite and carbon |  |
| VIII | 8 | C | 85 | parietal fragments | right | adult, blackened, four fragments, posterior portion along the sutures |  |
| VIII | 8 | C | 86 | vertebra fragment |  | adult, body fragment, probably thoracic |  |
| VIII | 8 | C | 87 | vertebral body |  | subadult, age 2-4 years, calcite and carbon, unfused body |  |
| VIII | 8 | C | 88 | third metacarpal fragment | left | adult, proximal fragment, blackened |  |
| VIII | 8 | C | 89 | metacarpal fragment | undetermined | adult, distal fragment with part of the shaft |  |
| VIII | 8 | C | 90 | thoracic vertebra fragment |  | probable subadult, lamina fuse (probably |  |


|  |  |  |  |  |  | over 4 years of age, blackened |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 91 | cervical vertebra fragment |  | probable adult, lamina fragment, blackened |
| VIII | 8 | C | 92 | vertebra fragment |  | probable adult, blackened, probably lumbar or first sacral vertebra fragment based on the morphology of the articular facet present |
| VIII | 8 | C | 93 | scapula fragment | left | subadult, blackened, glenoid and spine fragment, probably around 4-5 years old based on the size |
| VIII | 8 | C | 94 | cervical vertebra fragment |  | adult, body fragment with part of the left transverse process |
| VIII | 8 | C | 95 | radius epiphysis | left | subadult, probably around 5 years of age, blackened |
| VIII | 8 | C | 96 | root fragment | undetermined | probable adult, probable canine root |
| VIII | 8 | C | 97 | metatarsal fragment | undetermined | subadult, distal unfused epiphysis |
| VIII | 8 | C | 98 | hamate | right | subadult, blackened |
| VIII | 8 | C | 99 | phalanx fragment | undetermined | adult, distal fragment, possible proximal |


|  |  |  |  |  |  | pedal phalanx, blackened |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 100 | occipital fragment | undetermined | subadult, blackened, left occipitomastoid structure |
| VIII | 8 | C | 101 | femur fragment | right | subadult, probably around 1.5 years old, blackened, proximal fragment |
| VIII | 8 | C | 102 | radius fragment | left | subadult, probably a little over 5 years of age based on the size, distal fragment, unfused epiphysis |
| VIII | 8 | C | 103 | talus | left | subadult, unfused and small, blackened, probably around 2-3 years old |
| VIII | 8 | C | 104 | rib fragment | undetermined | subadult, vertebral end, blackened |
| VIII | 8 | C | 105 | occipital fragment |  | subadult, basilar part, blackened |
| VIII | 8 | C | 106 | epiphysis | undetermined | subadult, blackened, possible femoral head |
| VIII | 8 | C | 107 | femoral epiphysis fragment | undetermined | subadult, blackened, distal epiphysis fragment |
| VIII | 8 | C | 108 | epiphysis fragment | undetermined | subadult, blackened, either a fragment of the distal femur |


|  |  |  |  |  |  | epiphysis or the superior humerus epiphysis |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 109 | long bone fragment | undetermined | subadult, possible proximal humerus fragment with unfused epiphysis, otherwise possible a femur, too fragmentary to determine |
| VIII | 8 | C | 110 | cranial fragment | undetermined | small fragment, blackened and warped |
| VIII | 8 | C | 111 | cranial fragment | undetermined | small fragment, blackened and warped |
| VIII | 8 | C | 112 | rib fragment | left | adult, vertebral end |
| VIII | 8 | C | 113 | unidentified fragments | undetermined | 35 unidentified fragments |
| VIII | 8 | C | 114 | sacrum fragment |  | subadult, first sacral body with superior articular facets, probably under age 12 but over age 5 based upon size and stage of development, blackened |


| VIII | 8 | C | 115 | vertebra fragment |  | possible adult, body fragment, probable lumbar based upon vertebral body height, blackened |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 116 | coccyx fragment |  | adult, first part of the coccyx with the cornu |
| VIII | 8 | C | 117 | neural arch | left | subadult, lumbar vertebra, possibly the last lumbar, calcite,24 years of age |
| VIII | 8 | C | 118 | neural arch | left | subadult, cervical neural arch, calcite covered, 2-4 years of age |
| VIII | 8 | C | 119 | neural arch | left | subadult, cervical neural arch, 2-4 years of age |
| VIII | 8 | C | 120 | neural arch | left | subadult, thoracic vertebra, blackened, 2-4 years of age |
| VIII | 8 | C | 121 | neural arch | right | subadult, thoracic vertebra, blackened, 2-4 years of age, damage to the lamina |
| VIII | 8 | C | 122 | lumbar vertebra |  | subadult, epiphyseal line at pedicle is still visible, probably 4-5 years old |


| VIII | 8 | C | 123 | lumbar vertebra fragment |  | subadult, body fragment with semifused pedicle, probably same individual as 122 , blackened |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 124 | vertebra fragment |  | possible adult, lamina fragment from a lower cervical or upper thoracic vertebra, calcite |  |
| VIII | 8 | C | 125 | vertebra body |  | subadult, 2-4 years of age, possibly a lumbar of a younger child or a slightly older child's thoracic |  |
| VIII | 8 | C | 126 | tibia epiphysis | right | subadult, probably closer to 9 years old, blackened, smaller than 127 , probably different child |  |
| VIII | 8 | C | 127 | tibia epiphysis | left | subadult, probably closer to 9 years old, blackened, smaller than 126, probably different child |  |
| VIII | 8 | C | 128 | interproximal manual phalanx |  | adult, blackened | 26 mm |
| VIII | 8 | C | 129 | proximal manual phalanx |  | subadult, proximal epiphysis is unfused, | 29.85 mm |


| VIII | 8 | C | 130 | proximal manual phalanx |  | subadult, proximal epiphysis is unfused, blackened | 32.12 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 131 | proximal manual phalanx |  | subadult, proximal epiphysis is unfused, blackened | 24.68 mm |
| VIII | 8 | C | 132 | distal manual phalanx |  | adult, blackened | 17.78 mm |
| VIII | 8 | C | 133 | distal manual phalanx |  | adult, blackened | 16.04 mm |
| VIII | 8 | C | 134 | proximal manual phalanx |  | adult, slightly blackened | 33.59 mm |
| VIII | 8 | C | 135 | proximal pedal phalanx |  | adult, blackened | 24.39 mm |
| VIII | 8 | C | 136 | proximal pedal phalanx |  | adult, grey calcite | 27.48 mm |
| VIII | 8 | C | 137 | first metatarsal | undetermined | subadult, blackened, slight damage to proximal and distal ends, probably around 4-5 years old based on the size | 25.56 mm |
| VIII | 8 | C | 138 | proximal manual phalanx | undetermined | subadult, blackened, probably 4-5 years old based on the size | 27.92 mm |
| VIII | 8 | C | 139 | proximal pedal phalanx | undetermined | adult, blackened | 22.23 mm |
| VIII | 8 | C | 140 | intermediate pedal phalanx | undetermined | adult, blackened | 14.54 mm |


| VIII | 8 | C | 141 | distal pedal phalanx | undetermined | adult, blackened | 22.57 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 142 | proximal manual phalanx | undetermined | subadult, probably 24 based on size, blackened | 19.47 mm |
| VIII | 8 | C | 143 | distal manual phalanx | undetermined | adult, slightly blackened | 17.5 mm |
| VIII | 8 | C | 144 | intermediate pedal phalanx | undetermined | adult, blackened | 10.31 mm |
| VIII | 8 | C | 145 | proximal manual phalanx fragment | undetermined | adult, distal and shaft fragment, blackened |  |
| VIII | 8 | C | 146 | proximal manual phalanx | undetermined | subadult, probably around 2-4 years of age based on the size, blackened | 20.58 mm |
| VIII | 8 | C | 147 | proximal manual phalanx | undetermined | subadult, probably around 2-4 years of age based on the size, blackened | 17.69 mm |
| VIII | 8 | C | 148 | proximal manual phalanx fragment | undetermined | subadult, probably around 2-4 years of age based on the size, <br> blackened, distal fragment with half of the shaft |  |
| VIII | 8 | C | 149 | proximal manual phalanx | undetermined | subadult, probably around 2-4 years of age based on the size, blackened, some damage to the proximal palmar |  |

$\left.\begin{array}{ccccccc}\hline \text { VIII } & 8 & \text { C } & 150 & \text { lunate } & \text { left } & \begin{array}{c}\text { subadult based on } \\ \text { size, blackened }\end{array} \\ \hline \text { VIII } & 8 & \text { C } & 151 & \text { scaphoid } & & \text { left }\end{array} \begin{array}{c}\text { subadult based on } \\ \text { size, blackened, same } \\ \text { size as 152 }\end{array}\right]$

| VIII | 8 | C | 160 | vertebral body |  | subadult, 2-4 years of age, probable lower thoracic |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 161 | vertebral body |  | subadult, 2-4 years of age, probable upper thoracic |
| VIII | 8 | C | 162 | vertebral body |  | subadult, 2-4 years of age, lumbar, blackened and damage to the posterior portion |
| VIII | 8 | C | 163 | vertebral body |  | subadult, 2-4 years of age, lumbar, blackened |
| VIII | 8 | C | 164 | sternal body (sternebra) |  | subadult, blackened, older child based on thickness |
| VIII | 8 | C | 165 | manubrium |  | subadult (probably slightly over 3 years of age based on size and shape) |
| VIII | 8 | C | 166 | navicular | left | adult, covered in calcite |
| VIII | 8 | C | 167 | metacarpal |  | subadult, distal and proximal epiphyses not fused, probably 2 4 years old based on the size, blackened |
| VIII | 8 | C | 168 | humerus epiphysis | possible left | subadult, probably closer to 9 years old |

than 5

| VIII | 8 | C | 169 | humerus fragment | undetermined | cannot be determined if it is a distal humerus fragment or a subadult distal epiphysis, badly blackened |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 170 | ilium fragment | probable left | perinate, blackened and brittle |
| VIII | 8 | C | 171 | tibia epiphysis | possible right | subadult, probably closer to 9 than 5 , proximal epiphysis, blackened and brittle |
| VIII | 8 | C | 172 | os coxa fragments | left | adult, blackened and in many pieces, needs conservation, part of the lunate surface is present but that is about it. |
| VIII | 8 | C | 173 | shaft fragment | undetermined | adult, blackened, needs conservation |
| VIII | 8 | C | 174 | third cuneiform fragment | left | adult, plantar surface is broken off, some blackening |
| VIII | 8 | C | 175 | vertebra fragment |  | adult, body fragment, blackened, morphological damage due to taphonomic |


|  |  |  |  |  |  | processes, either sacral or lumbar body |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 176 | rib fragment | undetermined | adult, mid rib, blackened, shaft fragment less than 6 cm long |
| VIII | 8 | C | 177 | calcaneus fragment | left | adult, narrow posterior fragment, with most of the medial portion gone, slight blackening |
| VIII | 8 | C | 178 | fifth metacarpal fragment | right | adult, proximal and shaft fragment, blackened |
| VIII | 8 | C | 179 | metacarpal fragment | undetermined | adult, proximal fragment, blackened, probably the fourth or fifth, most likely the fourth right |
| VIII | 8 | C | 180 | radius fragment | undetermined | subadult, probably around 5 years old, fragment with the radial tuberosity, blackened |
| VIII | 8 | C | 181 | epiphysis |  | subadult, possibly around two years old, possibly femoral head epiphysis, blackened |


| VIII | 8 | C | 182 | epiphysis |  | subadult, possible humeral head epiphysis, blackened |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 183 | epiphysis |  | subadult, possible humeral head epiphysis, blackened |  |
| VIII | 8 | C | 184 | vertebra body |  | subadult, probably around 2 years old, first sacral body vertebra, blackened |  |
| VIII | 8 | C | 185 | metatarsal fragment | undetermined | adult, distal fragment of only the head, blackened |  |
| VIII | 8 | C | 186 | rib fragment | undetermined | subadult, shaft fragment, blackened |  |
| VIII | 8 | C | 187 | unidentified fragments |  | 7 unidentified fragments |  |
| VIII | 8 | C | 188 | molar | left | first lower, root broken off, caries in buccal groove | 12.6 mm anterior to posterior, 11.37 mm lingual to buccal 8.63 mm crown height |
| VIII | 8 | C | 189 | molar | left | possibly third lower, root broken off, caries in the occlusal grove near the posterior buccal groove | 12.02 mm anterior <br> to posterior, 10.56 mm lingual to buccal 6.94 mm crown height |
| VIII | 8 | C | 190 | molar | left | upper, possible second, broken root | 10.08 mm anterior to posterior, 11.38 mm lingual |


| VIII | 8 | C | 191 | molar | undetermined | too much wear and no root makes siding and identification difficult, possibly and upper |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 192 | incisor | possible left | possibly the first, upper, some damage to root makes siding difficult, some shoveling | 8.76 mm anterior to posterior, 6.8 mm lingual to buccal 10.79 mm crown height |
| VIII | 8 | C | 193 | incisor | undetermined | probable lower | 6.78 mm anterior <br> to posterior, <br> 6.98 mm lingual to buccal <br> 10.36 mm crown <br> height, 13.46 root |
| VIII | 8 | C | 194 | premolar | right | upper, possible second, broken root | 7.03 mm anterior to posterior, 9.03 mm lingual to buccal 7.96 mm crown height |
| VIII | 8 | C | 195 | premolar | right | upper, possible first, no root | 7.18 mm anterior to posterior, <br> 9.15 mm lingual to buccal |
| VIII | 8 | C | 196 | canine | right | lower, no root because it appears to still be developing | 6.67 mm anterior to posterior, <br> 5.71 mm lingual |


|  |  |  |  |  |  |  | to buccal 10.13 mm crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 197 | premolar | left | upper second, no root | 7.13 mm anterior to posterior, 9.37 mm lingual to buccal 8.10 mm crown height |
| VIII | 8 | C | 198 | premolar | right | lower possible second, complete , damage to lateral enamel | 7.08 mm anterior to posterior, 8.38 mm lingual to buccal 7.9 mm crown height |
| VIII | 8 | C | 199 | premolar | left | lower possible second, complete root | 7.04 mm anterior <br> to posterior, <br> 7.36 mm lingual to buccal 7.15 mm crown height |
| VIII | 8 | C | 200 | incisor | right | upper first, root broken |  |
| VIII | 8 | C | 201 | molar | undetermined | upper, heavily worn, root broken off | 8.62 mm anterior <br> to posterior, <br> 7.13 mm lingual to buccal <br> 10.31 mm crown height |
| VIII | 8 | C | 202 | molar | undetermined | upper, heavily worn, root broken off |  |
| VIII | 8 | C | 203 | molar fragment | undetermined | partial crown fragment, worn |  |


| VIII | 8 | C | 204 | molar fragment | undetermined | partial crown fragment, worn |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 8 | C | 205 | incisor | undetermined | upper, possibly central, modified with an E motif | 8.66 mm anterior to posterior, <br> 7.24 mm lingual to buccal <br> 11.88 mm crown height |
| VIII | 8 | C | 206 | incisor | undetermined | upper, possibly central, modified with an Ik motif, slight ring of calculus around the tooth above the CEJ | 8.99 mm anterior <br> to posterior, <br> 7.55 mm lingual to buccal <br> 10.39 mm crown height |
| VIII | 8 | C | 207 | incisor | undetermined | possibly upper, broken, was modified with a chunk taken out of either the medial or lateral part of the tooth, neither line is perfectly perpendicular |  |
| VIII | 8 | C | 208 | canine | left | possibly upper, was modified with a chunk taken out of either the medial part of the tooth | 7.63 mm anterior to posterior, 6.99 mm lingual to buccal 10.13 mm crown height, 17.06 root |


| VIII | 10 | a | 1 | humerus fragment | left | proximal fragment, subadult, unfused head, under 14 years of age, calcite on lateral surface |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | a | 2 | second metatarsal fragment | right | adult, covered in calcite, damage to the base and head |  |
| VIII | 10 | a | 3 | fifth metatarsal | right | subadult, head is not fully fused, covered in calcite | 64.11 mm |
| VIII | 10 | a | 4 | first metatarsal fragment | right | adult, distal fragment, covered in calcite |  |
| VIII | 10 | a | 5 | third metatarsal fragment | right | adult, proximal and shaft fragment, covered in calcite |  |
| VIII | 10 | a | 6 | proximal manual phalanx | undetermined | adult, covered in calcite, head worn away |  |
| VIII | 10 | a | 7 | fifth metacarpal fragment | left | proximal fragment, possibly subadult based on size, calcite |  |
| VIII | 10 | a | 8 | proximal pedal phalanx | undetermined | subadult, proximal epiphysis is not fully fused, covered in calcite, first digit | 30.8 mm |
| VIII | 10 | a | 9 | proximal pedal phalanx | undetermined | subadult, proximal epiphysis is not fully fused, covered in calcite | 23.58 mm |


| VIII | 10 | a | 10 | distal and intermediate pedal phalanx | undetermined | fused together, possible subadult | 6.75 mm prox, <br> 9.27 mm dist |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | a | 11 | distal pedal phalanx | undetermined | possible subadult | 10.3 mm |
| VIII | 10 | a | 12 | intermediate pedal phalanx | undetermined | possible subadult | 7.97 mm |
| VIII | 10 | a | 13 | humerus fragment | left | probable adult, rather small though, fossa is intermediate, medial epicondyle is slightly elevated, not spool like, trochlea is slightly angled, may be a subadult, calcite mostly on the anterior surface, distal fragment | 50.84 mm epicondylar width, 22.25 mm fossa width |
| VIII | 10 | a | 14 | ilium fragment | undetermined | subadult, unfused iliac crest, probably under 14 years old, size is large indicating it is an older child, calcite |  |
| VIII | 10 | a | 15 | humerus fragment | left | subadult, unfused proximal epiphysis, over 5 but under 15, probably close to 9 |  |


| VIII | 10 | a | 16 | radius fragment | left | subadult, distal fragment, possibly same bone as 17 but does not cross mend, epiphysis present but not fused, under 16 years of age, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | a | 17 | radius fragment | left | subadult, distal shaft fragment, calcite, probably the same bone as 16 but does not cross med |
| VIII | 10 | a | 18 | rib fragment | left | subadult, neck fragment, calcite, badly deteriorated |
| VIII | 10 | a | 19 | rib fragment | left | subadult, neck fragment, calcite, badly deteriorated |
| VIII | 10 | a | 20 | rib fragment | undetermined | subadult, shaft fragment, calcite |
| VIII | 10 | a | 21 | rib fragment | undetermined | subadult, shaft fragment, calcite |
| VIII | 10 | a | 22 | cervical vertebra fragment |  | subadult, middle cervical, covered in calcite, modern break, left portion of the vertebra |
| VIII | 10 | a | 23 | thoracic vertebra |  | subadult based on size, transverse processes are broken off, body badly |


|  |  |  |  |  |  | deteriorated, covered in calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | a | 24 | fourth metatarsal fragment | right | adult, proximal fragment, covered in calcite |  |
| VIII | 10 | a | 25 | first cuneiform fragment | probable right | adult, covered in calcite, damage to the superior portion |  |
| VIII | 10 | a | 26 | metatarsal fragment | undetermined | probable adult, head fragment, covered in calcite |  |
| VIII | 10 | a | 27 | ilium fragment | undetermined | age undetermined, part of the blade, calcite |  |
| VIII | 10 | a | 28 | os coxa fragment | undetermined | age undetermined, part of the lunate surface |  |
| VIII | 10 | a | 29 | rib fragments | undetermined | possible subadult, shaft fragment, calcite |  |
| VIII | 10 | a | 30 | rib fragments | undetermined | possible subadult, shaft fragment, calcite |  |
| VIII | 10 | a | 31 | incisor | left | upper first incisor, calculus at CEJ on anterior medial and lateral surfaces, foil says two teeth, but only one present, slight wear and shoveling | 8.95 anterior to posterior, <br> 6.24 mm lingual to buccal <br> 10.66 mm crown height |


| VIII | 10 | a | 32 | incisor | undetermined | upper, possibly central, large chunk filed out of the medial or lateral corner, neither line is perfectly perpendicular | 8.94 mm anterior <br> to posterior, <br> 7.03 mm lingual to buccal 9.43 mm crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | B | 1 | femur fragment | left | adult, proximal fragment, calcite and carbon, trochanteric crest is damaged, fragment ends right under the lesser trochanteric tubercle | 44.14 mm head diameter |
| VIII | 10 | B | 2 | first metacarpal | left | adult, calcite and carbon, the distal lateral margins are wider than near the base | 45.83 mm |
| VIII | 10 | B | 3 | fourth metatarsal fragment | right | adult, proximal and complete shaft fragment, calcite and carbon |  |
| VIII | 10 | B | 4 | distal manual phalanx | undetermined | adult, calcite and carbon | 17.65 mm |
| VIII | 10 | B | 5 | metacarpal fragment | undetermined | subadult, unfused proximal and distal ends, probably a perinate based on size | 23.48 mm |
| VIII | 10 | B | 6 | fibula fragment | right | adult, distal fragment, blackened |  |

adult, too much
calcite on interior and

| VIII | 10 | B | 7 | parietal fragments | undetermined | exterior |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | B | 8 | tibia epiphysis | possible right | proximal epiphysis, <br> over 5 years of age <br> but under 9 probably, <br> calcite |
| VIII | 10 | B | 9 | humerus epiphysis | undetermined | subadult, over 5 years <br> of age, but not by <br> much, calcite |
| VIII | 10 | B | 10 | humerus epiphysis | possible right | subadult, over 5 years <br> of age, but not by <br> much, calcite |
| VIII | 10 | B | 11 | cranial fragments | undetermined | possible subadult <br> frontal |
| VIII | 10 | B | 12 | occipital fragment |  | adult, calcite, some <br> enlargement of the <br> dura, but some of it <br> may be taphonomic |
| VIII | 10 | B | 13 | proximal pedal phalanx | undetermined | first didgit, covered in <br> carbon |
| VIII | 10 | B | 14 | third cuneiform |  | adult, inferior margin <br> has damage, some <br> carbon |
| VIII | 10 | B | 15 | second cuneiform |  | right |

fragment

| VIII | 10 | B | 17 | fifth metatarsal fragment | left | adult, proximal fragment, calcite and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | B | 18 | metacarpal fragment | undetermined | subadult, shaft, calcite and carbon, unfused proximal and distal ends | 40.21 mm |
| VIII | 10 | B | 19 | navicular fragment | right | adult, badly deteriorated, blackened |  |
| VIII | 10 | B | 20 | thoracic vertebra fragment |  | adult, lamina fragment, lower thoracic |  |
| VIII | 10 | B | 21 | distal manual phalanx |  | subadult, unfused proximal epiphysis, first digit, possible perinate or slightly older | 13.39 mm |
| VIII | 10 | B | 22 | metacarpal fragment | undetermined | subadult, calcite and carbon, unfused proximal and distal epiphyses, little under 8 years of age | 33.6 mm |
| VIII | 10 | B | 23 | metacarpal fragment | undetermined | subadult, calcite and carbon, unfused proximal and distal epiphyses, little under 8 years of age | 31.75 mm |


| VIII | 10 | B | 24 | talus fragment | undetermined | adult, badly deteriorated, blackened, superior facet only |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | B | 25 | tibia fragment | undetermined | adult, distal end, blackened, taphonomic damage |  |
| VIII | 10 | B | 26 | premolar | left | permanent first, lower, root not fully developed, around 2 years of age |  |
| VIII | 10 | B | 27 | unidentified fragment | undetermined | 1 unidentified fragment |  |
| VIII | 10 | B | 28 | premolar | undetermined | heavily worn on buccal facet, no dentine exposed, possibly second based on root curvature, calculus at CEJ on lingual surface | 7.38 mm anterior <br> to posterior, 8398mm lingual to buccal 8.24 mm crown height |
| VIII | 10 | B | 29 | premolar | right | upper second, root broken off, no real wear | 7.91 mm anterior to posterior, 9.41 mm lingual to buccal 7.08 mm crown height |
| VIII | 10 | B | 30 | molar | right | first lower, root broken, no real wear | 12.08 mm anterior to posterior, 10.3 mm lingual to buccal 6.56 mm crown height |


| VIII | 10 | B | 31 | molar | right | second upper, slight wear on the cusps, possible carabelli's cusp | 10.78 mm anterior <br> to posterior, 10.17 mm lingual to buccal 6.36 mm crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | B | 32 | molar | possible left | upper deciduous second molar, root absent, damage to crown | 9.71 mm anterior to posterior, 9.171b |
| VIII | 10 | B | 33 | incisor | possible right | central upper, modified with an E design and a line that goes medial to laterally half way up the crown | 8.53 mm anterior <br> to posterior, <br> 7.11 mm lingual to buccal <br> 12.57 mm crown height |
| VIII | 10 | B | 34 | canine | undetermined | upper, modified with an Ik motif, calculus along the lateral and medial edges above the CEJ, root broken off, damage to crown | 8.25 mm anterior to posterior, 8.3 mm lingual to buccal |
| VIII | 10 | E | 1 | mandible fragment |  | subadult, anterior fragment with incisors, left canine, both premolars and molar, first permanent molars are in the process of erupting. 5 years plus or minus 1 year |  |


| VIII | 10 | E | 2 | proximal pedal phalanx | undetermined | adult, covered in calcite | 33.07 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 3 | proximal manual phalanx | undetermined | subadult probably close to 15 , proximal unfused, calcite and carbon | 32.06 mm |
| VIII | 10 | E | 4 | intermediate manual phalanx | undetermined | subadult probably close to 15 , proximal unfused, calcite and carbon | 26.04 mm |
| VIII | 10 | E | 5 | proximal manual phalanx | undetermined | damage to the distal end, subadult probably close to 15 , proximal unfused, calcite and carbon |  |
| VIII | 10 | E | 6 | proximal pedal phalanx | undetermined | adult, calcite and carbon covered | 34.97 mm |
| VIII | 10 | E | 7 | first metacarpal | undetermined | subadult, probably between 1-2 years old based upon the size |  |
| VIII | 10 | E | 8 8 | distal manual phalanx | undetermined | subadult, probably around 15 years old, proximal epiphysis is unfused, calcite and carbon |  |
| VIII | 10 | E | , | intermediate manual phalanx | undetermined | subadult, proximal epiphysis not fused, calcite and carbon, probably around 15 years of age |  |


| VIII | 10 | E | 10 | proximal manual phalanx | undetermined | subadult, between 5 and 8 years of age probably, unfused proximal epiphysis, calcite and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 11 | proximal manual phalanx | undetermined | adult, calcite and carbon | 39.56 mm |
| VIII | 10 | E | 12 | proximal manual phalanx | undetermined | adult, calcite and carbon | 31.47 mm |
| VIII | 10 | E | 13 | proximal manual phalanx | undetermined | subadult, probably around 15 years old, proximal epiphysis is unfused, calcite and carbon | 28.94 mm |
| VIII | 10 | E | 14 | proximal manual phalanx | undetermined | subadult, probably around 15 years old, proximal epiphysis is unfused, calcite and carbon | 29.32 mm |
| VIII | 10 | E | 15 | humerus fragment | left | subadult, probably closer to 8 or 9 years of age, distal fragment, triangular shaped fossa, distal epiphysis unfused |  |
| VIII | 10 | E | 16 | humerus fragment | right | subadult, probably closer to 5 years of age, distal fragment, somewhat triangular shaped fossa, distal |  |

epiphysis unfused

| VIII | 10 | E | 17 | clavicle fragment | left | subadult, probably no <br> more than 2 years of <br> age, calcite and <br> carbon, lateral <br> fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 18 | clavicle fragment | left | possible adult, lateral <br> fragment, calcite and <br> carbon, damage to the <br> lateral end |
| VIII | 10 | E | 19 | rib fragment |  | left |


|  |  |  |  |  |  | fragment, calcite and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 25 | rib fragment | undetermined | subadult, shaft fragment, calcite and carbon |  |
| VIII | 10 | E | 26 | rib fragment | undetermined | subadult, sternal fragment, calcite and carbon |  |
| VIII | 10 | E | 27 | rib fragment | undetermined | subadult, sternal fragment, calcite and carbon |  |
| VIII | 10 | E | 28 | rib fragment | undetermined | adult, shaft fragment, calcite and carbon, mid to lower rib |  |
| VIII | 10 | E | 29 | fourth metatarsal | left | adult, calcite and carbon | 71.37 mm |
| VIII | 10 | E | 30 | first metatarsal | left | adult, calcite and carbon, some damage to the proximal end | 63.75 mm |
| VIII | 10 | E | 31 | third metatarsal | left | adult, calcite and carbon | 75.12 mm |
| VIII | 10 | E | 32 | second metatarsal | left | adult, calcite and carbon | 78.9 mm |
| VIII | 10 | E | 33 | first metatarsal | right | adult, calcite and carbon | 59.66 mm |
| VIII | 10 | E | 34 | second metatarsal | right | adult, calcite and carbon | 72.31 mm |
| VIII | 10 | E | 35 | fifth metatarsal | right | adult, calcite and carbon | 67.52 mm |
| VIII | 10 | E | 36 | third metatarsal | right | adult, calcite and | 68.08 mm |


|  |  |  |  |  | carbon |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 37 | fourth metacarpal | right | adult, calcite and carbon | 53.83 mm |
| VIII | 10 | E | 38 | first metacarpal | right | adult, calcite and carbon | 49.35 mm |
| VIII | 10 | E | 39 | fourth metacarpal fragment | left | adult, calcite and carbon, head is broken off |  |
| VIII | 10 | E | 40 | fourth metatarsal | right | adult, calcite and carbon | 65.52 mm |
| VIII | 10 | E | 41 | third metacarpal | right | adult, calcite and carbon | 58.71 mm |
| VIII | 10 | E | 42 | metatarsal fragment | undetermined | adult, shaft and distal fragment, calcite and carbon |  |
| VIII | 10 | E | 43 | second metacarpal fragment | right | adult, calcite and carbon, shaft and proximal fragment |  |
| VIII | 10 | E | 44 | fifth metacarpal fragment | right | possible subadult, head absent, covered in calcite and carbon |  |
| VIII | 10 | E | 45 | talus | right | adult, calcite and carbon | 52.51 mm length, 40.20 mm width |
| VIII | 10 | E | 46 | cuboid | right | adult, calcite and carbon |  |
| VIII | 10 | E | 47 | navicular | right | adult, calcite and carbon |  |
| VIII | 10 | E | 48 | thoracic vertebra fragment |  | subadult, body fused to the pedicle, but line still visible, right |  |


|  |  |  |  |  | transverse process present, calcite and carbon, mid thoracic |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 49 | thoracic vertebra | subadult, body fused to the pedicle, line still visible, calcite and carbon, upper thoracic |
| VIII | 10 | E | 50 | thoracic vertebra fragment | subadult, body only, pedicle and body fused, line still visible, calcite and carbon |
| VIII | 10 | E | 51 | cervical vertebra fragment | adult, fragment of C1 with right superior and inferior articular facets, calcite and carbon |
| VIII | 10 | E | 52 | cervical vertebra fragment | possible subadult, body is badly deteriorated, lower cervical, calcite |
| VIII | 10 | E | 53 | cervical vertebra | adult, C 1 , calcite and carbon |
| VIII | 10 | E | 54 | thoracic vertebra fragment | possible subadult, lamina fragment, calcite and carbon |
| VIII | 10 | E | 55 | thoracic vertebra fragment | possible subadult, left transverse process fragment, calcite and |

carbon

| VIII | 10 | E | 56 | thoracic vertebra fragment |  | possible adult, transverse process, calcite and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 57 | humerus epiphysis | right | subadult, mate to 58 , calcite and carbon, probably around 9 years old |  |
| VIII | 10 | E | 58 | humerus epiphysis | left | subadult, mate to 57, calcite and carbon, probably around 9 years old |  |
| VIII | 10 | E | 59 | calcaneus | right | adult, calcite and carbon covered, damage to the lateral aspect | 76.18 mm length |
| VIII | 10 | E | 60 | patella | left | adult, calcite covered | $39.84 \mathrm{~h}, 38.17 \mathrm{w}$ |
| VIII | 10 | E | 61 | femur epiphysis | undetermined | subadult, probably around 9 years old, calcite covered | $\begin{gathered} 31.87 \mathrm{~mm} \text { head } \\ \text { diameter } \end{gathered}$ |
| VIII | 10 | E | 62 | second cuneiform | right | adult, calcite |  |
| VIII | 10 | E | 63 | third cuneiform | right | adult, calcite |  |
| VIII | 10 | E | 64 | first cuneiform | right | adult, calcite |  |
| VIII | 10 | E | 65 | third cuneiform | left | adult, calcite |  |
| VIII | 10 | E | 66 | scapula fragment | left | subadult, young child probably around 5 years old, calcite and carbon |  |
| VIII | 10 | E | 67 | third cuneiform | left | adult, calcite |  |


| VIII | 10 | E | 68 | distal pedal phalanx |  | adult, calcite | 18.98 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 69 | tibia epiphysis | right | proximal epiphysis, probably around 9 years of age, calcite covered |  |
| VIII | 10 | E | 70 | cervical vertebra fragment |  | adult, calcite, damage to the lamina, lower cervical |  |
| VIII | 10 | E | 71 | vertebra body |  | subadult, thoracic vertebra, probably 2-4 years of age, calcite |  |
| VIII | 10 | E | 72 | fibula fragment | undetermined | adult, shaft fragment less than 5 cm long, calcite and carbon |  |
| VIII | 10 | E | 73 | radius fragment | undetermined | adult, shaft fragment |  |
| VIII | 10 | E | 74 | fibula fragment | undetermined | subadult, calcite and carbon |  |
| VIII | 10 | E | 75 | thoracic vertebra fragment |  | adult, left superior articular facet, and spine, calcite |  |
| VIII | 10 | E | 76 | sternal fragments |  | adult, grey calcite covered 4 pieces |  |
| VIII | 10 | E | 77 | pubic fragment | probable right | adult, part of the pubic symphysis, heavily worn, calcite |  |
| VIII | 10 | E | 78 | first cuneiform | right | adult, badly deteriorated, calcite covered |  |
| VIII | 10 | E | 79 | rib fragment | left | adult, probable first rib, calcite |  |


| VIII | 10 | E | 80 | first metatarsal fragment | right | adult, distal fragment, calcite covered |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 81 | vertebra fragment |  | possible subadult, part of a body and a superior articular fact, probable lumbar or sacral, covered in calcite |
| VIII | 10 | E | 82 | rib fragment | probable right | subadult, neck fragment, calcite, first or second rib |
| VIII | 10 | E | 83 | triquetral | right | adult, covered in calcite |
| VIII | 10 | E | 84 | third metacarpal fragment | left | adult, head is broken off, covered in calcite |
| VIII | 10 | E | 85 | metacarpal | undetermined | subadult, calcite and carbon covered |
| VIII | 10 | E | 86 | clavicle fragment | right | adult, calcite and carbon covered, lateral shaft fragment |
| VIII | 10 | E | 87 | fibula epiphysis | undetermined | subadult, probably around 9 years old, calcite covered, proximal |
| VIII | 10 | E | 88 | unidentified fragments |  | 5 unidentified frags |


| VIII | 10 | E | 89 | incisor | right | upper first, adult modified incisor, groove cut from lateral occlusal surface toward the central portion of the buccal surface at a 45 degree angle, slight calculus and calcite, slight shoveling | 8.11 mm anterior <br> to posterior, <br> 7.3 mm lingual to buccal 9.26 mm crown height, 13.68 root |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | E | 90 | molar | left | lower first, heavily worn, no dentine exposure, root broken off, slight damage to base of crown | 11.48 mm anterior to posterior, 10.99lb |
| VIII | 10 | E | 91 | molar | left | upper first, heavily worn, no dentine exposed, root broken off | 10.68 mm anterior to posterior, 11.71 mm lingual to buccal 5.49 mm crown height |
| VIII | 10 | E | 92 | molar | possible right | lower second, root broken off, slight wear, no dentine, slight damage to the base of the crown | 10.5 mm anterior to posterior, 9.91 lb |
| VIII | 10 | E | 93 | molar | possible left | root broken heavy wear but no dentine | 10.88 mm anterior to posterior, 10.86 mm lingual to buccal 5.16 mm |


| VIII | 10 | E | 94 | molar | possible left | third lower, root broken off, damage to the base of the crown | 12.11 mm anterior to posterior, 10.87 mm lingual to buccal |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | F | 1 | vertebra fragment |  | probable subadult, unfused pedicel for a thoracic vertebra |  |
| VIII | 10 | F | 2 | intermediate hand phalanx |  | slight damage to the proximal end |  |
| VIII | 10 | F | 3 | second metatarsal | right | subadult, unfused head and proximal end |  |
| VIII | 10 | F | 4 | metacarpal fragment | undetermined | subadult, unfused base, head broken off |  |
| VIII | 10 | F | 5 | metatarsal fragment | undetermined | subadult, unfused base, head broken off |  |
| VIII | 10 | F | 6 | tibia fragment | undetermined | superior fragment of an adult, badly damaged |  |
| VIII | 10 | F | 7 | femur fragment | undetermined | badly deteriorated, grey from carbon |  |
| VIII | 10 | F | 8 | rib fragment | undetermined | shaft fragment |  |
| VIII | 10 | F | 9 | rib fragment | undetermined | shaft fragment |  |
| VIII | 10 | F | 10 | 4 long bone fragments | undetermined | three tubular fragments that have taphonomic damage that has distorted the |  |


|  |  |  |  |  |  | original morphology, another fragment is flat |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 10 | F | 11 | vertebra fragment |  | possible thoracic vertebra fragment with a superior articular facet |  |
| VIII | 10 | F | 12 | epiphysis | undetermined | possible radius epiphysis |  |
| VIII | 10 | F | 13 | epiphysis | undetermined | unknown |  |
| VIII | 10 | F | 14 | epiphysis | undetermined | appears to be a transverse process of a vertebra or a phalanx |  |
| VIII | 10 | F | 15 | epiphysis | undetermined | unknown |  |
| VIII | 10 | F | 16 | molar | right | first lower, calcite on buccal surface, slight damage to root | 12.35 mm anterior to posterior, 11.44 mm lingual to buccal 8.64 mm crown height |
| VIII | 10 | F | 17 | molar | left | third lower molar, root broken at base of crown, slightly broken 11 mm anterior to posterior, 10 lb |  |
| VIII | 10 | F | 18 | molar | right | second upper, root broken, crown slightly broken | 10.87 mm anterior to posterior, 10.1 mm lingual to |


| VIII | 10 | F | 19 | premolar | right | first upper, some calcite, tip of the root broken | 7.11 mm anterior <br> to posterior, <br> 7.91 mm lingual <br> to buccal 8.45 mm crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | a | 1 | ulna fragment | right | proximal fragment, covered in calcite, subadult, over 5 years, probably closer to 9 |  |
| VIII | 11 | a | 2 | ischium fragment | possible right | covered in calcite, probable adult |  |
| VIII | 11 | a | 3 | humerus fragment | undetermined | calcite, proximal fragment of part of the head, not enough to measure |  |
| VIII | 11 | a | 4 | rib fragment | right | neck fragment, covered in calcite, adult, middle rib |  |
| VIII | 11 | a | 5 | rib fragment | right | shaft fragment, adult, middle rib, covered in calcite |  |
| VIII | 11 | a | 6 | rib fragment | right | vertebral end, covered in calcite, middle rib |  |
| VIII | 11 | a | 7 | tibia fragment | right | distal portion, adult, covered in calcite |  |
| VIII | 11 | a | 8 | patella | right | adult, covered in calcite | 40.03 mm height, 45.77 mm width |


| VIII | 11 | a | 9 | scapula fragment | right | spine fragment, adult, covered in calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | a | 10 | fibula fragment | probable left | proximal fragment, adult, covered in calcite |
| VIII | 11 | a | 11 | hamate | right | adult, covered in calcite |
| VIII | 11 | a | 12 | zygomatic fragment | right | adult, covered in calcite, numerous bone fragments attached via calcite to the posterior surface. |
| VIII | 11 | a | 13 | frontal fragment |  | adult, light calcite, the frontal groove on the interior is more pronounced than normal, possible active lesion on the exterior that measures $\sim 9.99 \mathrm{~mm}$ in diameter, thickness of the bone varies throughout, indicating some type of reactive growth and degeneration. |
| VIII | 11 | a | 14 | fibula fragment | right | adult, distal fragment with part of the shaft, covered in calcite |


| VIII | 11 | a | 15 | frontal/parietal/temporal fragment | right | could be the same individual as 13 but the pieces do not fit back together, pin prick porosity, rounded supraorbital margin, slight torus, adult male, possible cut mark above the eye. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | a | 16 | molar | left | upper first, root broken, some enamel chipped off, calcite | 12.56 mm anterior to posterior, 10.56 mm lingual to buccal 7.13 mm crown height |
| VIII | 11 | a | 17 | molar | right | third lower | 11.6 mm anterior to posterior, 9.63 mm lingual to buccal 5.31 mm crown height |
| VIII | 11 | a | 18 | maxilla fragment | left | first molar roots in socket, others lost perimortem |  |


| VIII | 11 | a | 19 | mandible fragment | right portion | subadult, first and second deciduous molars are in their sockets, heavily covered in calcite makes it hard to determine if other anterior teeth were lost peri or post mortem, first adult molar is forming in the crypt (amount is hard to determine) probably 2-4 years of age. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 1 | scapula fragment | right | lateral margin and the glenoid, doubtful of fragment al0 being from the same individual due to the base of the spine present on this fragment, covered in calcite, adult | 39.35 mm height, <br> 30.74 mm width |
| VIII | 11 | B | 2 | tibia fragment | right | proximal fragment, damaged in antiquity to the superior condyles, indicated by the fact that they are covered in calcite, adult, completely |  |

covered in calcite
$\left.\begin{array}{ccccccc}\hline & & & & & \begin{array}{c}\text { proximal fragment, } \\ \text { possible subadult } \\ \text { based on size and } \\ \text { epiphyseal line } \\ \text { around neck visible } \\ \text { under the calcite that } \\ \text { covers the whole } \\ \text { surface, possible }\end{array} \\ \text { VIII } & 11 & \text { B } & & & & \\ \text { rodent gnaw marks on } \\ \text { medial surface. }\end{array} \quad \begin{array}{c}41.36 \mathrm{~mm} \text { head } \\ \text { diameter }\end{array}\right]$

| VIII | 11 | B | 10 | proximal manual phalanx |  | calcite, adult | 36.83 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 11 | talus | left | adult, calcite, most of which is on the pedal surface | 53.41 mm length, 40.74 mm width |
| VIII | 11 | B | 12 | cuboid | right | adult, calcite |  |
| VIII | 11 | B | 13 | first cuneiform | right | adult, calcite |  |
| VIII | 11 | B | 14 | proximal manual phalanx |  | calcite, adult | 39.9 mm |
| VIII | 11 | B | 15 | first proximal manual phalanx |  | calcite, adult | 32.89 mm |
| VIII | 11 | B | 16 | first proximal pedal phalanx |  | calcite, adult | 31.49 mm |
| VIII | 11 | B | 17 | proximal pedal phalanx |  | calcite, adult | 37.55 mm |
| VIII | 11 | B | 18 | intermediate manual $\qquad$ |  | calcite, adult | 31.68 mm |
| VIII | 11 | B | 19 | intermediate manual phalanx |  | calcite, adult | 24.48 mm |
| VIII | 11 | B | 20 | intermediate manual phalanx |  | subadult, proximal and distal epiphysis is not fused yet | 26.25 mm |
| VIII | 11 | B | 21 | proximal manual phalanx fragment |  | proximal end, adult, covered in calcite |  |
| VIII | 11 | B | 22 | second metatarsal | left | covered in calcite, adult | 73.66 mm |
| VIII | 11 | B | 23 | metatarsal | undetermined | covered in calcite which obscures the facets, adult | 69.87 mm |


| VIII | 11 | B | 24 | third metatarsal | left | covered in calcite, adult | 68.1 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 25 | second metacarpal | right | covered in calcite, adult | 66.13 mm |
| VIII | 11 | B | 26 | first metacarpal | right | covered in calcite, adult | 66.52 mm |
| VIII | 11 | B | 27 | first metacarpal | left | covered in calcite, adult | 68.22 mm |
| VIII | 11 | B | 28 | second metacarpal | left | covered in calcite, adult | 66 mm |
| VIII | 11 | B | 29 | third metacarpal fragment | left | proximal fragment, covered in calcite, adult |  |
| VIII | 11 | B | 30 | talus | left | badly deteriorated, adult, calcite |  |
| VIII | 11 | B | 31 | thoracic vertebra fragment |  | lamina is broken, calcite is thicker on the right lateral surface, mid thoracic vertebra, adult |  |
| VIII | 11 | B | 32 | thoracic vertebra fragment |  | subadult, unfused lamina, upper thoracic region, calcite on anterior surface mostly, was originally found attached to 33 |  |
| VIII | 11 | B | 33 | cuboid | left | adult, calcite |  |

second or third based
on size, facets are
difficult to make out
due to calcite

| VIII | 11 | B | 34 | cuneiform |  | covering all surfaces |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 35 | courth metatarsal <br> fragment | left | proximal fragment, <br> adult, covered in <br> calcite |
| VIII | 11 | B | 36 | metatarsal fragment | undetermined | distal portion, adult, <br> covered in calcite |
| VIII | 11 | B | 37 | fourth metatarsal | right | proximal fragment, <br> adult, covered in <br> calcite |
| VIII | 11 | B | 38 | ulna fragment | left | distal portion, adult, <br> covered in calcite |
| VIII | 11 | B | 39 | scapula fragment | left | inferior corner, adult, <br> calcite mostly on the <br> anterior surface |
| VIII | 11 | B | 40 | clavicle | right | perinate, calcite |
| VIII | 11 | B | 41 | hamate | right | adult, calcite |
| VIII | 11 | B | 42 | clavicle fragment | right | possible subadult <br> based on size, slight <br> damage to this lateral <br> fragment, calcite |
| VIII | 11 | B | 43 | ischium | right | perinate, calcite |
| VIII | 11 | B | 44 | calcaneus | left | perinate, calcite |
|  |  |  |  |  |  | subadult, tuberosity <br> and shaft fragment, <br> covered in calcite |
| VIII | 11 | B | 45 | radius fragment | undetermined |  |


| VIII | 11 | B | 46 | ulna fragment | probable left | shaft fragment, completely covered in calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 47 | clavicle fragment | undetermined | shaft fragment |  |
| VIII | 11 | B | 48 | scapula fragment | possible right | spine fragment, adult, covered in calcite |  |
| VIII | 11 | B | 49 | shaft fragment | undetermined | subadult shaft fragment, completely covered in calcite |  |
| VIII | 11 | B | 50 | fibula fragment | undetermined | adult, small shaft fragment, completely covered with calcite |  |
| VIII | 11 | B | 51 | proximal pedal phalanx |  | adult, calcite | 29.67 mm |
| VIII | 11 | B | 52 | proximal pedal phalanx |  | adult, calcite | 23.66 mm |
| VIII | 11 | B | 53 | first proximal pedal phalanx |  | adult, calcite | 34.86 mm |
| VIII | 11 | B | 54 | proximal pedal phalanx |  | adult, calcite | 27.09 mm |
| VIII | 11 | B | 55 | proximal pedal phalanx |  | adult, calcite | 32.35 mm |
| VIII | 11 | B | 56 | proximal pedal phalanx |  | adult, calcite | 20.57 mm |
| VIII | 11 | B | 57 | first proximal pedal $\qquad$ phalanx |  | adult, calcite | 32.08 mm |
| VIII | 11 | B | 58 | first proximal pedal phalanx |  | adult, calcite | 34.14 mm |
| VIII | 11 | B | 59 | lunate | left | adult, calcite |  |


| VIII | 11 | B | 60 | capitate | right | adult, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 61 | capitate | right | adult, calcite |  |
| VIII | 11 | B | 62 | capitate | right | adult, calcite |  |
| VIII | 11 | B | 63 | proximal manual phalanx |  | adult, calcite, lateral margins well defined | 49.16 mm |
| VIII | 11 | B | 64 | proximal manual phalanx |  | adult, calcite, lateral margins well defined | 43.35 mm |
| VIII | 11 | B | 65 | proximal manual phalanx |  | adult, calcite, lateral margins well defined, damage to the proximal area | 45.74 mm |
| VIII | 11 | B | 66 | proximal manual $\qquad$ |  | adult, calcite, lateral margins well defined, damage to the proximal and distal areas |  |
| VIII | 11 | B | 67 | patella | left | adult, calcite | 45.06 mm height, 45.51 mm width |
| VIII | 11 | B | 68 | talus | left | adult, calcite | 53.68 mm length, 44.18 mm width |
| VIII | 11 | B | 69 | scapula fragments | right | adult, covered in calcite, glenoid fragment and a lateral border fragment | 42.74 mm height, <br> 29.23 mm width |
| VIII | 11 | B | 70 | humerus fragments | left | adult, three fragments form a complete humerus, covered in calcite, triangular shaped fossa, slightly | 60.40 mm epicondylar breath, 44.93 mm head diameter |


|  |  |  |  |  |  | angled medial epicondyle, spool shaped, angle is wide |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 71 | femur fragment | left | adult, covered in calcite, trochanter fragment |
| VIII | 11 | B | 72 | tibia fragment | left | adult, proximal fragment, covered in calcite, large |
| VIII | 11 | B | 73 | frontal fragment |  | adult, calcite covered (including some of the fractures), groove on interior surface rather than the typical crest, cranial modification |
| VIII | 11 | B | 74 | mandible fragment |  | right ramus and part of the lateral aspect, third molar erupted, no teeth in any of the crypts, possible abscess between M1 and M2, calcite |
| VIII | 11 | B | 75 | frontal fragment |  | right fragment above the orbit, rounded margin, raised torus, probable male, calcite covered, meningeal grooves are well |

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defined on the interior given it is a frontal
bone
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| VIII | 11 | B | 76 | frontal fragment |  | forehead portion, <br> groove noticeable on <br> the interior of this <br> fragment, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 77 | frontal fragment |  | supraorbital fragment, <br> ridge is kind of sharp, <br> but it also appears to <br> be a subadult based <br> on size, calcite |
| VIII | 11 | B | 78 | frontal fragment |  | fragment right above <br> the frontal sinus with <br> the crest, calcite |
| VIII | 11 | B | 79 | frontal fragment |  | possibly a parietal <br> fragment, calcite |
| VIII | 11 | B | 80 | zygomatic fragment | right | adult, calcite |


| VIII | 11 | B | 84 | occipital and parietal fragment | both | adult, calcite, pin prick porosity with larger macroscopic pitting on the left parietal, sample was taken in previous seasons for isotope testing |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 85 | parietal fragments | left | two fragments that cross mend, pin prick porosity, heavy calcite covering interior and exterior, even covers old fractures, possible subadult |  |
| VIII | 11 | B | 86 | femur fragments | right | distal fragment, adult, calcite covered | 84.61 mm epicondylar width |
| VIII | 11 | B | 87 | mandible fragment |  | left fragment, possibly the same bone as 74 , all teeth erupted and broken, roots are still in crypts, calcite |  |
| VIII | 11 | B | 88 | frontal fragment |  | above one of the orbits, blunt margin, torus noticeable, possible male, calcite |  |
| VIII | 11 | B | 89 | cranial fragment |  | adult, calcite |  |


| VIII | 11 | B | 90 | thoracic vertebra fragment |  | upper thoracic, possible subadult, calcite, damage to the entire bone |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 91 | thoracic vertebra fragment |  | mid thoracic, calcite, damage to the entire bone |  |
| VIII | 11 | B | 92 | thoracic vertebra fragment |  | body only, calcite, probably T10 |  |
| VIII | 11 | B | 93 | first metacarpal | right | adult, calcite | 48.74 mm |
| VIII | 11 | B | 94 | fourth metacarpal | left | adult, calcite | 57.8 mm |
| VIII | 11 | B | 95 | fourth metacarpal | left | left | 61.96 mm |
| VIII | 11 | B | 96 | fifth metacarpal | left | left | 56.89 mm |
| VIII | 11 | B | 97 | femur fragment | undetermined | head only, adult, calcite | 45.09 mm head diameter |
| VIII | 11 | B | 98 | tibia fragment | undetermined | proximal condyle fragment, adult, calcite |  |
| VIII | 11 | B | 99 | temporal fragment | right | fragment with mandibular fossa and zygomatic process, adult, completely covered in calcite (including the old fractures) |  |
| VIII | 11 | B | 100 | temporal fragment | left | fragment with internal auditory meatus, tympanic portion, and a broken mastoid process, |  |

adult, covered in calcite

| VIII | 11 | B | 101 | clavicle fragment | right | lateral portion, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 102 | scapula fragment | right | acromion fragment, rather large, new bone growth on anterior surface, possible arthritis or healed dislocation |
| VIII | 11 | B | 103 | femur fragment | possible right | distal portion of one condyle, adult, covered in calcite, not the same bone as 104 |
| VIII | 11 | B | 104 | femur fragment | undetermined | distal portion of one condyle, adult, covered in calcite, not the same bone as 103 |
| VIII | 11 | B | 105 | thoracic vertebra fragment |  | lamina fragment, adult, upper thoracic, calcite |
| VIII | 11 | B | 106 | cervical vertebra fragment |  | adult, calcite, lower cervical |
| VIII | 11 | B | 107 | cervical vertebra fragment |  | adult, calcite, upper cervical |
| VIII | 11 | B | 108 | calcaneus | right | adult, calcite, damaged |
| VIII | 11 | B | 109 | scapula fragment | right | acromion fragment |


| VIII | 11 | B | 110 | thoracic vertebra fragment |  | posterior portion of the body, and part of the right superior articular facet, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 111 | fibula fragment | right | distal fragment, adult, calcite covered |
| VIII | 11 | B | 112 | thoracic vertebra fragment |  | body only, calcite, mid thoracic |
| VIII | 11 | B | 113 | thoracic vertebra fragment |  | body fragment |
| VIII | 11 | B | 114 | scapula | right | perinate, calcite |
| VIII | 11 | B | 115 | scapula | left | perinate, calcite |
| VIII | 11 | B | 116 | thoracic vertebra fragment |  | body only, adult, phalanx stuck to it via calcite |
| VIII | 11 | B | 117 | tibia fragment | right | distal fragment, adult, calcite covered |
| VIII | 11 | B | 118 | cuboid | left | damaged, adult, calcite |
| VIII | 11 | B | 119 | ulna fragment | left | distal portion, adult, covered in calcite |
| VIII | 11 | B | 120 | third metacarpal fragment | right | proximal fragment, adult, covered in calcite |
| VIII | 11 | B | 121 | second metacarpal | right | proximal fragment, adult, covered in calcite |
| VIII | 11 | B | 122 | navicular | left | adult, calcite, damaged |

$\left.\begin{array}{ccccccc}\text { VIII } & 11 & \text { B } & 123 & \begin{array}{c}\text { nasals and frontal } \\ \text { fragments }\end{array} & \text { both } & \begin{array}{c}\text { possible subadult, } \\ \text { sutures are fused, but } \\ \text { still open }\end{array} \\ \hline \text { VIII } & 11 & \text { B } & 124 & \text { humerus fragment } & \text { left } & \begin{array}{c}\text { perinate, calcite, } \\ \text { distal fragment }\end{array} \\ \hline \text { VIII } & 11 & \text { B } & 125 & \text { ulna fragment } & \text { left } & \begin{array}{c}\text { subadult } \sim \text { 1 year of } \\ \text { age, proximal } \\ \text { fragment, calcite }\end{array} \\ \hline \text { VIII } & 11 & \text { B } & 126 & \text { ulna fragment } & \text { right } & \begin{array}{c}\text { perinate, proximal } \\ \text { fragment, calcite }\end{array} \\ \hline \text { VIII } & 11 & \text { B } & 127 & \text { ischium } & \text { left } & \text { perinate, calcite } \\ \hline \text { VIII } & 11 & \text { B } & 128 & \text { rib fragment } & \text { undetermined } & \text { shaft fragment, calcite } \\ \hline \text { VIII } & 11 & \text { B } & 129 & \text { rib fragment } & \text { undetermined } & \text { shaft fragment, calcite } \\ \hline \text { VIII } & 11 & \text { B } & 130 & \text { rib fragment } & \text { undetermined } & \text { shaft fragment, calcite } \\ \hline \text { VIII } & 11 & \text { B } & 131 & \text { rib fragment } & & \text { left } \\ \text { VIII } & 11 & \text { B } & 132 & \text { first distal manual } \\ \text { in calcite, lower rib }\end{array}\right]$

| VIII | 11 | B | 139 | second metatarsal | right | adult, calcite | 78.07 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 140 | metatarsal |  | possible third right, calcite covers facets | 70.66 mm |
| VIII | 11 | B | 141 | fifth metatarsal fragment | right | proximal fragment, adult, covered in calcite |  |
| VIII | 11 | B | 142 | fifth metatarsal fragment | left | proximal fragment, adult, covered in calcite |  |
| VIII | 11 | B | 143 | intermediate pedal phalanx |  | adult, calcite | 16.27 mm |
| VIII | 11 | B | 144 | intermediate pedal phalanx |  | adult, calcite | 15.31 mm |
| VIII | 11 | B | 145 | intermediate pedal phalanx |  | adult, calcite | 13.81 mm |
| VIII | 11 | B | 146 | intermediate pedal phalanx |  | adult, calcite | 12.54 mm |
| VIII | 11 | B | 147 | thoracic vertebra fragment |  | body and lamina, transverse processes are broken off, adult, calcite, mid thoracic |  |
| VIII | 11 | B | 148 | thoracic vertebra fragment |  | inferior articular facets and part of the lamina, adult, calcite |  |
| VIII | 11 | B | 149 | cervical vertebra |  | adult, calcite, probably C7 |  |
| VIII | 11 | B | 150 | rib fragment | undetermined | shaft fragment, adult, mid rib, calcite |  |
| VIII | 11 | B | 151 | rib fragment | undetermined | shaft fragment, adult, mid rib, calcite |  |


| VIII | 11 | B | 152 | rib fragment | undetermined | shaft fragment, adult, mid rib, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 153 | rib fragment | undetermined | shaft fragment, adult, lower rib, calcite |  |
| VIII | 11 | B | 154 | rib fragment | right | rib 1, vertebra fragment, adult, calcite |  |
| VIII | 11 | B | 155 | temporal, parietal, and occipital fragment | left | sutures are still very open, young adult, calcite |  |
| VIII | 11 | B | 156 | cranial fragment | undetermined | adult, calcite |  |
| VIII | 11 | B | 157 | cranial fragment | undetermined | adult, calcite |  |
| VIII | 11 | B | 158 | ilium | left | perinate, calcite |  |
| VIII | 11 | B | 159 | femur fragment | probable left | perinate, proximal fragment, calcite |  |
| VIII | 11 | B | 160 | radius fragment | left | perinate, damage to the proximal end, calcite |  |
| VIII | 11 | B | 161 | ulna fragment | right | perinate, damage to the distal end, calcite |  |
| VIII | 11 | B | 162 | proximal manual phalanx |  | adult, calcite | 45.88 mm |
| VIII | 11 | B | 163 | proximal manual phalanx fragment |  | adult, calcite |  |
| VIII | 11 | B | 164 | intermediate manual phalanx |  | adult, calcite | 30.09 mm |
| VIII | 11 | B | 165 | proximal pedal phalanx |  | adult, calcite | 24.62 mm |


| VIII | 11 | B | 166 | proximal pedal phalanx |  | adult, calcite | 24.6 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 167 | proximal pedal phalanx |  | adult, calcite | 24.04 mm |
| VIII | 11 | B | 168 | proximal pedal phalanx |  | adult, calcite | 28.03 mm |
| VIII | 11 | B | 169 | first distal pedal phalanx |  | adult, calcite | 22.06 mm |
| VIII | 11 | B | 170 | hamate | left | adult calcite |  |
| VIII | 11 | B | 171 | capitate | left | adult calcite |  |
| VIII | 11 | B | 172 | hamate | right | adult calcite |  |
| VIII | 11 | B | 173 | trapezium | right | adult calcite |  |
| VIII | 11 | B | 174 | maxilla fragment | right | young child, no teeth present but the molar crypts are open, calcite |  |
| VIII | 11 | B | 175 | femur fragment | undetermined | proximal fragment, perinate, covered in calcite |  |
| VIII | 11 | B | 176 | radius fragment | undetermined | proximal epiphysis, at least a year old, calcite |  |
| VIII | 11 | B | 177 | thoracic vertebra fragment |  | unfused body, less than 3, calcite |  |
| VIII | 11 | B | 178 | mandible fragment |  | anterior portion, adult, many broken roots in crypts, calcite |  |


| VIII | 11 | B | 179 | mandible fragment |  | left portion with first and second molar, adult, calcite | M1 anterior to posterior 12.48, lingual to buccal 11.22, 6.35 crown height, M2 anterior to posterior 10.69 lingual to buccal 9.91, 6.63 crown height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 180 | mandible fragment |  | anterior portion, subadult, teeth have erupted but are not in the crypt, calcite |  |
| VIII | 11 | B | 181 | rib fragment | left | subadult, calcite, mid rib, shaft fragment |  |
| VIII | 11 | B | 182 | rib fragment | left | subadult, calcite, mid rib, shaft fragment |  |
| VIII | 11 | B | 183 | rib fragment | left | subadult, calcite, upper rib, shaft fragment |  |
| VIII | 11 | B | 184 | rib fragment | right | subadult, calcite, upper rib, sternal and shaft fragment |  |
| VIII | 11 | B | 185 | rib fragment | left | subadult, calcite, upper rib, shaft fragment |  |
| VIII | 11 | B | 186 | rib fragment | left | subadult, calcite, upper rib, shaft fragment |  |


| VIII | 11 | B | 187 | rib fragment | left | subadult, calcite, mid rib, shaft fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 188 | rib fragment | right | possibly the first rib, subadult, calcite, vertebral end |  |
| VIII | 11 | B | 189 | interproximal pedal phalanx |  | adult, calcite | 15 mm |
| VIII | 11 | B | 190 | interproximal pedal phalanx |  | adult, calcite | 8.76 mm |
| VIII | 11 | B | 191 | distal manual phalanx |  | adult, calcite | 16.48 mm |
| VIII | 11 | B | 192 | distal pedal phalanx |  | adult, calcite | 9.59 mm |
| VIII | 11 | B | 193 | proximal manual phalanx |  | perinate, calcite | 16.24 mm |
| VIII | 11 | B | 194 | intermediate manual phalanx |  | adult, calcite | 19.07 mm |
| VIII | 11 | B | 195 | intermediate manual phalanx fragment |  | adult, distal end is broken |  |
| VIII | 11 | B | 196 | intermediate manual phalanx |  | adult, calcite | 22.75 mm |
| VIII | 11 | B | 197 | cranial fragment |  | unidentified, adult, calcite |  |
| VIII | 11 | B | 198 | cranial fragment |  | unidentified, adult, calcite |  |
| VIII | 11 | B | 199 | cranial fragment |  | unidentified, adult, calcite |  |
| VIII | 11 | B | 200 | thoracic vertebra fragment |  | body fragment, adult, calcite |  |
| VIII | 11 | B | 201 | thoracic vertebra fragment |  | lamina and transverse process fragment, |  |

adult, calcite

| VIII | 11 | B | 202 | vertebra fragment |  | superior articular facet, probably lumbar, calcite, adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 203 | scaphoid | left | adult, calcite |  |
| VIII | 11 | B | 204 | trapezoid | right | adult, calcite |  |
| VIII | 11 | B | 205 | trapezium | left | adult, calcite |  |
| VIII | 11 | B | 206 | trapezium | right | adult, calcite |  |
| VIII | 11 | B | 207 | rib fragment | undetermined | subadult, shaft fragment, calcite |  |
| VIII | 11 | B | 208 | rib fragment | undetermined | subadult, shaft fragment, calcite |  |
| VIII | 11 | B | 209 | rib fragment | undetermined | subadult, shaft fragment, calcite |  |
| VIII | 11 | B | 210 | rib fragment | undetermined | subadult, shaft fragment, calcite |  |
| VIII | 11 | B | 211 | metacarpal fragment |  | distal end, adult, calcite |  |
| VIII | 11 | B | 212 | metatarsal fragment |  | distal end, adult, calcite |  |
| VIII | 11 | B | 213 | metatarsal fragment |  | distal end, adult, calcite |  |
| VIII | 11 | B | 214 | fifth metacarpal fragment | right | head is broken off, calcite, adult |  |
| VIII | 11 | B | 215 | first metacarpal fragment | probable left | proximal fragment, adult, calcite |  |
| VIII | 11 | B | 216 | first proximal pedal phalanx |  | perinate, calcite | 9.12 mm |


| VIII | 11 | B | 217 | first metatarsal | undetermined | perinate, calcite | 19.48 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 218 | distal manual phalanx |  | adult, calcite | 16.85 mm |
| VIII | 11 | B | 219 | distal pedal phalanx |  | adult, calcite | 10.47 mm |
| VIII | 11 | B | 220 | cuneiform |  | possibly the second right, adult, calcite |  |
| VIII | 11 | B | 221 | scaphoid | left | adult calcite |  |
| VIII | 11 | B | 222 | triquetral | right | adult calcite |  |
| VIII | 11 | B | 223 | trapezium | left | adult calcite |  |
| VIII | 11 | B | 224 | occipital fragment | right | basilar portion of a new born |  |
| VIII | 11 | B | 225 | neural arch | left | perinate, thoracic, calcite |  |
| VIII | 11 | B | 226 | neural arch | left | perinate, thoracic, calcite |  |
| VIII | 11 | B | 227 | neural arch | left | perinate, thoracic, calcite |  |
| VIII | 11 | B | 228 | neural arch | left | perinate, lumbar, calcite |  |
| VIII | 11 | B | 229 | neural arch | right | perinate, lumbar, calcite |  |
| VIII | 11 | B | 230 | third metacarpal fragment | left | adult, proximal fragment, calcite |  |
| VIII | 11 | B | 231 | capitate | right | subadult, calcite |  |
| VIII | 11 | B | 232 | rib fragment | left | adult, upper rib, , shaft fragment |  |
| VIII | 11 | B | 233 | rib fragment | undetermined | subadult, sternal fragment, calcite |  |
| VIII | 11 | B | 234 | ulna fragment | probable left | proximal fragment, adult, calcite |  |


| VIII | 11 | B | 235 | humerus fragment | probable left | distal fragment of part <br> of the trochlea, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 236 | cranial fragment |  | possibly temporal or <br> frontal, adult, calcite |
| VIII | 11 | B | 237 | cranial fragment |  | subadult, younger <br> than 5, calcite |
| VIII | 11 | B | 238 | cranial fragment |  | subadult, younger <br> than 5, calcite |
| VIII | 11 | B | 239 | occipital |  | subadult, younger <br> than 5 - probably <br> perinate, lateral <br> portion, calcite |
| VIII | 11 | B | 240 | manubrium fragment |  | adult, superior <br> portion, calcite |
| VIII | 11 | B | 241 | femur fragment | undetermined | adult, calcite, medial <br> portion just above the <br> condyles |
| VIII | 11 | B | 242 | cranial fragment |  | adult, calcite, <br> probably part of the <br> occipital |
| VIII | 11 | B | 243 | femur fragment | undetermined | adult, distal condyle <br> fragment, calcite |
| VIII | 11 | B | 244 | humerus fragment | right | distal portion of part <br> of the capitulum, <br> calcite, adult |
| VIII | 11 | B | 245 | talus fragment | right | posterior portion, <br> adult, calcite |
| VIII | 11 | B | 246 | neural arch | left | thoracic, perinate |
| VIII | 11 | B | 247 | neural arch | right | lumbar, perinate |
| VIII | 11 | B | 248 | neural arch | right | lumbar, perinate |


| VIII | 11 | B | 249 | sacral body | perinate |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 250 | thoracic vertebra <br> fragment | adult, body and left <br> pedicle area, calcite |
| VIII | 11 | B | 251 | vertebra fragment | adult, calcite, lamina <br> fragment, probable <br> lumbar |
| VIII | 11 | B | 252 | vertebra fragment | adult, body fragment, <br> probably lumbar |
| VIII | 11 | B | 253 | first metatarsal <br> fragment | proximal fragment, <br> adult, calcite |
| VIII | 11 | B | 254 | coccyx | adult, calcite, just the <br> horns |
| VIII | 11 | B | 255 | cervical vertebra <br> fragment | adult, calcite, C1, <br> fragment with two <br> articular facets and <br> part of the transverse <br> process |
| VIII | 11 | B | 256 | metacarpal | perinate |
| VIII | 11 | B | 257 | epiphysis fragment | subadult, head <br> fragment of humerus <br> or femur, calcite |
| VIII | 11 | B | 258 | cranial fragment | perinate, calcite |

calcite

| VIII | 11 | B | 262 | lumbar vertebra fragment |  | unfused body, less than 3, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 263 | thoracic vertebra fragment |  | unfused body, less than 3, calcite |  |
| VIII | 11 | B | 264 | proximal manual phalanx fragment |  | adult, proximal end, calcite |  |
| VIII | 11 | B | 265 | vertebra fragment |  | perinate, body, possibly cervical |  |
| VIII | 11 | B | 266 | temporal fragment |  | adult, calcite |  |
| VIII | 11 | B | 267 | femur fragment | right | perinate, proximal fragment, calcite |  |
| VIII | 11 | B | 268 | maxilla fragment | left | probable adult, empty crypts for incisors, canine, premolar |  |
| VIII | 11 | B | 269 | maxilla fragment | left | subadult, 7 years +/24 months, first adult molar present, deciduous molars present, lateral incisor (permanent) ready to erupt, in fact it may have been infected since it was erupting strange, premolar crowns are formed, caries in the deciduous teeth, slight carabelli's | 11.22 mm anterior to posterior, 10.71 mm lingual to buccal |


| VIII | 11 | B | 270 | temporal fragment | undetermined | petrous portion, adult, <br> calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 271 | trapezoid | right | adult, calcite |
| VIII | 11 | B | 272 | rib fragment | undetermined | shaft fragment, adult, <br> calcite |
| VIII | 11 | B | 273 | rib fragment | left | subadult, vertebral en <br> fragment |
| VIII | 11 | B | 274 | vertebra fragment |  | adult, calcite, <br> probably cervical <br> fragment |
| VIII | 11 | B | 275 | rib fragment | left | perinate, probably <br> 10th rib, calcite |
| VIII | 11 | B | 276 | rib fragment | right | perinate, first rib, <br> calcite |
| VIII | 11 | B | 277 | rib fragment | right | perinate, upper rib, <br> vertebral end |
| VIII | 11 | B | 278 | rib fragment | right | perinate, mid rib, <br> vertebral end |
| VIII | 11 | B | 279 | neural arch | left | perinate, thoracic, <br> calcite |
| VIII | 11 | B | 280 | neural arch | right | perinate, thoracic, <br> calcite |
| VIII | 11 | B | 281 | neural arch | right | perinate, thoracic, <br> calcite |
| VIII | 11 | B | 282 | neural arch | right | perinate, thoracic, <br> calcite |
| VIII | 11 | B | 283 | vertebra fragment |  | cervical body <br> perinate, calcite <br> cervical body <br> perinate, calcite |
| VIII | 11 | B | 284 | vertebra fragment |  | rent |


| VIII | 11 | B | 285 | neural arch | left | thoracic, perinate, <br> calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 286 | neural arch | right | thoracic, perinate, <br> calcite |
| VIII | 11 | B | 287 | neural arch | left | thoracic, perinate, <br> calcite |
| VIII | 11 | B | 288 | neural arch | right | thoracic, perinate, <br> calcite |
| VIII | 11 | B | 289 | neural arch | right | thoracic, perinate, <br> calcite |
| VIII | 11 | B | 290 | neural arch | right | cervical, perinate, <br> calcite |
| VIII | 11 | B | 291 | rib fragment | left | perinate, upper rib, <br> vertebral end, calcite |
| VIII | 11 | B | 292 | neural arch | left | perinate, cervical, <br> calcite |
| VIII | 11 | B | 293 | neural arch | left | perinate, cervical, <br> calcite |
| VIII | 11 | B | 294 | neural arch | right | perinate, cervical, <br> calcite |
| VIII | 11 | B | 295 | vertebra fragment |  | perinate body, <br> possibly cervical, <br> calcite |
| VIII | 11 | B | 296 | vertebra fragment |  | neral arch |


| VIII | 11 | B | 299 | radius fragment | right | distal end, perinate, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 300 | distal phalanx |  | subadult, probably pedal, calcite |  |
| VIII | 11 | B | 301 | distal manual phalanx |  | adult, calcite | 18.08 mm |
| VIII | 11 | B | 302 | distal pedal phalanx |  | subadult possibly, with a intermediate phalanx used to it |  |
| VIII | 11 | B | 303 | clavicle fragment | left | damage to the lateral end, perinate, calcite |  |
| VIII | 11 | B | 304 | rib fragment | possible left | shaft fragment, perinate, upper rib, calcite |  |
| VIII | 11 | B | 305 | rib fragment | undetermined | shaft fragment, perinate, calcite |  |
| VIII | 11 | B | 306 | rib fragment | right | shaft fragment, perinate, calcite |  |
| VIII | 11 | B | 307 | radius fragment | left | proximal fragment, perinate, calcite |  |
| VIII | 11 | B | 308 | clavicle fragment | right | lateral fragment, perinate, calcite |  |
| VIII | 11 | B | 309 | rib fragment | undetermined | perinate, shaft fragment, calcite, mid rib |  |
| VIII | 11 | B | 310 | rib fragment | right | perinate, shaft fragment, calcite, upper rib |  |
| VIII | 11 | B | 311 | intermediate pedal phalanx |  | adult, calcite | 14.92 mm |


| VIII | 11 | B | 312 | metacarpal fragment | undetermined | proximal end, perinate, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 313 | metatarsal | undetermined | perinate, calcite | 21.15 mm |
| VIII | 11 | B | 314 | rib fragment | possible left | perinate, calcite | 19.94 mm |
| VIII | 11 | B | 315 | metatarsal | undetermined | perinate, calcite | 19.98 mm |
| VIII | 11 | B | 316 | metatarsal | undetermined | perinate, calcite | 18.56 mm |
| VIII | 11 | B | 317 | metacarpal | undetermined | perinate, calcite |  |
| VIII | 11 | B | 318 | neural arch | right | thoracic, perinate, calcite |  |
| VIII | 11 | B | 319 | neural arch |  | perinate, cervical, calcite |  |
| VIII | 11 | B | 320 | thoracic vertebra fragment |  | subadult, thoracic vertebra lamina fused, pedicle not fused yet |  |
| VIII | 11 | B | 321 | radius fragment | undetermined | proximal epiphysis, subadult, over 5 years of age, probably closer to 9 |  |
| VIII | 11 | B | 322 | pubis | right | perinate, calcite |  |
| VIII | 11 | B | 323 | neural arch | left | perinate, thoracic, calcite |  |
| VIII | 11 | B | 324 | neural arch | right | perinate, thoracic, calcite |  |
| VIII | 11 | B | 325 | neural arch | right | perinate, thoracic, calcite |  |
| VIII | 11 | B | 326 | neural arch | left | perinate, lumbar, calcite |  |
| VIII | 11 | B | 327 | neural arch | right | perinate, probable lumbar, calcite |  |
| VIII | 11 | B | 328 | neural arch | left | perinate, lumbar, |  |

calcite

| VIII | 11 | B | 329 | neural arch | left | perinate, cervical, <br> calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 330 | vertebra fragment |  | perinate, body <br> unfused, possible <br> cervical, calcite |
| VIII | 11 | B | 331 | rib fragment | left | perinate, most of the <br> rib, minus the sternal <br> end, calcite |
| VIII | 11 | B | 332 | vertebra fragment |  | perinate, body <br> fragment, calcite |
| VIII | 11 | B | 333 | neural arch fragment | undetermined | cervical, perinate, <br> calcite |
| VIII | 11 | B | 334 | rib fragment | undetermined | perinate, calcite, shaft <br> fragment, mid rib |
| VIII | 11 | B | 335 | rib fragment | probable left | perinate, calcite, <br> neck/shaft fragment, <br> upper rib |
| VIII | 11 | B | 336 | epiphysis fragment | undetermined | unknown epiphysis |
| VIII | 11 | B | 337 | probable radius |  | fistal fragment of a |
| fragment | undetermined | perinate, calcite |  |  |  |  |


| VIII | 11 | B | 344 | shaft fragment | undetermined | clavicle |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | B | 345 | zygomatic fragment | left | adult, calcite |
| VIII | 11 | B | 346 | maxilla fragment | undetermined | adult, calcite |
| VIII | 11 | B | 347 | temporal fragment | undetermined | adult, calcite |
| VIII | 11 | B | 348 | temporal fragment | undetermined | adult, calcite |
| VIII | 11 | B | 349 | temporal fragment | undetermined | adult, calcite |
| VIII | 11 | B | 350 | temporal fragment | right | adult, calcite |
| VIII | 11 | B | 351 | temporal fragment | undetermined | adult, calcite |
| VIII | 11 | B | 352 | temporal fragment | undetermined | adult, calcite |
| VIII | 11 | B | 353 | cranial fragment |  | adult, calcite |
| VIII | 11 | B | 354 | cranial fragment |  | adult, calcite |
| VIII | 11 | B | 355 | cranial fragment |  | adult, calcite |
| VIII | 11 | B | 356 | rib fragment? |  | adult, calcite |
| VIII | 11 | B | 357 | metacarpal, metatarsal fragment |  | adult, calcite, head fragment |
| VIII | 11 | B | 358 | shaft fragment | undetermined | subadult, calcite |
| VIII | 11 | B | 359 | calcaneus fragment? | undetermined | adult, calcite |
| VIII | 11 | B | 360 | shaft fragment | undetermined | adult, calcite |
| VIII | 11 | B | 361 | 32 unidentified fragments |  |  |
| VIII | 11 | B | 362 | molar | left | first lower |
| VIII | 11 | B | 363 | molar | left | first lower |
| VIII | 11 | B | 364 | molar | left | first lower |
| VIII | 11 | B | 365 | parietal fragments | undetermined | three small fragments, with evidence of porotic hyperostosis |


| VIII | 11 | C | 1 | ulna fragment | left | b72, proximal fragment, adult, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 2 | humerus fragment | left | b72, subadult, distal fragment, calcite, older than 5 probably closer to 9 probably |  |
| VIII | 11 | C | 3 | talus | left | b72, adult, badly deteriorated, calcite |  |
| VIII | 11 | C | 4 | femur fragment | right | b72, subadult, proximal fragment with part of the shaft, badly deteriorated | 38.35 mm |
| VIII | 11 | C | 5 | femur fragment | left | b72, distal medial condyle, possible subadult |  |
| VIII | 11 | C | 6 | femur fragment | left | b72, distal lateral condyle, possible subadult |  |
| VIII | 11 | C | 7 | tibia fragment | possible right | b72, proximal fragment of the condyles, adult, calcite |  |
| VIII | 11 | C | 8 | tibia fragment | possible left | b72, proximal fragment of the condyles, adult, calcite |  |
| VIII | 11 | C | 9 | femur fragment | right | b72, medial condyle, adult |  |
| VIII | 11 | C | 10 | femur fragment | left | b72, lateral condyle |  |


| VIII | 11 | C | 11 | humerus fragment | right | b72, subadult, proximal head fragment, calcite | 36.69 mm head diameter |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 12 | humerus fragment | left | b72, adult, proximal head fragment, calcite | 43.19 mm head diameter |
| VIII | 11 | C | 13 | humerus epiphysis | right | b72, proximal head epiphysis, calcite, older than 5 probably, but younger than 9 |  |
| VIII | 11 | C | 14 | calcaneus | left | b72, possible subadult based on size, calcite | 66.44 mm length, 35.8 mm width |
| VIII | 11 | C | 15 | ulna fragment | left | b72, proximal fragment, adult, calcite |  |
| VIII | 11 | C | 16 | talus | left | b72, possible subadult, too damaged to take measurements, calcite |  |
| VIII | 11 | C | 17 | sternum fragment |  | b72, proximal fragment, superior surface is unfused, subadult, calcite |  |
| VIII | 11 | C | 18 | thoracic vertebra fragment |  | b72, body fragment, upper thoracic, slight lipping on the inferior margin |  |
| VIII | 11 | C | 19 | femur fragment | possible right | b72, adult, distal fragment with both condyles, badly deteriorated, calcite |  |


| VIII | 11 | C | 20 | femur fragment | undetermined | b72, distal condyle fragment, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 21 | tibia fragment | probable right | b72, lateral superior condyle, adult, calcite |
| VIII | 11 | C | 22 | calcaneus fragment | right | b72, anterior fragment, subadult, mate to 14 , calcite |
| VIII | 11 | C | 23 | scapula fragment | right | b72, acromion fragment, adult, calcite |
| VIII | 11 | C | 24 | femur fragment | left | b72, proximal fragment, subadult, older than 5 years of age |
| VIII | 11 | C | 25 | femur fragment | left | b72, proximal fragment, subadult, around 5 years of age, smaller than 24 |
| VIII | 11 | C | 26 | vertebra fragment |  | b72, body fragment, possible lumbar vertebra, calcite |
| VIII | 11 | C | 27 | os coxa fragment | undetermined | b72, acetabular fragment, possible subadult |
| VIII | 11 | C | 28 | scapula fragment | left | b72, acromion fragment, adult, calcite |
| VIII | 11 | C | 29 | tibia fragment | undetermined | b72, distal fragment, probable adult, calcite |


| VIII | 11 | C | 30 | pubis | left | b72, child, over 1 year possibly closer to 5, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 31 | pubis | right | b72, child, over 1 year possibly closer to 5, calcite |
| VIII | 11 | C | 32 | scapula fragment | left | b72, attaches to 28, most lateral portion of the acromion, adult, calcite |
| VIII | 11 | C | 33 | vertebra fragment |  | b72, body fragment, adult, calcite, possible lumbar vertebra |
| VIII | 11 | C | 34 | vertebra fragment |  | b72, body fragment, adult, calcite, possible lumbar vertebra, slight crushing of the posterior area of the body |
| VIII | 11 | C | 35 | vertebra fragment |  | b72, subadult thoracic vertebra, upper thoracic, body and left lamina fragment, calcite |
| VIII | 11 | C | 36 | vertebra fragment |  | b72, body and left transverse process fragment, adult, calcite, probable 5th lumbar |


| VIII | 11 | C | 37 | os coxa fragment | probable left | b72, auricular surface fragment, calcite on surface obscures morphology, no deep billows suggests an adult of older age, some microporosity, possibly phase $3 / 4$, 30-39 years of age |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 38 | femur fragment | left | b72, proximal fragment, probable subadult, calcite | 37.41 head diameter |
| VIII | 11 | C | 39 | femur fragments | undetermined | b72, one distal condyle in two fragments, calcite |  |
| VIII | 11 | C | 40 | ulna fragments | left | distal fragment with some of the shaft, adult, calcite |  |
| VIII | 11 | C | 41 | fibula fragments | left | proximal fragments, adult, covered in calcite |  |
| VIII | 11 | C | 42 | ulna fragments | right | distal fragment with some of the shaft, adult, calcite, mate to 40 |  |
| VIII | 11 | C | 43 | first metatarsal fragments | right | adult, calcite, badly deteriorated, too fragmentary to measure |  |


| VIII | 11 | C | 44 | tibia | probable left | subadult, probably closer to 9 years of age, proximal and distal epiphyses are not fused, completely covered in calcite | 19.4 cm length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 45 | fibula fragment | left | distal fragment, adult, calcite |  |
| VIII | 11 | C | 46 | humerus fragments | left | distal and proximal fragments, subadult, covered in calcite, distal epiphysis is not fused, approximately 5 years of age based upon size | $\sim 13.7$ cm length |
| VIII | 11 | C | 47 | humerus fragment | left | distal fragment, subadult, covered in calcite, distal epiphysis is not fused, older than 5 years possibly closer to 9 |  |
| VIII | 11 | C | 48 | temporal bone | left | mastoid process is short but very wide, possible male heavily coated in calcite |  |
| VIII | 11 | C | 49 | talus | right | adult, calcite | 49.98 mm length, 37.9 mm width |
| VIII | 11 | C | 50 | humerus fragment | left | subadult, proximal fragment, calcite, probably close to 9 in |  |


| VIII | 11 | C | 51 | radius fragment | left | proximal fragment, calcite, subadult, probably close to 5 years of age |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 52 | first metacarpal | left | adult, calcite | 43.14 mm |
| VIII | 11 | C | 53 | first metacarpal | right | adult, calcite | 46.43 mm |
| VIII | 11 | C | 54 | first proximal pedal phalanx |  | adult, calcite | 30.13 mm |
| VIII | 11 | C | 55 | first proximal pedal phalanx |  | adult, calcite | 29.1 mm |
| VIII | 11 | C | 56 | proximal manual phalanx |  | adult, calcite | 40 mm |
| VIII | 11 | C | 57 | proximal manual phalanx |  | adult, calcite | 43.26 mm |
| VIII | 11 | C | 58 | first proximal manual phalanx |  | adult, calcite | 32.17 mm |
| VIII | 11 | C | 59 | proximal pedal phalanx |  | adult, calcite | 22.52 mm |
| VIII | 11 | C | 60 | proximal pedal phalanx |  | adult, calcite | 19.63 mm |
| VIII | 11 | C | 61 | proximal pedal phalanx |  | adult, calcite | 20.51 mm |
| VIII | 11 | C | 62 | intermediate manual phalanx |  | subadult, unfused epiphyses, calcite | 20.28 mm |
| VIII | 11 | C | 63 | intermediate manual phalanx |  | subadult, unfused epiphyses, calcite | 29.28 mm |


| VIII | 11 | C | 64 | fourth metacarpal | right | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 65 | fifth metatarsal | right | adult, calcite |
| VIII | 11 | C | 66 | fifth metatarsal | right | subadult, unfused distal epiphysis, calcite |
| VIII | 11 | C | 67 | fourth metatarsal | probable left | subadult, unfused distal epiphysis, calcite |
| VIII | 11 | C | 68 | metatarsal fragment | possible left | possibly the second metatarsal proximal fragment, distal head has not fused yet, calcite, probably around 8 years old |
| VIII | 11 | C | 69 | metatarsal fragment | possible left | possible third metatarsal proximal fragment, calcite, probably around 8 years old |
| VIII | 11 | C | 70 | metatarsal fragment | possible right | possible third metatarsal proximal fragment, distal head has not fused, calcite, probably around 8 years old |
| VIII | 11 | C | 71 | fourth metatarsal | left | subadult, probably 8 years of age or a little younger, calcite, distal head has not fused yet |


| VIII | 11 | C | 72 | metacarpal | undetermined | proximal and distal epiphyses have not fused yet, younger than 8 , calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 73 | metacarpal | undetermined | proximal and distal epiphyses have not fused yet, younger than 8, calcite |  |
| VIII | 11 | C | 74 | metacarpal | undetermined | proximal and distal epiphyses have not fused yet, younger than 8, calcite |  |
| VIII | 11 | C | 75 | unidentified shaft fragment | undetermined | long bone shaft fragment |  |
| VIII | 11 | C | 76 | patella | probable left | b72, subadult | 24.57 mm height, <br> 24.16 mm width |
| VIII | 11 | C | 77 | 3 unidentified fragments | undetermined | b 72 |  |
| VIII | 11 | C | 78 | ulna fragments | right | adult, proximal and shaft fragment, light calcite |  |
| VIII | 11 | C | 79 | tibia fragments | undetermined | possible subadult based on size, calcite covers completely, probable proximal shaft fragment. |  |
| VIII | 11 | C | 80 | radius | right | adult, calcite | 24.8 cm length, 14.89 mm medial to lateral, 12.47 mm anterior to |


| VIII | 11 | C | 81 | parietal | left | adult, covered with calcite, broken at the suture lines, suggesting a younger individual |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 82 | femur fragment | undetermined | shaft fragment, adult, covered in calcite |
| VIII | 11 | C | 83 | ulna fragment | left | proximal fragment, adult, calcite |
| VIII | 11 | C | 84 | fibula fragment | undetermined | shaft fragment, adult, calcite |
| VIII | 11 | C | 85 | humerus fragment | right | shaft fragment, probable subadult, calcite |
| VIII | 11 | C | 86 | femur fragment | undetermined | shaft fragment, calcite, probable subadult |
| VIII | 11 | C | 87 | thoracic vertebra fragment |  | adult, lamina fragment, upper thoracic, calcite |
| VIII | 11 | C | 88 | lumbar vertebra fragment |  | subadult, body fragment, covered in calcite |
| VIII | 11 | C | 89 | cervical vertebra |  | C2, adult, calcite |
| VIII | 11 | C | 90 | cervical vertebra |  | C2, adult, calcite |


| VIII | 11 | C | 91 | thoracic vertebra fragment |  | transverse processes are broken, damage to anterior portion of the body, mid thoracic, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 92 | vertebra fragment |  | subadult, probable lumbar vertebra, body fragment, calcite |
| VIII | 11 | C | 93 | vertebra fragment |  | subadult, probable thoracic vertebra, body with epiphyseal lines of the pedicle still visible, lamina is broken off |
| VIII | 11 | C | 94 | rib fragment |  | adult, calcite, shaft fragment, mid rib |
| VIII | 11 | C | 95 | rib fragment |  | adult, calcite, shaft fragment, mid rib |
| VIII | 11 | C | 96 | rib fragment |  | adult, calcite, shaft fragment, mid rib |
| VIII | 11 | C | 97 | third metatarsal fragment | right | proximal fragment, adult, calcite |
| VIII | 11 | C | 98 | metacarpal/metatarsal fragment |  | shaft and part of the distal end, adult, calcite |
| VIII | 11 | C | 99 | metatarsal fragment |  | distal end, adult, calcite |
| VIII | 11 | C | 100 | second metacarpal fragment | right | proximal fragment, adult, calcite |
| VIII | 11 | C | 101 | first cuneiform | left | adult calcite |


| VIII | 11 | C | 102 | patella | left | adult calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 103 | first metatarsal | left | adult calcite |  |
| VIII | 11 | C | 104 | femur and clavicle fragment | both right | clavicle is a lateral fragment which is stuck to the trochanteric crest of a proximal fragment that lacks the head, adult calcite |  |
| VIII | 11 | C | 105 | ilium fragment | right | crest is broken off, subadult, older than 6 , probably closer to 9 years of age, calcite |  |
| VIII | 11 | C | 106 | occipital fragment |  | basioccipital fragment, unfused spheno occipital suture, subadult under 18, calcite |  |
| VIII | 11 | C | 107 | proximal pedal phalanx fragment |  | part of the distal end is broken, adult, calcite | 30.81 mm |
| VIII | 11 | C | 108 | first distal pedal phalanx |  | adult calcite |  |
| VIII | 11 | C | 109 | metacarpal fragment |  | adult calcite, damage to distal and proximal ends |  |
| VIII | 11 | C | 110 | proximal manual phalanx fragment |  | subadult, calcite, damage to proximal end |  |


| VIII | 11 | C | 111 | proximal manual phalanx fragment |  | subadult, calcite, damage to proximal end |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 112 | ilium fragments | left | mate to 105 , subadult, probably closer to 9 years of age, calcite |
| VIII | 11 | C | 113 | cervical vertebra fragments |  | most of the body and lamina, adult, calcite, lower cervical |
| VIII | 11 | C | 114 | thoracic vertebra fragments |  | adult, mid thoracic, calcite |
| VIII | 11 | C | 115 | thoracic vertebra fragments |  | adult, upper thoracic, calcite |
| VIII | 11 | C | 116 | mandible fragments |  | left ramus fragments, adult, calcite |
| VIII | 11 | C | 117 | femur fragments | right | subadult, proximal and shaft fragments, calcite, probably closer to 9 years of age or older |
| VIII | 11 | C | 118 | occipital fragment |  | possible subadult based on size, calcite |
| VIII | 11 | C | 119 | frontal fragment |  | right above the frontal sinus, crest is irregular and beginning of groove is on the fragment, calcite, possible subadult with cranial modification |


| VIII | 11 | C | 120 | humerus fragment | right | adult, calcite, badly damaged, triangular shaped fossa, angle is wide but not flat, medial condyle is level | $\begin{gathered} 61.88 \mathrm{~mm} \\ \text { epicondylar width } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 121 | talus | left | adult calcite | 60.09 mm length, 41.69 mm width |
| VIII | 11 | C | 122 | talus | right | possible subadult, damage to the posterior and lateral edges |  |
| VIII | 11 | C | 123 | patella | left | adult calcite |  |
| VIII | 11 | C | 124 | rib fragments | undetermined | adult, shaft fragment, calcite, mid rib |  |
| VIII | 11 | C | 125 | rib fragments | right | adult, calcite, vertebral end, lower rib probably 11 |  |
| VIII | 11 | C | 126 | rib fragments | undetermined | sub adult, shaft fragment, calcite, mid rib |  |
| VIII | 11 | C | 127 | rib fragments | undetermined | adult, shaft fragment, calcite, upper rib |  |
| VIII | 11 | C | 128 | parietal fragments | undetermined | adult, calcite |  |
| VIII | 11 | C | 129 | mandible fragment |  | adult, right portion of the ramus minus the mandibular condyle, calcite, cannot determine anything about the teeth with |  |

this fragment

| VIII | 11 | C | 130 | thoracic vertebra fragments |  | adult, mostly intact, lower thoracic, probably T10 or 11, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 131 | vertebra fragments |  | subadult, probable lower cervical or thoracic, calcite |  |
| VIII | 11 | C | 132 | proximal manual phalanx |  | adult calcite, slightly raised margins | 39.9 mm |
| VIII | 11 | C | 133 | intermediate manual phalanx |  | adult calcite, slightly raised margins | 28.3 mm |
| VIII | 11 | C | 134 | proximal manual phalanx |  | subadult | 27.22 mm |
| VIII | 11 | C | 135 | proximal manual phalanx fragment |  | adult calcite, head broken off |  |
| VIII | 11 | C | 136 | navicular | left | adult, calcite |  |
| VIII | 11 | C | 137 | navicular | left | adult, calcite |  |
| VIII | 11 | C | 138 | scaphoid | right | adult, calcite |  |
| VIII | 11 | C | 139 | clavicle fragment | right | adult, calcite, most of the clavicle, probably the mate to 140 |  |
| VIII | 11 | C | 140 | clavicle fragment | left | adult, calcite, lateral fragment, probably the mate to 139 |  |

$\left.\begin{array}{cccccccc}\text { VIII } & 11 & \text { C } & 141 & \text { calcaneus } & \text { left } & \text { adult, calcite } & \begin{array}{c}\text { length 73.85 mm, } \\ 43.66 \mathrm{~mm} \text { width }\end{array} \\ \hline \text { VIII } & 11 & \text { C } & 142 & \text { talus } & \text { left } & \text { adult, calcite } & \begin{array}{c}47.97 \mathrm{~mm} \text { length, } \\ 40.32 \mathrm{~mm} \text { width }\end{array} \\ \hline \text { VIII } & 11 & \text { C } & 143 & \text { patella } & \text { right } & \text { adult, calcite } & \begin{array}{c}44.64 \mathrm{~mm} \text { height, } \\ 46.60 \mathrm{~mm} \text { width }\end{array} \\ \hline \text { VIII } & 11 & \text { C } & 144 & \text { cervical vertebra } & & \begin{array}{c}\text { adult, calcite, lower } \\ \text { cervical, probably C7, } \\ \text { slight lipping on the } \\ \text { superior border of the } \\ \text { body }\end{array} \\ \hline \text { VIII } & 11 & \text { C } & 145 & \text { cervical vertebra } & & \text { adult, calcite, upper } \\ \text { cervical }\end{array}\right]$

| VIII | 11 | C | 152 | femur fragment | undetermined | probable femur, subadult, calcite, larger than 152 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 153 | rib fragment | left | neck and shaft fragment of a subadult, calcite |  |
| VIII | 11 | C | 154 | rib | left | first rib, adult, calcite |  |
| VIII | 11 | C | 155 | rib fragment | undetermined | subadult, calcite, mid rib, sterna fragment |  |
| VIII | 11 | C | 156 | rib fragment | undetermined | adult, mid rib, shaft fragment, calcite |  |
| VIII | 11 | C | 157 | humerus | left | perinate, calcite | 64.71 mm |
| VIII | 11 | C | 158 | radius fragment | right | proximal fragment, subadult, probably $\sim 5$ years old, calcite |  |
| VIII | 11 | C | 159 | metacarpal fragment | undetermined | subadult, epiphyses are not fused |  |
| VIII | 11 | C | 160 | metatarsal fragment | undetermined | subadult, epiphyses are not fused |  |
| VIII | 11 | C | 161 | scapula fragment | right | glenoid and acromion fragment, subadult, unfused glenoid, calcite |  |
| VIII | 11 | C | 162 | thoracic vertebra |  | subadult, calcite, upper thoracic |  |
| VIII | 11 | C | 163 | thoracic vertebra |  | subadult, calcite, upper thoracic |  |
| VIII | 11 | C | 164 | metacarpal | undetermined | subadult, epiphyses | 32.28 mm |


| are not fused |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 165 | metacarpal | undetermined | subadult, epiphyses are not fused | 34.34 mm |
| VIII | 11 | C | 166 | fifth metatarsal | undetermined | subadult, epiphyses are not fused | 44.34 mm |
| VIII | 11 | C | 167 | proximal manual phalanx |  | subadult, epiphyses are not fused | 26.12 mm |
| VIII | 11 | C | 168 | first proximal pedal phalanx |  | adult, calcite | 35.75 mm |
| VIII | 11 | C | 169 | first proximal manual phalanx |  | adult, calcite | 26.04 mm |
| VIII | 11 | C | 170 | proximal manual phalanx fragment |  | adult, calcite |  |
| VIII | 11 | C | 171 | proximal manual phalanx fragment |  | adult, calcite, slightly raised lateral margins |  |
| VIII | 11 | C | 172 | first cuneiform | left | adult, calcite |  |
| VIII | 11 | C | 173 | first cuneiform | right | adult, calcite, badly damaged, cannot determine if it is the mate to 172 |  |
| VIII | 11 | C | 174 | cuboid | left | adult, calcite |  |
| VIII | 11 | C | 175 | second cuneiform | left | adult, calcite |  |
| VIII | 11 | C | 176 | sacrum fragment |  | subadult, unfused first sacral vertebra, pedicle lines are very visible still, ala fused but not the lamina, age 2-5 |  |



| VIII | 11 | C | 185 | first distal pedal $\qquad$ |  | adult, calcite | 26.9 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 186 | rib fragment | left | subadult, mid rib, vertebral and shaft fragment, calcite |  |
| VIII | 11 | C | 187 | rib fragment | left | subadult, upper rib, calcite, shaft fragment |  |
| VIII | 11 | C | 188 | rib fragment | right | subadult, mid rib, vertebral and shaft fragment, calcite |  |
| VIII | 11 | C | 189 | rib fragment | right | subadult, lower rib, calcite, shaft fragment |  |
| VIII | 11 | C | 190 | thoracic vertebra |  | adult, calcite, damage to body and right transverse process, upper thoracic |  |
| VIII | 11 | C | 191 | thoracic vertebra |  | adult, calcite, mid thoracic, damage to the body and transverse process |  |
| VIII | 11 | C | 192 | sacral vertebra |  | subadult, calcite, other small bones stuck to it, one of the lower sacral vertebrae, probably age $2-5$, lamina is fused |  |
| VIII | 11 | C | 193 | tibia fragment | right | distal fragment, adult, calcite |  |
| VIII | 11 | C | 194 | ischium fragment | left | probable subadult, |  |

$\left.\begin{array}{ccccccc}\hline & & & & & \text { calcite } \\ \text { VIII } & 11 & \text { C } & 195 & \text { femur fragment } & \text { undetermined } & \begin{array}{c}\text { proximal head } \\ \text { fragment only, } \\ \text { subadult, calcite }\end{array} \\ \hline \text { VIII } & 11 & \text { C } & 196 & \text { humerus fragment } & \text { probable right } & \begin{array}{c}\text { 35.97 mm head } \\ \text { diameter }\end{array} \\ \text { end not fused, greater } \\ \text { than 5 years of age, } \\ \text { calcite }\end{array}\right]$

| VIII | 11 | C | 206 | scaphoid | left | adult calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 207 | capitate | left | adult calcite |  |
| VIII | 11 | C | 208 | lunate | left | adult calcite |  |
| VIII | 11 | C | 209 | trapezium | left | adult calcite |  |
| VIII | 11 | C | 210 | first cuneiform | left | adult calcite |  |
| VIII | 11 | C | 211 | cuboid | left | subadult, calcite |  |
| VIII | 11 | C | 212 | second cuneiform | left | subadult, calcite |  |
| VIII | 11 | C | 213 | third cuneiform | right | subadult, calcite |  |
| VIII | 11 | C | 214 | third metacarpal fragment | right | head is broken off, calcite, adult |  |
| VIII | 11 | C | 215 | metacarpal fragment | undetermined | possible fourth right, head is not fused, subadult, calcite |  |
| VIII | 11 | C | 216 | metatarsal fragment |  | proximal end is damaged, adult, calcite |  |
| VIII | 11 | C | 217 | third metatarsal fragment | left | head is broken off, calcite, adult |  |
| VIII | 11 | C | 218 | proximal manual phalanx |  | subadult, calcite | 30.98 mm |
| VIII | 11 | C | 219 | proximal pedal phalanx |  | adult calcite | 28.82 mm |
| VIII | 11 | C | 220 | proximal pedal phalanx |  | adult calcite | 25.45 mm |
| VIII | 11 | C | 221 | first proximal pedal $\qquad$ phalanx |  | subadult, calcite | 20.02 mm |
| VIII | 11 | C | 222 | proximal pedal phalanx |  | subadult, calcite | 21.4 mm |


| VIII | 11 | C | 223 | scapula fragment | left | glenoid fragment, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 224 | patella | right | possible subadult, calcite |
| VIII | 11 | C | 225 | pubis | right | subadult, probably around 5 years of age, calcite |
| VIII | 11 | C | 226 | proximal manual phalanx |  | subadult, calcite |
| VIII | 11 | C | 227 | proximal manual phalanx |  | subadult, calcite |
| VIII | 11 | C | 228 | proximal manual phalanx fragment |  | subadult, calcite, proximal fragment |
| VIII | 11 | C | 229 | proximal pedal phalanx |  | subadult, proximal epiphysis is fused but the line is still visible |
| VIII | 11 | C | 230 | intermediate manual phalanx fragment |  | subadult, calcite, distal fragment |
| VIII | 11 | C | 231 | thoracic vertebra |  | subadult, pedicle line is still visible, upper thoracic, calcite |
| VIII | 11 | C | 232 | thoracic vertebra fragment |  | subadult, lamina fragment, calcite, upper thoracic |
| VIII | 11 | C | 233 | cervical vertebra fragment |  | subadult, lower cervical, calcite |
| VIII | 11 | C | 234 | vertebra fragment |  | possible lower cervical transverse process with superior articular facet, calcite |


| VIII | 11 | C | 235 | third metacarpal fragment | right | adult, proximal fragment, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 236 | metatarsal fragment |  | subadult, proximal fragment with an unfused epiphysis, almost complete |  |
| VIII | 11 | C | 237 | metatarsal fragment |  | subadult, epiphyses are not fused, calcite |  |
| VIII | 11 | C | 238 | metacarpal fragment |  | subadult, epiphyses are not fused, calcite |  |
| VIII | 11 | C | 239 | metatarsal fragment |  | distal fragment, epiphysis not fused, calcite |  |
| VIII | 11 | C | 240 | fifth metatarsal | right | adult, calcite, some damage to the proximal end | 52.21 mm |
| VIII | 11 | C | 241 | metacarpal fragment |  | adult, probably the first, calcite |  |
| VIII | 11 | C | 242 | first metacarpal | undetermined | subadult, calcite | 23.58 mm |
| VIII | 11 | C | 243 | first metacarpal | undetermined | subadult, calcite | 24.22 mm |
| VIII | 11 | C | 244 | proximal manual phalanx |  | adult, calcite, lateral margins defined | 45.9 mm |
| VIII | 11 | C | 245 | intermediate manual phalanx |  | adult, calcite | 19.02 mm |
| VIII | 11 | C | 246 | distal manual phalanx |  | adult, calcite | 15.61 mm |
| VIII | 11 | C | 247 | hamate | left | adult, calcite |  |
| VIII | 11 | C | 248 | hamate | left | adult, calcite |  |
| VIII | 11 | C | 249 | triquetral | left | adult, calcite |  |
| VIII | 11 | C | 250 | trapezium | left | adult, calcite |  |

$\left.\left.\begin{array}{cccccc}\text { VIII } & 11 & \text { C } & 251 & \text { vertebra fragment } & \\ \hline \text { VIII } & 11 & \text { C } & 252 & \begin{array}{c}\text { possible sternum } \\ \text { fragment }\end{array} & \begin{array}{c}\text { lamina fragment, } \\ \text { possible subadult }\end{array} \\ \hline \text { VIII } & 11 & \text { C } & 253 & \text { scapula fragments } & \text { right }\end{array} \begin{array}{c}\text { subadult, very young } \\ \text { child }\end{array}\right] \begin{array}{c}\text { subadult, acromion } \\ \text { and glenoid fragment, } \\ \text { calcite }\end{array}\right]$

| VIII | 11 | C | 261 | metatarsal fragment | undetermined | subadult, proximal fragment, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 262 | rib fragment | right | subadult, shaft fragment, upper rib, calcite |
| VIII | 11 | C | 263 | ulna fragment | possible left | very distal shaft fragment, possibly same bone as 264 , adult, calcite |
| VIII | 11 | C | 264 | ulna fragment | left | mid shaft fragment, adult, calcite |
| VIII | 11 | C | 265 | radius fragment | left | distal portion, adult, covered in calcite |
| VIII | 11 | C | 266 | talus fragment | left | subadult, damage to posterior and medial surfaces, calcite |
| VIII | 11 | C | 267 | radius fragment | probable left | subadult, distal fragment, $\sim 1.5$ years of age, calcite |
| VIII | 11 | C | 268 | radius fragment | undetermined | subadult, closer to 5 years of age, proximal fragment, calcite |
| VIII | 11 | C | 269 | humerus fragment | left | distal lateral fragment, adult, calcite, not enough for morphology or measurements |
| VIII | 11 | C | 270 | radius fragment | right | distal epiphysis, subadult, roughly 5 |


| VIII | 11 | C | 271 | scaphoid | probable right | subadult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 272 | cuneiform | undetermined | subadult, facets are not easy to make out, calcite |
| VIII | 11 | C | 273 | phalanx |  | subadult, unfused proximal facet, distal end broken |
| VIII | 11 | C | 274 | cuneiform |  | possible right first, subadult, calcite |
| VIII | 11 | C | 275 | ossified cartilage |  | adult, calcite |
| VIII | 11 | C | 276 | ossified cartilage |  | adult, calcite |
| VIII | 11 | C | 277 | shaft fragment |  | shaft fragment, calcite |
| VIII | 11 | C | 278 | navicular | left | articulated foot 278286, adult, calcite |
| VIII | 11 | C | 279 | second cuneiform | left | articulated foot 278286, adult, calcite |
| VIII | 11 | C | 280 | third cuneiform | left | articulated foot 278286, adult, calcite |
| VIII | 11 | C | 281 | first proximal phalanx | left | articulated foot 278286, adult, calcite |
| VIII | 11 | C | 282 | first metatarsal | left | articulated foot 278286, adult, calcite |
| VIII | 11 | C | 283 | third metatarsal | left | articulated foot 278286, adult, calcite |
| VIII | 11 | C | 284 | fourth metatarsal | left | articulated foot 278286, adult, calcite |
| VIII | 11 | C | 285 | fifth metatarsal | left | articulated foot 278286, adult, calcite |


| VIII | 11 | C | 286 | second metatarsal | left | articulated foot 278286, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 287 | ischium | right | b72, subadult, probably around 6 years old, calcite |
| VIII | 11 | C | 288 | ischium | left | b72, subadult, probably around 6 years old, calcite |
| VIII | 11 | C | 289 | tibia fragment | left | b72, subadult, roughly 5 years of age, calcite, proximal fragment |
| VIII | 11 | C | 290 | radius fragment | right | b72, subadult, distal fragment, over 5 years of age, but not by much, calcite |
| VIII | 11 | C | 291 | femur fragment |  | b72, adult, calcite, head fragment only, too deteriorated to measure |
| VIII | 11 | C | 292 | ulna fragment | left | b72, adult, calcite, proximal fragment |
| VIII | 11 | C | 293 | lumbar vertebra fragment |  | b72, adult, calcite, lamina is badly damaged, probably <br> L1 |
| VIII | 11 | C | 294 | lumbar vertebra fragment |  | b72, adult, calcite, lamina is badly damaged, probably L2 |


| VIII | 11 | C | 295 | os coxa fragment | undetermined | b72, adult, calcite, part of the lunate surface and ilium blade |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 296 | femur fragment | probable right | b72, subadult, unfused epiphysis, probably 9 or older, calcite, distal fragment, condyles only |  |
| VIII | 11 | C | 297 | femur fragment | probable left | b72, subadult, unfused epiphysis, probably 9 or older, calcite, distal fragment, condyles only |  |
| VIII | 11 | C | 298 | humerus fragments | undetermined | b72, shaft fragment, subadult, calcite |  |
| VIII | 11 | C | 299 | molar | left | heavy wear, pin prick dentine exposure on posterior lingual cusp, root broken off | 10.35 mm anterior to posterior, 12.15 mm lingual to buccal 6.27 ch |
| VIII | 11 | C | 300 | incisor | right | hair line dentine exposure, calcite on buccal surface | 6.58 mm anterior to posterior, 5.48 mm lingual to buccal 7.15 ch , 13.19ch |
| VIII | 11 | C | 301 | proximal pedal phalanx | undetermined | some calcite and porosity, part of an articulated foot, wrapping says | 26.06 |

medial, but it looks more proximal

| VIII | 11 | C | 302 | incisor | right | modified with Ik, some calcite | 8.05 mm anterior to posterior, 6.5 mm lingual to buccal 14.44 root |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | C | 303 | incisor | left | modified with Ik, some calcite, calculus on anterior surface at the CEJ | 8.54 anterior to posterior, 6.91 lingual to buccal, 12.21 root |
| VIII | 11 | D | 1 | Humerus fragment | right | distal fragment, gray on posterior surface, triangular shaped fossa, medial epicondyle is slightly elevated | 59.12 epicondylar breadth |
| VIII | 11 | D | 2 | talus | right | adult, light calcite and carbon | 55.47 length, 38.72 width |
| VIII | 11 | D | 3 | calcaneus fragment | right | damage to the lateral portion of the bone, light calcite and carbon | 77.47 length |
| VIII | 11 | D | 4 | cervical vertebra |  | C1, adult, light carbon and calcite |  |
| VIII | 11 | D | 5 | cervical vertebra |  | probably C4-6 |  |
| VIII | 11 | D | 6 | calcaneus | left | adult, light calcite and carbon | 79.44 length, |
| VIII | 11 | D | 7 | patella | left | adult, large macroporosity on | 41.78 height, 37.04 width |


|  |  |  |  |  |  | anterior surface, light carbon and calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 8 | patella | right | adult, large macroporosity on anterior surface, light carbon and calcite | 40.71 height, 37.99 width |
| VIII | 11 | D | 9 | mandible fragment |  | anterior portion with all crypts visible, adult, third molars erupted, the left third molar is reabsorbing, the rest of the teeth were lost post mortem, intermediate mental eminence (3) |  |
| VIII | 11 | D | 10 | first metatarsal | right | adult, calcite and carbon | 66.85 mm |
| VIII | 11 | D | 11 | first metatarsal | left | adult, calcite and carbon | 68.15 mm |
| VIII | 11 | D | 12 | first cuneiform | right | adult, calcite and carbon |  |
| VIII | 11 | D | 13 | proximal manual phalanx |  | adult, slightly defined lateral margins, carbon and calcite | 46.7 mm |
| VIII | 11 | D | 14 | first proximal manual $\qquad$ |  | subadult, unfused epiphyses, calcite | 30.64 mm |
| VIII | 11 | D | 15 | first proximal manual phalanx |  | adult, calcite and carbon | 32.87 mm |
| VIII | 11 | D | 16 | proximal manual phalanx |  | adult, slightly defined lateral margins, | 42.11 mm |

carbon and calcite

| VIII | 11 | D | 17 | femur fragment | left | subadult, most of the bone - minus the epiphyses and the distal end, between 5 and 8 years of age |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 18 | radius fragment | right | adult, distal fragment with part of the shaft, covered in calcite and carbon on the posterior surface |
| VIII | 11 | D | 19 | femur fragment | right | proximal fragment, unfused epiphyses, subadult, probably closer to 9 years old |
| VIII | 11 | D | 20 | thoracic vertebra |  | subadult, lamina fused to body, but body is not fused, calcite, upper thoracic |
| VIII | 11 | D | 21 | thoracic vertebra |  | subadult, lamina fused to body but the line at the pedicle is visible, and body is not fused, calcite, middle thoracic |
| VIII | 11 | D | 22 | ulna fragment | right | adult, calcite and carbon, mostly on the posterior surface, proximal fragment |


| VIII | 11 | D | 23 | rib fragment | and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 24 | rib fragment | adult, shaft fragment, covered with calcite and carbon |  |
| VIII | 11 | D | 25 | rib fragment | adult, shaft fragment, covered with calcite and carbon |  |
| VIII | 11 | D | 26 | rib fragment | adult, shaft fragment, covered with calcite and carbon |  |
| VIII | 11 | D | 27 | proximal manual phalanx | adult, carbon and calcite | 49.4 mm |
| VIII | 11 | D | 28 | proximal manual phalanx | adult, carbon and calcite | 46.18 mm |
| VIII | 11 | D | 29 | proximal manual phalanx | adult, carbon and calcite | 33.85 mm |
| VIII | 11 | D | 30 | first proximal pedal phalanx | adult, minimal calcite and carbon | 36.72 mm |
| VIII | 11 | D | 31 | proximal pedal phalanx | adult, minimal calcite and carbon | 32.08 mm |
| VIII | 11 | D | 32 | proximal pedal phalanx | adult, minimal calcite and carbon | 31.24 mm |
| VIII | 11 | D | 33 | proximal pedal phalanx | adult, minimal calcite and carbon | 27.48 mm |
| VIII | 11 | D | 34 | cervical vertebra | adult, probably C3-6, adult, calcite and carbon |  |


| VIII | 11 | D | 35 | cervical vertebra |  | subadult, at least or greater than 3-4 years old, calcite and carbon |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 36 | thoracic vertebra fragment |  | subadult between 1-3 years of age, lamina that is not fused to the body, upper thoracic, calcite and carbon |
| VIII | 11 | D | 37 | third cuneiform | right | adult, calcite and carbon, small pathological defect on one of the bones that measures 4.46 mm in diameter, looks like degenerative localized gout |
| VIII | 11 | D | 38 | second cuneiform | right | adult, calcite, and carbon |
| VIII | 11 | D | 39 | second cuneiform | left | adult, calcite, and carbon |
| VIII | 11 | D | 40 | humerus fragment | right | distal fragment, subadult, calcite and carbon, roughly 5 years old based on size |
| VIII | 11 | D | 41 | cranial fragment | undetermined | possible parietal fragment based on a slightly visible meningeal groove, adult, calcite covers |

interior and exterior, fractures look recent

| VIII | 11 | D | 42 | clavicle fragment | right | subadult, epiphyseal line on the medial surface is visible, lateral end is broken off, probably an adolescent |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 43 | trapezium | right | adult, calcite and carbon |
| VIII | 11 | D | 44 | hamate | right |  |
| VIII | 11 | D | 45 | clavicle fragment | left | lateral fragment, subadult, calcite and carbon covered, probably around 1-2 years old based upon size, 3 at the oldest |
| VIII | 11 | D | 46 | lumbar vertebra fragment |  | right lamina fragment of probably L3 |
| VIII | 11 | D | 47 | thoracic vertebra fragment |  | body and a superior articular facet, upper thoracic, adult |
| VIII | 11 | D | 48 | pubis | left | subadult, calcite and carbon, child |
| VIII | 11 | D | 49 | scapula fragment | probable right | spine and acromion fragment covered in calcite mostly on the posterior surface |


| VIII | 11 | D | 50 | ischium fragment | right | subadult, child, most of the acetabulum, calcite and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 51 | rib fragment | undetermined | shaft fragment, carbon and calcite |  |
| VIII | 11 | D | 52 | rib fragment | probable right | shaft fragment, subadult, calcite and carbon |  |
| VIII | 11 | D | 53 | second metacarpal | right | adult, slight carbon and calcite | 70.02 mm |
| VIII | 11 | D | 54 | third metacarpal | right | adult, slight carbon and calcite | 70.42 mm |
| VIII | 11 | D | 55 | fourth metatarsal | right | adult, slight carbon and calcite, degenerative pathology on the proximal facet where it articulates with 37, this one measures 5 mm by 6 mm | 74.25 mm |
| VIII | 11 | D | 56 | ulna fragment | left | proximal fragment, possible subadult, calcite and carbon |  |
| VIII | 11 | D | 57 | second metatarsal fragment | left | adult, calcite and carbon, proximal fragment, gout on the dorsal aspect of the proximal facet, 4.3 by 5.3 in diameter |  |


| VIII | 11 | D | 58 | third metatarsal fragment | right | subadult, head not fused, calcite and carbon |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 59 | ulna fragment | left | distal fragment, adult, calcite and carbon |
| VIII | 11 | D | 60 | second metatarsal fragment | right | proximal fragment, adult, calcite and carbon |
| VIII | 11 | D | 61 | metacarpal fragment |  | shaft fragment with the head, adult, calcite and carbon |
| VIII | 11 | D | 62 | metacarpal fragment |  | shaft fragment, adult, calcite and carbon |
| VIII | 11 | D | 63 | first distal pedal phalanx |  | adult, carbon and calcite |
| VIII | 11 | D | 64 | intermediate or proximal manual phalanx |  | subadult, unfused proximal phalanx |
| VIII | 11 | D | 65 | metacarpal fragment |  | adult, calcite and carbon covered |
| VIII | 11 | D | 66 | sternum fragment |  | calcite and carbon covered on posterior, distal portion, subadult |
| VIII | 11 | D | 67 | temporal bone | right | adult, tympanic portion, calcite and carbon, mastoid broken |
| VIII | 11 | D | 68 | temporal bone | right | adult, tympanic portion, calcite and |


|  |  |  |  |  |  | carbon, mastoid broken |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 69 | frontal fragment |  | adult, carbon and calcite |  |
| VIII | 11 | D | 70 | parietal fragment | undetermined | adult, calcite and carbon covered, fragments adhered to the interior, macroporosity on the interior, pin prick porosity on the exterior |  |
| VIII | 11 | D | 71 | radius fragment | left | shaft fragment, adult, carbon and calcite | 16.21 mm medial to lateral, 11.9 mm anterior to posterior |
| VIII | 11 | D | 72 | radius fragment | undetermined | shaft fragment, adult, calcite and carbon |  |
| VIII | 11 | D | 73 | humerus fragment | right | shaft fragment, adult, calcite and carbon, deltoid tuberosity is prominent |  |
| VIII | 11 | D | 74 | thoracic vertebra |  | upper thoracic, adult, calcite and carbon covered |  |
| VIII | 11 | D | 75 | radius fragment | possible left | radial tuberosity fragment, calcite and carbon covered |  |
| VIII | 11 | D | 76 | long bone fragment | undetermined | subadult, unfused epiphysis, calcite and |  |


|  |  |  |  |  |  | carbon, possibly the tibia |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 77 | long bone fragment | undetermined | possible clavicle fragment, shaft fragment, calcium and carbon covered |  |
| VIII | 11 | D | 78 | frontal and parietal fragments |  | superior portion of the frontal with the anterior portions of the parietal, calcite and carbon, adult, but the coronal suture is loose, indicating it has not completely fused, cranial modification is evident with the flattening of the forehead |  |
| VIII | 11 | D | 79 | parietal and cranial fragment | left | parietal fragment with either a frontal or occipital fragment, adult, cranial modification, calcite and carbon |  |
| VIII | 11 | D | 80 | scapula fragment | left | glenoid fragment, adult, calcite and carbon | 38.87 mm height, <br> 25.49 mm width |
| VIII | 11 | D | 81 | mandible fragment |  | anterior tip of an adult mandible |  |

most of the mandible minuses the rami,
teeth absent, lost post
mortem, adult, calcite

| VIII | 11 | D | 82 | mandible fragment |  | and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 83 | talus | left | adult, calcite and carbon | 56.03 mm length, 40.39 mm width |
| VIII | 11 | D | 84 | femur fragment | undetermined | epiphysis of the head | 36.18 mm head diameter |
| VIII | 11 | D | 85 | humerus fragment | right | proximal epiphysis, head, calcite and carbon, over 5 closer to 9 , younger than 86 |  |
| VIII | 11 | D | 86 | humerus fragment | right | proximal epiphysis, head, calcite and carbon, over 5 closer to 9 , older than 86 |  |
| VIII | 11 | D | 87 | first proximal pedal phalanx |  | adult, calcite and carbon |  |
| VIII | 11 | D | 88 | proximal manual phalanx fragment |  | adult, calcite and carbon |  |
| VIII | 11 | D | 89 | proximal pedal phalanx |  | adult, calcite and carbon |  |
| VIII | 11 | D | 90 | first proximal pedal phalanx |  | adult, calcite and carbon |  |
| VIII | 11 | D | 91 | second metacarpal | right | adult, calcite, carbon |  |
| VIII | 11 | D | 92 | fifth metacarpal fragment | left | proximal fragment, adult, calcite and carbon |  |


| VIII | 11 | D | 93 | fourth metacarpal | right | adult, calcite, carbon |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 94 | proximal manual phalanx |  | subadult, proximal epiphysis not fused, calcite and carbon |
| VIII | 11 | D | 95 | rib fragment | right | vertebral end, upper rib, calcite and carbon, adult |
| VIII | 11 | D | 96 | rib fragment | right | neck and shaft fragment, upper rib, carbon and calcite, possible subadult |
| VIII | 11 | D | 97 | rib fragment | left | vertebral end, calcite and carbon, lower rib, adult |
| VIII | 11 | D | 98 | rib fragment | left | vertebral end, calcite and carbon, lower rib, adult |
| VIII | 11 | D | 99 | radius fragment | right | shaft fragment, carbon and calcite |
| VIII | 11 | D | 100 | humerus fragment | left | distal shaft portion, possible subadult, calcite and carbon |
| VIII | 11 | D | 101 | clavicle fragment | left | shaft fragment, possible subadult, calcite and carbon |
| VIII | 11 | D | 102 | thoracic vertebra |  | subadult, pedicle line s still visible body not completely fused, middle thoracic, calcite and carbon |


| VIII | 11 | D | 103 | thoracic vertebra fragment | lamina only, mid thoracic, calcite and carbon, probable adult |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 104 | thoracic vertebra | subadult, pedicle line s still visible body not completely fused, upper thoracic, calcite and carbon |
| VIII | 11 | D | 105 | cervical vertebra | adult, mid cervical, calcite and carbon |
| VIII | 11 | D | 106 | thoracic vertebra | adult, some damage to the body, mid thoracic, covered in calcite and carbon |
| VIII | 11 | D | 107 | lumbar vertebra fragment | body, adult, calcite and carbon |
| VIII | 11 | D | 108 | lumbar vertebra fragment | damage to the right transverse process and the anterior portion of the body, adult, calcite and carbon, probable L2 |
| VIII | 11 | D | 109 | lumbar vertebra fragment | adult, body with part of the lamina, possible L1, calcite and carbon |
| VIII | 11 | D | 110 | lumbar vertebra fragment | adult, body with part of the lamina, possible L5, calcite |


|  |  |  |  |  |  | and carbon, lipping on the superior border of the body |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 111 | occipital fragment |  | adult, calcite and carbon |
| VIII | 11 | D | 112 | occipital fragment |  | adult, calcite and carbon |
| VIII | 11 | D | 113 | sacrum fragment |  | adult, distal posterior section, calcite and carbon |
| VIII | 11 | D | 114 | cuboid | right | adult, light calcite |
| VIII | 11 | D | 115 | cuboid | left | mate to 114 , adult, heavy calcite and carbon |
| VIII | 11 | D | 116 | scaphoid | left | adult, calcite and carbon |
| VIII | 11 | D | 117 | intermediate manual phalanx |  | adult, calcite and carbon |
| VIII | 11 | D | 118 | intermediate manual phalanx |  | adult, calcite and carbon |
| VIII | 11 | D | 119 | proximal manual phalanx |  | subadult, proximal head is not fused calcite and carbon |
| VIII | 11 | D | 120 | proximal manual phalanx |  | adult, calcite and carbon |
| VIII | 11 | D | 121 | fifth metacarpal |  | adult, calcite and carbon |
| VIII | 11 | D | 122 | metatarsal fragment |  | subadult, distal head is not fused yet, |


|  |  |  |  |  |  | calcite and carbon, second or third |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 123 | metatarsal fragment |  | subadult, distal head is not fused yet, calcite and carbon, probably the fourth |
| VIII | 11 | D | 124 | scaphoid | left |  |
| VIII | 11 | D | 125 | thoracic vertebra body fragment |  | adult, calcite and carbon, |
| VIII | 11 | D | 126 | cervical vertebra fragment |  | lamina and transverse foramen fragment, calcite and carbon, adult |
| VIII | 11 | D | 127 | cervical vertebra fragment |  | C2 fragment of the dens, adult, calcite and carbon, mid cervical |
| VIII | 11 | D | 128 | neural arch | right | sacral arch, probably 2-3 years of age, calcite |
| VIII | 11 | D | 129 | neural arch | left | sacral arch, probably 2-3 years of age, calcite |
| VIII | 11 | D | 130 | thoracic vertebra fragment |  | subadult, lamina that is not fused to the body yet, between 1-3 years of age, calcite |
| VIII | 11 | D | 131 | thoracic vertebra fragment |  | subadult, lamina that is not fused to the body yet, between 1-3 |

years of age, calcite

| VIII | 11 | D | 132 | thoracic vertebra fragment |  | subadult, lamina that is not fused to the body yet, between 1-3 years of age, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 133 | thoracic vertebra fragment |  | subadult, lamina that is not fused to the body yet, between 1-3 years of age, calcite |  |
| VIII | 11 | D | 134 | scapula fragment | left | subadult, glenoid fragment, epiphysis on the glenoid has not fused yet, calcite |  |
| VIII | 11 | D | 135 | scapula fragment | right | adult, glenoid fragment, calcite, damage to the inferior margin of the glenoid |  |
| VIII | 11 | D | 136 | manual phalanx fragment |  | probably and subadult proximal, distal fragment, calcite |  |
| VIII | 11 | D | 137 | proximal manual phalanx |  | subadult, proximal epiphysis not fused, calcite and carbon | 25.64 mm |
| VIII | 11 | D | 138 | intermediate manual phalanx |  | subadult, proximal epiphysis not fused, calcite and carbon | 20.36 mm |
| VIII | 11 | D | 139 | proximal pedal phalanx |  | adult, calcite | 22.77 mm |
| VIII | 11 | D | 140 | distal manual phalanx |  | adult, calcite | 20.86 mm |


| VIII | 11 | D | 141 | proximal pedal phalanx |  | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 142 | proximal pedal phalanx |  | adult, calcite |
| VIII | 11 | D | 143 | trapezoid | right | adult, calcite |
| VIII | 11 | D | 144 | capitate | left | adult, calcite |
| VIII | 11 | D | 145 | scaphoid | right | adult, calcite |
| VIII | 11 | D | 146 | metatarsal fragment |  | subadult, distal head <br> epiphysis |
| VIII | 11 | D | 147 | first proximal manual <br> phalanx |  | subadult, unfused <br> proximal epiphysis |
| VIII | 11 | D | 148 | first metacarpal <br> fragment | undetermined | distal fragment |


| mid rib, calcite |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 157 | rib fragment | right | subadult, vertebral end, lower rib, calcite |
| VIII | 11 | D | 158 | rib fragment | right | subadult, vertebral end, lower rib, calcite |
| VIII | 11 | D | 159 | rib fragment | right | subadult, vertebral end, upper rib, calcite |
| VIII | 11 | D | 160 | rib fragment | undetermined | subadult, shaft end, mid rib, calcite |
| VIII | 11 | D | 161 | cranial fragments |  | subadult, probable occipital bone |
| VIII | 11 | D | 162 | neural arch | right | subadult, cervical, 2 years and under, calcite |
| VIII | 11 | D | 163 | neural arch | right | subadult, cervical, 2 years and under, calcite |
| VIII | 11 | D | 164 | neural arch | left | subadult, cervical, 2 years and under, calcite |
| VIII | 11 | D | 165 | neural arch | left | subadult, cervical, 2 years and under, calcite |
| VIII | 11 | D | 166 | fibula fragment | right | distal fragment, adult, calcite |
| VIII | 11 | D | 167 | radius fragment | right | shaft fragment, adult, calcite |
| VIII | 11 | D | 168 | scapula fragment | right | acromion fragment, adult, calcite |
| VIII | 11 | D | 169 | scapula fragment | possible right | base of the spine |

$\left.\begin{array}{cccccc} & & & & \begin{array}{c}\text { fragment, adult, } \\ \text { calcite }\end{array} \\ \hline \text { VIII } & 11 & \text { D } & 170 & \text { scapula fragment } & \text { left }\end{array} \begin{array}{c}\text { coracoid fragment, } \\ \text { adult, calcite }\end{array}\right]$

| VIII | 11 | D | 182 | humerus fragment | left | subadult, proximal head epiphysis, calcite, probably around 5-9 years of age based on size |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 183 | first cuneiform | right | adult, calcite |
| VIII | 11 | D | 184 | thoracic vertebra fragment |  | transverse process fragment, adult, calcite |
| VIII | 11 | D | 185 | vertebra fragment |  | probably the lamina of the 3 lumbar, unfused to a body, subadult, calcite |
| VIII | 11 | D | 186 | vertebra fragment |  | lamina fragment, probably of the thoracic region, subadult |
| VIII | 11 | D | 187 | thoracic vertebra body fragment |  | right lateral portion of the body, adult, calcite |
| VIII | 11 | D | 188 | sacrum fragment |  | subadult, young, first sacral vertebra with part of the ala, calcite |
| VIII | 11 | D | 189 | sacrum fragment |  | subadult, sacral body, older child based on the size of the unfused body, calcite |
| VIII | 11 | D | 190 | patella fragment | left | subadult, calcite, superior fragment |


| VIII | 11 | D | 191 | patella | right | subadult, mate to 190 , calcite | 36.18 mm height, <br> 31.27 mm width |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 192 | navicular | left | badly deteriorated, adult, calcite |  |
| VIII | 11 | D | 193 | vertebra fragment |  | subadult, body, unfused, probably thoracic, 2-4 years old, calcite |  |
| VIII | 11 | D | 194 | vertebra fragment |  | subadult, body, unfused, probably thoracic, 2-4 years old, calcite |  |
| VIII | 11 | D | 195 | vertebra fragment |  | subadult, body, unfused, cervical, probably C1, 2-4 years old, calcite |  |
| VIII | 11 | D | 196 | manubrium |  | subadult, unfused |  |
| VIII | 11 | D | 197 | ulna fragment | left | proximal fragment, calcite and carbon |  |
| VIII | 11 | D | 198 | rib fragment | left | shaft fragment, middle rib |  |
| VIII | 11 | D | 199 | femur fragment | right | neck fragment with the lesser trochanter, adult, calcite and carbon |  |
| VIII | 11 | D | 200 | tibia fragment | right | subadult, proximal epiphysis, older child, probably around 9 years or older, calcite |  |


| VIII | 11 | D | 201 | first metatarsal fragment | right | adult, proximal fragment, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 202 | radius fragment | right | subadult, distal fragment, unfused epiphysis, probably around 5 years of age, calcite |
| VIII | 11 | D | 203 | humerus fragment | right | subadult, proximal end, unfused epiphysis, probably around 5 years of age, calcite |
| VIII | 11 | D | 204 | femur fragment | right | perinate, calcite, proximal fragment |
| VIII | 11 | D | 205 | scapula fragment | undetermined | subadult, unfused glenoid fragment, calcite |
| VIII | 11 | D | 206 | radius fragment | right | subadult, proximal fragment, calcite, probably close to 9 in age |
| VIII | 11 | D | 207 | rib fragment | undetermined | subadult, shaft end, upper rib, calcite |
| VIII | 11 | D | 208 | radius fragment | undetermined | subadult, unfused proximal epiphysis |
| VIII | 11 | D | 209 | unidentified fragment |  |  |


| VIII | 11 | D | 210 | mandible fragment | right portion | adult, calcite, calculus on buccal surface of second right incisor and anterior portion of first right molar at the CEJ, other teeth between these are present | Molar - 12.24mm anterior to posterior, <br> 11.34 mm lingual <br> to buccal 8.34 ch ; I2 6.42 mm anterior to posterior, <br> 6.45 mm lingual to buccal 10.34 ch ; C <br> 8.18 mm anterior to posterior, 7.69 mm lingual to buccal 12.03 ch (enamel defect at 2.25); PM1 <br> 7.37 mm anterior to posterior, 7.74 mm lingual to buccal 9.62ch; PM2 7.41 mm anterior to posterior, 7.91 mm lingual to buccal 9.1ch |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 211 | molar | left | first, lower, root broken | 12.25 mm anterior to posterior, 11.13 mm lingual to buccal 6.79 ch |


| VIII | 11 | D | 212 | molar | left | first, lower, root broken | 11.58 mm anterior to posterior, 11.2 mm lingual to buccal 6.86ch |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 213 | molar | right | first, lower, root broken | 12.35 mm anterior to posterior, 11.18 mm lingual to buccal 7.19ch |
| VIII | 11 | D | 214 | molar | right | first, upper, root intact | 12.07 mm anterior to posterior, 11.77 mm lingual to buccal 7.25 ch |
| VIII | 11 | D | 215 | molar | right | possible second, upper, root intact, | 12.51 mm anterior to posterior, 11.04 mm lingual to buccal 4.53 ch |
| VIII | 11 | D | 216 | molar | right | second, upper, root intact, calcite on buccal surface prevents measurements | 11.09 mm anterior to posterior, |
| VIII | 11 | D | 217 | molar | left | possible third with a fourth cusp, root intact | 11.29 mm anterior <br> to posterior, 11.64 mm lingual to buccal 4.58ch |
| VIII | 11 | D | 218 | molar | right | possibly second upper, tips of root broken |  |
| VIII | 11 | D | 219 | molar | right | first lower, root broken off |  |


| VIII | 11 | D | 220 | molar | left | possibly second upper, calcite covered |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 221 | incisor | undetermined | lower, calculus on anterior and lingual surfaces, calculus prevents accurate measurement |  |
| VIII | 11 | D | 222 | incisor | undetermined | lower, calculus on anterior and lingual surfaces, calculus prevents accurate measurement |  |
| VIII | 11 | D | 223 | canine | undetermined | upper, modified, possible Ik, but slightly more spade shaped, calcite prevents measurement |  |
| VIII | 11 | D | 224 | molar | left | third upper, calcite on posterior surface, tip of roots broken | 11.28 mm lingual to buccal 8.53 mm anterior to posterior, 5.89 ch |
| VIII | 11 | D | 225 | canine | undetermined | possibly an upper, huge caries on occlusal surface, covered in calcite |  |
| VIII | 11 | D | 226 | premolar | right | upper first, some calcite, slightly worn, calculus on lingual surface at CEJ | 7.18 mm anterior to posterior, 8.67 mm lingual to buccal 8.07ch |


| VIII | 11 | D | 227 | premolar | left | lower first, some calcite, slight damage to the root | 8.04 mm anterior to posterior, 10.43 mm lingual to buccal 8.07 ch |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | D | 228 | incisor | right | upper, possibly lateral, modified with an Ik design, calculus on the anterior surface just above the CEJ |  |
| VIII | 11 | E | 1 | second metatarsal | left | adult, calcite, very long | 81.43 mm |
| VIII | 11 | E | 2 | second metatarsal fragment | left | adult, calcite |  |
| VIII | 11 | E | 3 | fifth metatarsal | left | subadult, head is not fused, calcite |  |
| VIII | 11 | E | 4 | fourth metatarsal | left | subadult, head is not fused, calcite |  |
| VIII | 11 | E | 5 | fibula fragment | probable right | adult, proximal fragment, calcite |  |
| VIII | 11 | E | 6 | ulna fragment | left | proximal fragment, subadult, calcite, around 5 years of age based on the size |  |
| VIII | 11 | E | 7 | rib fragment | undetermined | adult, shaft fragment, covered with calcite and carbon, upper rib |  |
| VIII | 11 | E | 8 | rib fragment | undetermined | adult, shaft fragment, covered with calcite and carbon |  |


| VIII | 11 | E | 9 | rib fragment | right | adult, vertebra end, mid rib, calcite and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | E | 10 | rib fragment | right | adult, vertebra end, mid rib, calcite and carbon |  |
| VIII | 11 | E | 11 | vertebra fragment |  | thoracic lamina fragment, adult, calcite, mid thoracic |  |
| VIII | 11 | E | 12 | vertebra fragment |  | thoracic lamina fragment, adult, calcite, upper thoracic |  |
| VIII | 11 | E | 13 | vertebra fragment |  | thoracic lamina fragment, adult, calcite, mid thoracic |  |
| VIII | 11 | E | 14 | fifth metatarsal fragment | left | head is broken off, adult, calcite |  |
| VIII | 11 | E | 15 | second metatarsal fragment | left | head is broken off, adult, calcite |  |
| VIII | 11 | E | 16 | third metatarsal fragment | right | distal fragment, adult, calcite |  |
| VIII | 11 | E | 17 | first distal pedal phalanx |  | adult, calcite and carbon | 23.09 mm |
| VIII | 11 | E | 18 | proximal manual phalanx fragment |  | proximal fragment, adult, calcite and carbon |  |
| VIII | 11 | E | 19 | first proximal pedal phalanx |  | adult, calcite and carbon | 27.97 mm |


| VIII | 11 | E | 20 | fifth metatarsal fragment | left | proximal fragment, adult, calcite and carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 11 | E | 21 | vertebra fragment |  | subadult, probably lumbar vertebra, calcite |  |
| VIII | 11 | E | 22 | cervical vertebra fragment |  | body fragment, upper cervical, adult, calcite |  |
| VIII | 11 | E | 23 | cervical vertebra fragment |  | part of the body and a transverse process, upper cervical, adult, calcite |  |
| VIII | 11 | E | 24 | premolar | right | upper second premolar | 10.76 lingual to buccal, 9.57 mesial to distal, 7.03 crown height |
| VIII | 13 |  | 1 | femur fragment | right | distal fragment with part of the shaft |  |
| VIII | 13 |  | 2 | patella | right |  | 40.53 width |
| VIII | 13 |  | 3 | patella | left | mate to 4 | 39.41 height, 39.97 width |
| VIII | 13 |  | 4 | patella | right | mate to 3 | 37.87 height, 38.11 width |
| VIII | 13 |  | 5 | iliac fragment | undetermined | crest fragment, epiphyseal line is still visible |  |
| VIII | 13 |  | 6 | cranial fragment | undetermined |  |  |
| VIII | 13 |  | 7 | shaft fragment | undetermined |  |  |
| VIII | 13 |  | 8 | hamate | right |  |  |


| VIII | 13 | 9 | vertebra fragment |  | transverse process of a thoracic vertebra |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 10 | vertebra fragment |  | transverse process of a thoracic vertebra |
| VIII | 13 | 11 | sternum |  | superior portion with facets for articulation with manubrium, young child? |
| VIII | 13 | 12 | rib fragment | undetermined | shaft fragment, calcite |
| VIII | 13 | 13 | rib fragment | left | shaft fragment, calcite |
| VIII | 13 | 14 | second metacarpal fragment | left | calcite |
| VIII | 13 | 15 | third metatarsal fragment | right | calcite |
| VIII | 13 | 16 | metatarsal fragment | undetermined | calcite |
| VIII | 13 | 17 | cervical vertebra fragment |  | body fragment |
| VIII | 13 | 18 | cervical vertebra fragment |  | body fragment |
| VIII | 13 | 19 | femur fragment | undetermined | distal fragment, one of the condyles |
| VIII | 13 | 20 | femur fragment | undetermined | distal fragment, one of the condyles |
| VIII | 13 | 21 | vertebra fragment |  | probably sacral body fragment |
| VIII | 13 | 22 | femur fragment | undetermined | distal fragment where the patella articulates |
| VIII | 13 | 23 | femur fragment | undetermined | shaft fragment, calcite |


| VIII | 13 | 24 | mandible fragment |  | anterior portion, post mortem tooth loss, premolar still in crypt, calcite | 7.51 anterior to posterior, 8.15 lingual to labial, 9.28 height |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 25 | probable mandible fragment |  | loads of calcite, probable second molar still in crypt | 10.51 ant to post, 10.12 ling to lab, 6.63 |
| VIII | 13 | 26 | 4 unidentified fragments |  |  |  |
| VIII | 13 | 27 | humerus fragment | left | adult, calcite, proximal fragment, large muscle attachments | 18.85 ant to post, 20.82 lat to med, 6.33 cm circumference |
| VIII | 13 | 28 | thoracic vertebra |  | adult, calcite, T10 |  |
| VIII | 13 | 29 | vertebra fragment |  | adult, calcite, lumbar body fragment, slight lipping on the lateral margin |  |
| VIII | 13 | 30 | thoracic vertebra |  | adult, calcite, damage to laminae and transverse processes, mid thoracic |  |
| VIII | 13 | 31 | proximal manual $\qquad$ |  | adult, calcite | 49.76 mm |
| VIII | 13 | 32 | proximal manual phalanx |  | adult, calcite, slightly raised lateral margins | 45.48 mm |
| VIII | 13 | 33 | proximal manual phalanx |  | adult, calcite, slightly raised lateral margins | 40.48 mm |

first proximal manual

| VIII | 13 | 34 | phalanx |  | adult, calcite | 29.66 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 35 | proximal pedal phalanx |  | adult, calcite | 26.5 mm |
| VIII | 13 | 36 | proximal pedal phalanx |  | adult, calcite | 33.02 mm |
| VIII | 13 | 37 | proximal pedal phalanx |  | adult, calcite | 29.97 mm |
| VIII | 13 | 38 | first proximal pedal $\qquad$ phalanx |  | adult, calcite | 31.4 mm |
| VIII | 13 | 39 | first metatarsal | right | adult, calcite | 64.4 mm |
| VIII | 13 | 40 | first metatarsal | right | adult, calcite | 60.87 mm |
| VIII | 13 | 41 | first metatarsal | right | adult, calcite | 58.15 mm |
| VIII | 13 | 42 | first metatarsal | left | adult, calcite | 57.71 mm |
| VIII | 13 | 43 | fibula fragment | right | adult, calcite, distal fragment |  |
| VIII | 13 | 44 | calcaneus fragment | left | adult, calcite, damage to the lateral portion | 80.51 length, 38.94 width |
| VIII | 13 | 45 | calcaneus fragment | left | adult, calcite |  |
| VIII | 13 | 46 | tibia fragment | possible right | adult, calcite, distal fragment |  |
| VIII | 13 | 47 | proximal manual phalanx |  | adult, calcite | 36.67 mm |
| VIII | 13 | 48 | proximal manual phalanx |  | adult, calcite | 31.56 mm |
| VIII | 13 | 49 | first proximal manual phalanx |  | adult, calcite | 26.92 mm |


| VIII | 13 | 50 | proximal manual phalanx fragment |  | adult, calcite, distal portion |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 51 | proximal pedal phalanx |  | adult, calcite | 25.48 mm |
| VIII | 13 | 52 | proximal pedal phalanx |  | adult, calcite | 23.79 mm |
| VIII | 13 | 53 | intermediate manual phalanx |  | adult, calcite | 30.13 mm |
| VIII | 13 | 54 | intermediate manual $\qquad$ |  | adult, calcite | 26.85 mm |
| VIII | 13 | 55 | patella | left | adult, calcite | 35.03 mm height, 38.62 mm width |
| VIII | 13 | 56 | patella | right | adult, calcite, some damage to the distal and lateral ends, possibly the mate to 55 |  |
| VIII | 13 | 57 | ulna fragment | left | adult, calcite, proximal end |  |
| VIII | 13 | 58 | femur fragment | right | subadult, proximal end with a large amount to the shaft, possibly a little under 5 years old |  |
| VIII | 13 | 59 | second metacarpal fragment | left | adult, calcite, proximal end |  |
| VIII | 13 | 60 | third metacarpal | right | adult, calcite, well defined muscle attachments | 62.64 mm |


| VIII | 13 | 61 | third metacarpal | left | adult, calcite, well defined muscle attachments | 68.63 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 62 | fifth metacarpal | right | adult, calcite | 53.88 mm |
| VIII | 13 | 63 | proximal manual phalanx |  | adult, calcite, slightly raised lateral margins, proximal end is not fully fused, line visible | 43.21 mm |
| VIII | 13 | 64 | proximal manual phalanx |  | adult, calcite, slightly raised lateral margins | 43.11 mm |
| VIII | 13 | 65 | proximal manual phalanx |  | adult, calcite, slightly raised lateral margins | 44.83 mm |
| VIII | 13 | 66 | proximal pedal phalanx |  | adult, calcite | 26.44 mm |
| VIII | 13 | 67 | fifth metacarpal | left | adult, calcite, well defined muscle attachments | 50.75 mm |
| VIII | 13 | 68 | first metacarpal | left | adult, calcite | 46.68 mm |
| VIII | 13 | 69 | first metacarpal | right | adult, calcite | 45.76 mm |
| VIII | 13 | 70 | third metacarpal fragment | right | adult, calcite, head is broken off |  |
| VIII | 13 | 71 | talus | right | adult, calcite | 47.16 mm length, 40.09 mm width |
| VIII | 13 | 72 | talus | right | adult, calcite | 49.58 mm length, <br> 38.74 mm width |
| VIII | 13 | 73 | talus | left | adult, calcite, not the mate to 71 or 72 | 55.08 mm length, 44.59 mm width |
| VIII | 13 | 74 | navicular | left | adult, calcite |  |


| VIII | 13 | 75 | navicular | left | adult, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 76 | first cuneiform | left | adult, calcite |  |
| VIII | 13 | 77 | first metatarsal | right | adult, calcite | 56.51 mm |
| VIII | 13 | 78 | third metatarsal | left | adult, calcite | 68.46 mm |
| VIII | 13 | 79 | first metacarpal | left | adult, calcite | 44.26 mm |
| VIII | 13 | 80 | first metacarpal | right | adult, calcite | 41.47 mm |
| VIII | 13 | 81 | thoracic vertebra fragment |  | adult, body fragment with right superior articular facet, mid thoracic |  |
| VIII | 13 | 82 | thoracic vertebra fragment |  | body fragment, adult, right lamina portion present, possibly T10 |  |
| VIII | 13 | 83 | thoracic vertebra fragment |  | body fragment, adult, calcite, possibly T10 |  |
| VIII | 13 | 84 | thoracic vertebra fragment |  | adult, calcite, upper thoracic, lamina fragment |  |
| VIII | 13 | 85 | vertebra fragment |  | adult, probable upper lumbar lamina fragment, calcite |  |
| VIII | 13 | 86 | lumbar vertebra fragment |  | subadult, unfused lamina of a lower lumbar vertebra, probably L4 or L5 |  |
| VIII | 13 | 87 | calcaneus | left | adult, calcite, decent condition, damage to distal end | 37.46 mm width |


| VIII | 13 | 88 | patella | right | adult, calcite | 39.5 mm height, <br> 35.08 mm width |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 89 | lumbar vertebra fragment |  | adult, body fragment, calcite, lipping and macroscopic porosity on the body |  |
| VIII | 13 | 90 | lumbar vertebra fragment |  | adult, body fragment, calcite, lipping and macroscopic porosity on the body |  |
| VIII | 13 | 91 | rib fragment | right | adult, vertebral end, upper rib, calcite |  |
| VIII | 13 | 92 | rib fragment | undetermined | adult, shaft fragment, calcite |  |
| VIII | 13 | 93 | rib fragment | undetermined | adult, shaft fragment, calcite |  |
| VIII | 13 | 94 | rib fragment | right | adult, shaft fragment, calcite |  |
| VIII | 13 | 95 | rib fragment | right | adult, shaft fragment, calcite |  |
| VIII | 13 | 96 | rib fragment | right | adult, shaft fragment, calcite |  |
| VIII | 13 | 97 | rib fragment | right | adult, shaft fragment, calcite |  |
| VIII | 13 | 98 | rib fragment | right | adult, shaft fragment, calcite |  |
| VIII | 13 | 99 | first proximal pedal phalanx |  | adult, calcite | 22.33 mm |
| VIII | 13 | 100 | proximal manual phalanx fragment |  | adult, calcite, proximal end |  |

fragment
$\left.\begin{array}{cccccc}\hline \text { VIII } & 13 & 101 & \text { metatarsal fragment } & & \begin{array}{c}\text { adult, calcite, distal } \\ \text { end, head only }\end{array} \\ \hline \text { VIII } & 13 & 102 & \begin{array}{c}\text { proximal manual } \\ \text { phalanx fragment }\end{array} & \begin{array}{c}\text { adult, calcite, distal } \\ \text { end }\end{array} \\ \hline \text { VIII } & 13 & 103 & \begin{array}{c}\text { second metatarsal } \\ \text { fragment }\end{array} & \text { left } & \begin{array}{c}\text { proximal fragment, } \\ \text { adult, calcite }\end{array} \\ \hline \text { VIII } & 13 & 104 & \text { fourth metacarpal } & \text { right } & \text { adult, calcite } \\ \hline \text { VIII } & 13 & 105 & \text { metacarpal fragment } & & \begin{array}{c}\text { distal fragment, adult, } \\ \text { calcite }\end{array} \\ \hline \text { VIII } & 13 & 106 & \begin{array}{c}\text { fourth metatarsal } \\ \text { fragment }\end{array} & \text { left } & \text { proximal fragment, } \\ \text { adult, calcite }\end{array}\right]$

| VIII | 13 | 115 | talus fragment | right | adult, calcite, damage to the superior portion |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 116 | clavicle fragment | right | adult, calcite, lateral portion with conoid process |
| VIII | 13 | 117 | humerus fragment | left | subadult, calcite, distal portion, roughly 1 year old |
| VIII | 13 | 118 | sternum fragment |  | possible subadult, about $1 / 3$ the body, possibly the superior portion? |
| VIII | 13 | 119 | femur fragment | probable left | adult, shaft fragment, calcite, portion below the trochanteric crest |
| VIII | 13 | 120 | thoracic vertebra fragment |  | adult, mid thoracic, lamina fragment, calcite |
| VIII | 13 | 121 | cervical vertebra fragment |  | adult, right lamina fragment, calcite |
| VIII | 13 | 122 | lumbar vertebra fragment |  | adult, upper lumbar lamina fragment, calcite |
| VIII | 13 | 123 | thoracic vertebra fragment |  | subadult, body fragment, body still has undulations, pedicle line still visible, possibly T 10 or 11 |


| VIII | 13 | 124 | femur fragment | undetermined | adult, distal condyle fragment, one condyle only |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 125 | femur fragment | undetermined | adult, distal condyle fragment, one condyle only |
| VIII | 13 | 126 | clavicle fragment | right | adult, lateral fragment with conoid tubercle, calcite |
| VIII | 13 | 127 | patella | right | adult, calcite and carbon, damaged distal and medial ends |
| VIII | 13 | 128 | ulna fragment | possible right | adult, calcite, olecranon fragment |
| VIII | 13 | 129 | thoracic vertebra fragment |  | adult, calcite, left transverse process, spinous process and superior and inferior articular facets along with a small part of the body, upper thoracic |
| VIII | 13 | 130 | cervical vertebra |  | adult, calcite, C2, broken dens |
| VIII | 13 | 131 | thoracic vertebra fragment |  | adult, calcite, left transverse process fragment |
| VIII | 13 | 132 | ulna fragment | left | distal fragment, adult, calcite, large pronator ridge |


| VIII | 13 | 133 | radius fragment | possible left | adult, calcite, head and tuberosity fragment | 24.94 mm head diameter |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 134 | radius fragment | possible right | tuberosity fragment only, adult, calcite |  |
| VIII | 13 | 135 | cranial fragment | undetermined | adult, calcite |  |
| VIII | 13 | 136 | cranial fragment | undetermined | adult, calcite |  |
| VIII | 13 | 137 | occipital fragment |  | adult, calcite |  |
| VIII | 13 | 138 | intermediate manual phalanx fragment |  | adult, proximal end, calcite |  |
| VIII | 13 | 139 | intermediate manual phalanx fragment |  | adult, calcite | 19.23 mm |
| VIII | 13 | 140 | distal manual phalanx |  | adult, calcite | 20.28 mm |
| VIII | 13 | 141 | scaphoid | right | adult, calcite |  |
| VIII | 13 | 142 | rib fragment | right | adult, first rib, vertebral end, calcite |  |
| VIII | 13 | 143 | rib fragment |  | subadult, shaft fragment, mid rib, calcite |  |
| VIII | 13 | 144 | rib fragment |  | subadult, shaft fragment, mid rib, calcite |  |
| VIII | 13 | 145 | rib fragment |  | subadult, shaft fragment, mid rib, calcite |  |
| VIII | 13 | 146 | radius fragment | right | adult, distal end, calcite, large muscle attachments |  |
| VIII | 13 | 147 | navicular | right | adult, calcite |  |


| VIII | 13 | 148 | radius fragment | undetermined | adult, head only | 21.18 mm head diameter |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 149 | radius fragment | left | proximal fragment, adult, calcite, head and tuberosity fragment | 20.12 mm head diameter |
| VIII | 13 | 150 | cuboid | right | adult, calcite |  |
| VIII | 13 | 151 | lunate | left | adult, calcite |  |
| VIII | 13 | 152 | capitate | right | adult, calcite |  |
| VIII | 13 | 153 | rib fragment |  | subadult, calcite, shaft fragment, upper rib |  |
| VIII | 13 | 154 | rib fragment |  | subadult, calcite, shaft fragment, upper rib |  |
| VIII | 13 | 155 | rib fragment |  | adult, calcite, shaft fragment, mid rib |  |
| VIII | 13 | 156 | rib fragment |  | adult, calcite, shaft fragment, upper rib |  |
| VIII | 13 | 157 | vertebra fragment |  | body fragment, adult, calcite |  |
| VIII | 13 | 158 | vertebra fragment |  | body fragment, adult, calcite |  |
| VIII | 13 | 159 | lumbar vertebra fragment |  | body fragment, adult, calcite |  |
| VIII | 13 | 160 | fourth metacarpal fragment | right | proximal fragment, adult, calcite, possible healed fracture indicated by the deformity |  |


| VIII | 13 | 161 | second cuneiform | left | adult, calcite, broken |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 162 | fourth metatarsal fragment | right | adult, calcite, head broken off |
| VIII | 13 | 163 | fifth metacarpal fragment | right | adult, calcite, head broken off |
| VIII | 13 | 164 | humerus fragment | undetermined | distal portion of the adult humerus capitulum and part of the trochlea, calcite |
| VIII | 13 | 165 | humerus fragment | right | distal portion of the adult humerus, trochlea, and medial epicondyle, calcite |
| VIII | 13 | 166 | cervical vertebra fragment |  | body fragment, adult, upper cervical, calcite |
| VIII | 13 | 167 | femur fragment | undetermined | adult, shaft fragment, calcite |
| VIII | 13 | 168 | femur fragment | undetermined | adult, shaft fragment, calcite |
| VIII | 13 | 169 | cervical vertebra fragment |  | adult, C 1 fragment of the bony rim |
| VIII | 13 | 170 | rib fragment | right | subadult, neck fragment, upper rib |
| VIII | 13 | 171 | vertebra fragment |  | spinous process of a thoracic or cervical, adult, calcite |
| VIII | 13 | 172 | femur fragment | undetermined | adult, calcite, shaft fragment |

$\left.\begin{array}{lccccc} & \text { VIII } & 13 & 173 & \text { femur fragment } & \text { possible left }\end{array} \begin{array}{c}\text { adult, calcite, shaft } \\ \text { fragment that appears } \\ \text { to begin right at the } \\ \text { distal margin of the } \\ \text { lesser trochanter }\end{array}\right]$

| VIII | 13 | 186 | clavicle fragment | left | lateral portion, adult calcite |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 187 | cranial fragment |  | subadult, calcite |
| VIII | 13 | 188 | cranial fragment |  | subadult, calcite |
| VIII | 13 | 189 | cranial fragment |  | subadult, calcite |
| VIII | 13 | 190 | scapula fragment | right | acromion fragment, calcite |
| VIII | 13 | 191 | rib fragment | undetermined | adult, calcite, shaft fragment, mid rib |
| VIII | 13 | 192 | rib fragment | undetermined | adult, calcite, shaft fragment, mid rib |
| VIII | 13 | 193 | rib fragment | undetermined | subadult, calcite, shaft fragment, upper rib |
| VIII | 13 | 194 | humerus fragment | left | subadult $\sim 1.5$ years of age, proximal fragment, head is not fused, calcite |
| VIII | 13 | 195 | cranial fragment | undetermined | adult, calcite |
| VIII | 13 | 196 | cranial fragment | undetermined | adult, calcite |
| VIII | 13 | 197 | ulna fragment | probable right | adult, proximal shaft fragment |
| VIII | 13 | 198 | vertebra fragment |  | adult, probably thoracic |
| VIII | 13 | 199 | vertebra fragment |  | lamina and transverse fragment with articular facets, adult, calcite, possibly lumbar |


|  | VIII | vertebra fragment |  | lumbar superior <br> articular facet <br> fragment, adult, <br> calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 200 | rib fragment |  | adult, calcite, shaft <br> fragment |
| VIII | 13 | 201 |  | subadult, calcite, <br> unfused lamina, upper <br> thoracic |  |
| VIII | 13 | 202 | thoracic vertebra | cranial fragment | undetermined |
| VIII | 13 | 203 | adult, calcite |  |  |


|  |  |  |  |  | fragment, adult, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 214 | vertebra fragment |  | adult, body fragment of a thoracic probably, calcite |  |
| VIII | 13 | 215 | vertebra fragment |  | adult, body fragment of a thoracic probably, calcite |  |
| VIII | 13 | 216 | os coxa fragment | left | possible subadult based on the size, narrow sciatic notch, possible mate |  |
| VIII | 13 | 217 | rib fragment |  | adult, shaft fragment, calcite |  |
| VIII | 13 | 218 | rib fragment |  | adult, shaft fragment, calcite |  |
| VIII | 13 | 219 | ulna fragment | undetermined | distal fragment of the olecranon, |  |
| VIII | 13 | 220 | humerus fragment | undetermined | adult, distal portion |  |
| VIII | 13 | 221 | cranial fragment | undetermined | adult, calcite |  |
| VIII | 13 | 222 | vertebra fragment |  | adult, calcite, probably lumbar, inferior articular facet and part of the lamina |  |
| VIII | 13 | 223 | tibia fragment | undetermined | proximal anterior portion with the tibial tuberosity, adult, calcite |  |
| VIII | 13 | 224 | talus | left | adult, calcite | 51.36 mm length |


| VIII | 13 | 225 | talus | left | adult, calcite | 46.77 mm length, 39.46 mm width |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 226 | talus | left | adult, calcite | 59.47 mm length, 46.37 mm width |
| VIII | 13 | 227 | navicular | left | adult, calcite |  |
| VIII | 13 | 228 | navicular | left | adult, calcite |  |
| VIII | 13 | 229 | navicular | left | adult, calcite |  |
| VIII | 13 | 230 | proximal pedal phalanx |  | adult, calcite | 25.57 mm |
| VIII | 13 | 231 | proximal pedal phalanx |  | adult, calcite | 22.03 mm |
| VIII | 13 | 232 | proximal pedal phalanx |  | adult, calcite | 29.44 mm |
| VIII | 13 | 233 | proximal pedal phalanx |  | adult, calcite | 26.25 mm |
| VIII | 13 | 234 | proximal pedal phalanx |  | adult, calcite | 21 mm |
| VIII | 13 | 235 | proximal pedal phalanx |  | adult, calcite | 28.18 mm |
| VIII | 13 | 236 | proximal pedal phalanx fragment |  | adult, calcite |  |
| VIII | 13 | 237 | proximal pedal phalanx |  | adult, calcite | 31.88 mm |
| VIII | 13 | 238 | first proximal pedal phalanx |  | adult, calcite | 36.81 mm |
| VIII | 13 | 239 | first proximal pedal phalanx |  | adult, calcite | 30.52 mm |


| VIII | 13 | 240 | first proximal pedal phalanx | adult, calcite | 26.83 mm |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 241 | first proximal pedal phalanx | adult, calcite, proximal superior margin has lipping | 23.22 mm |
| VIII | 13 | 242 | intermediate manual phalanx | adult, calcite | 21.97 mm |
| VIII | 13 | 243 | intermediate manual $\qquad$ | adult, calcite | 27.64 mm |
| VIII | 13 | 244 | intermediate manual phalanx | adult, calcite | 26.38 mm |
| VIII | 13 | 245 | intermediate manual phalanx | subadult, calcite, proximal epiphysis is not fully fused | 20.64 mm |
| VIII | 13 | 246 | proximal manual phalanx fragment | adult, proximal fragment, calcite |  |
| VIII | 13 | 247 | proximal manual phalanx fragment | adult, distal fragment, calcite |  |
| VIII | 13 | 248 | proximal pedal phalanx | adult, calcite | 29.68 mm |
| VIII | 13 | 249 | intermediate manual phalanx | adult, calcite | 21.92 mm |
| VIII | 13 | 250 | distal manual phalanx | adult, calcite | 18.05 mm |
| VIII | 13 | 251 | distal manual phalanx | adult, calcite | 20.87 mm |
| VIII | 13 | 252 | proximal manual phalanx | subadult, calcite | 18.72 mm |
| VIII | 13 | 253 | distal manual phalanx | adult, calcite | 17.16 mm |
| VIII | 13 | 254 | distal manual phalanx | adult, calcite | 16.6 mm |


| VIII | 13 | 255 | talus | left | adult, calcite | 49.12 mm length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 256 | talus | right | adult, calcite | 50.23 mm length |
| VIII | 13 | 257 | calcaneus | left | adult, calcite | $\begin{gathered} 67.06 \mathrm{~mm}, 35.03 \\ \mathrm{~mm} \text { width } \\ \hline \end{gathered}$ |
| VIII | 13 | 258 | navicular | left | adult, calcite |  |
| VIII | 13 | 259 | patella | left | adult, calcite | 38.76 mm height, 36.23 mm width |
| VIII | 13 | 260 | humerus | left | subadult, calcite, close to 5 years of age, bone complete other than the unfused epiphyses | 13.2 cm length |
| VIII | 13 | 261 | cranial fragment |  | adult, calcite |  |
| VIII | 13 | 262 | parietal fragment | undetermined | adult, calcite |  |
| VIII | 13 | 263 | parietal fragment | undetermined | adult, calcite |  |
| VIII | 13 | 264 | humerus fragment | right | distal portion, adult, no trochlea or capitulum, fossa is triangular, calcite |  |
| VIII | 13 | 265 | ulna fragment | left | proximal fragment only, adult, calcite |  |
| VIII | 13 | 266 | ulna fragment | right | proximal fragment, possible mate to 265 , adult, calcite |  |
| VIII | 13 | 267 | navicular fragment | left | adult, calcite, damaged |  |
| VIII | 13 | 268 | patella | left | adult, calcite, rather wide | $\begin{gathered} 38.94 \mathrm{~mm}, 45.44 \\ \mathrm{~mm} \text { width } \\ \hline \end{gathered}$ |


| VIII | 13 | 269 | femur fragment | right | condyles, damage to the anterior portion |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 270 | proximal manual phalanx |  | lateral margins defined, adult, calcite | 44.11 mm |
| VIII | 13 | 271 | proximal manual phalanx |  | adult calcite | 38.46 mm |
| VIII | 13 | 272 | proximal manual phalanx |  | lateral margins defined, adult, calcite | 36.41 mm |
| VIII | 13 | 273 | proximal manual phalanx |  | adult calcite | 32.61 mm |
| VIII | 13 | 274 | proximal manual phalanx |  | adult calcite | 30.72 mm |
| VIII | 13 | 275 | proximal pedal phalanx |  | adult calcite | 27.65 mm |
| VIII | 13 | 276 | proximal pedal phalanx |  | adult calcite | 27.47 mm |
| VIII | 13 | 277 | proximal pedal phalanx |  | subadult, proximal epiphysis is fused but line is visible | 26.35 mm |
| VIII | 13 | 278 | second metacarpal | right | adult calcite | 70.37 mm |
| VIII | 13 | 279 | fourth metatarsal | left | adult calcite | 66.25 mm |
| VIII | 13 | 280 | second metatarsal | left | adult calcite | 71.83 mm |
| VIII | 13 | 281 | fourth metacarpal | left | adult calcite | 58.79 mm |
| VIII | 13 | 282 | fifth metacarpal | right | subadult, calcite, the head is not fused yet |  |
| VIII | 13 | 283 | metacarpal fragment | undetermined | adult, calcite, distal and shaft fragment |  |


| VIII | 13 | 284 | first metacarpal <br> fragment | undetermined | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 285 | first metacarpal <br> fragment | right | adult, calcite |$\quad$ (134.2 mm

$\left.\begin{array}{cccccc} & \text { VIII } & 13 & \text { thoracic vertebra } & \begin{array}{c}\text { subadult, calcite, } \\ \text { damage to right } \\ \text { transverse process, } \\ \text { upper thoracic, }\end{array} \\ \text { pedicle line still } \\ \text { visible }\end{array}\right]$

| VIII | 13 | 301 | femur fragment | undetermined | subadult, possibly a little over 5 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 302 | fifth metatarsal fragment | possible right | proximal fragment, adult, calcite, head missing |  |
| VIII | 13 | 303 | third metatarsal | right | adult, calcite | 77.3 mm |
| VIII | 13 | 304 | fifth metatarsal fragment | right | adult, calcite | 63.79 mm |
| VIII | 13 | 305 | fourth metatarsal fragment | left | adult, calcite, head broken off |  |
| VIII | 13 | 306 | hamate | left | adult, calcite |  |
| VIII | 13 | 307 | proximal manual phalanx fragment |  | distal fragment, adult, calcite |  |
| VIII | 13 | 308 | intermediate manual phalanx |  | adult, calcite | 18.97 mm |
| VIII | 13 | 309 | intermediate manual phalanx |  | adult, calcite | 18.64 mm |
| VIII | 13 | 310 | proximal pedal phalanx |  | adult, calcite | 24.63 mm |
| VIII | 13 | 311 | distal manual phalanx |  | adult, calcite | 25.47 mm |
| VIII | 13 | 312 | intermediate manual phalanx |  | adult, calcite | 20.92 mm |
| VIII | 13 | 313 | first proximal pedal phalanx |  | adult, calcite | 30.13 mm |
| VIII | 13 | 314 | proximal pedal phalanx |  | adult, calcite | 23.3 mm |


| VIII | 13 | 315 | proximal pedal phalanx |  | adult, calcite | 20.45 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 316 | proximal pedal phalanx |  | adult, calcite | 27.64 mm |
| VIII | 13 | 317 | intermediate manual $\qquad$ |  | adult, calcite | 19.91 mm |
| VIII | 13 | 318 | first metacarpal |  | subadult, calcite | 27.82 mm |
| VIII | 13 | 319 | second metatarsal fragment | left | adult, calcite, head broken, damage to the proximal end |  |
| VIII | 13 | 320 | fourth metatarsal fragment | left | adult, calcite, head broken, damage to the proximal end |  |
| VIII | 13 | 321 | third metatarsal fragment | right | adult, calcite, head broken, damage to the proximal end |  |
| VIII | 13 | 322 | metacarpal fragment |  | adult, calcite, damage to the proximal end |  |
| VIII | 13 | 323 | first metatarsal fragment | left | adult, calcite, proximal end |  |
| VIII | 13 | 324 | scapula fragment | undetermined | adult, glenoid fragment |  |
| VIII | 13 | 325 | first metatarsal fragment | left | proximal end, adult, calcite, probably the same bone at 326 |  |
| VIII | 13 | 326 | first metatarsal fragment | left | distal end, adult, calcite, probably the same bone as 325 |  |
| VIII | 13 | 327 | lunate | left | adult, calcite |  |


| VIII | 13 | 328 | lunate | right | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 329 | hamate | left | adult, calcite |
| VIII | 13 | 330 | capitate | left | adult, calcite |
| VIII | 13 | 331 | third metatarsal fragment | left | adult, calcite, proximal fragment with other bone fragments stuck to it |
| VIII | 13 | 332 | scaphoid | left | adult, calcite |
| VIII | 13 | 333 | second cuneiform | left | adult, calcite |
| VIII | 13 | 334 | second cuneiform | right | adult, calcite |
| VIII | 13 | 335 | proximal manual phalanx fragment |  | adult, calcite, proximal end |
| VIII | 13 | 336 | proximal manual phalanx fragment |  | adult, calcite, distal end |
| VIII | 13 | 337 | metatarsal fragment |  | distal fragment, adult, calcite |
| VIII | 13 | 338 | metatarsal fragment |  | distal fragment, adult, calcite |
| VIII | 13 | 339 | vertebra fragment |  | anterior portion of a body, possibly thoracic or lumbar, adult, calcite |
| VIII | 13 | 340 | humerus fragment | undetermined | adult, head fragment, calcite |
| VIII | 13 | 341 | vertebra fragment |  | lumbar fragment, transverse process and articular facet, adult, calcite |

lumbar fragment,
lamina and inferior
articular facet, adult,

| VIII | 13 | 342 | vertebra fragment | calcite |
| :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 343 | cranial fragment | adult, calcite |
| VIII | 13 | 344 | cranial fragment | adult, possible parietal, calcite, cut mark that is curved and measures a little over 1 cm |
| VIII | 13 | 345 | cranial fragment | adult, calcite |
| VIII | 13 | 346 | rib fragment | subadult, calcite, shaft fragment, mid rib |
| VIII | 13 | 347 | rib fragment | subadult, calcite, shaft fragment, upper rib |
| VIII | 13 | 348 | rib fragment | subadult, calcite, shaft fragment, mid rib |
| VIII | 13 | 349 | rib fragment | subadult, calcite, shaft fragment, mid rib |
| VIII | 13 | 350 | tibia fragment |  adult, proximal <br> fragment, calcite,  <br> probably most of a  |
| VIII | 13 | 351 | tibia fragment | undeterminedadult, proximal <br> fragment, calcite, <br> probably most of a |

lateral condyle

| VIII | 13 | 352 | cranial fragment |  | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 353 | cranial fragment |  | adult, calcite |
| VIII | 13 | 354 | cranial fragment |  | adult, calcite |
| VIII | 13 | 355 | parietals fragment | both | adult, calcite |
| VIII | 13 | 356 | cranial fragment |  | adult, calcite |
| VIII | 13 | 357 | cranial fragment |  | subadult, calcite |
| VIII | 13 | 358 | tibia fragment | left | adult, calcite, distal portion, possible mate to 359 |
| VIII | 13 | 359 | tibia fragment | right | adult, calcite, distal portion, possible mate to 358 |
| VIII | 13 | 360 | vertebra fragment |  | adult, calcite, body fragment, inferior or superior anterior margin with lipping typical of arthritis, possible lower thoracic or lumbar |
| VIII | 13 | 361 | vertebra fragment |  | adult, calcite, anterior portion of the body, possible lower thoracic or lumbar |
| VIII | 13 | 362 | vertebra fragment |  | adult, calcite, possible lumbar, inferior or superior aspect of the body |


| VIII | 13 | 363 | cervical vertebrae fragment |  | adult, calcite, fused laminae of two mid cervical vertebrae, cross mends with 367 , indicating it is a C2/3 fusion |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 364 | tibia fragment | undetermined | subadult, unfused proximal epiphyses, one condyle only (possibly the medial one), less than 15 years of age, probably closer to 9 |
| VIII | 13 | 365 | thoracic vertebra fragment |  | lamina fragment of a mid thoracic, possible subadult based upon size, calcite |
| VIII | 13 | 366 | vertebra fragment |  | transverse process, adult, calcite, probably a lumbar |
| VIII | 13 | 367 | cervical vertebrae fragment |  | C 2 and C 3 fusion of bodies, dens is present, adult calcite |
| VIII | 13 | 368 | femur fragment | undetermined | head fragment, adult, calcite, additional bones attached |
| VIII | 13 | 369 | thoracic vertebra fragment |  | body fragment, adult, probably T9-11, calcite |
| VIII | 13 | 370 | $\operatorname{coccyx}$ |  | the superior portion only, calcite |


| VIII | 13 | 371 | intermediate pedal phalanx |  | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 372 | parietal fragment | undetermined | adult, calcite |
| VIII | 13 | 373 | cranial fragment |  | adult, calcite |
| VIII | 13 | 374 | scapula fragment | possible right | coracoid fragment, adult, calcite |
| VIII | 13 | 375 | femur fragment | possible right | subadult, proximal fragment, unfused epiphyses, probably $\sim 5$ years of age |
| VIII | 13 | 376 | femur fragment | possible left | subadult, proximal fragment, unfused epiphyses, probably $\sim 5$ years of age |
| VIII | 13 | 377 | thoracic vertebra fragment |  | adult, body fragment, upper thoracic, calcite |
| VIII | 13 | 378 | second metacarpal fragment | left | proximal fragment, adult, calcite |
| VIII | 13 | 379 | second metatarsal fragment | right | proximal fragment, adult, calcite |
| VIII | 13 | 380 | rib fragment | undetermined | sternal end, adult, mid rib, sternal end looks young (20-30s), calcite |
| VIII | 13 | 381 | rib fragment | left | sternal end, adult, lower rib, calcite |
| VIII | 13 | 382 | vertebra fragment |  | possible sacral fragment with an articular facet and a foramen, adult, |

calcite

| VIII | 13 | 383 | thoracic vertebra fragment |  | lamina fragment of a mid thoracic, possible subadult based upon size, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 384 | femur fragment | undetermined | distal portion with only part of one condyle, adult, calcite |
| VIII | 13 | 385 | rib fragment | left | neck and shaft fragment, adult, calcite, mid rib |
| VIII | 13 | 386 | rib fragment | left | vertebra end fragment, adult, calcite, upper rib |
| VIII | 13 | 387 | rib fragment | undetermined | shaft fragment, adult, calcite, upper rib |
| VIII | 13 | 388 | rib fragment | undetermined | shaft fragment, adult, calcite, upper rib |
| VIII | 13 | 389 | rib fragment | right | vertebra end fragment, adult, calcite, upper rib |
| VIII | 13 | 390 | neural arch fragment | right | thoracic, subadult, under 5 probably |
| VIII | 13 | 391 | neural arch fragment | right | thoracic, subadult, under 5 probably |
| VIII | 13 | 392 | neural arch fragment | undetermined | possible lumbar, subadult, under 5 probably |
| VIII | 13 | 393 | rib fragment | undetermined | shaft fragment, adult, |


|  |  |  |  |  | calcite, mid rib |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 394 | vertebra fragment |  | body fragment, inferior or superior anterior portion, adult, calcite, probable lumbar |  |
| VIII | 13 | 395 | vertebra fragment |  | body fragment, inferior or superior anterior portion, adult, calcite, probable lumbar |  |
| VIII | 13 | 396 | vertebra fragment |  | body fragment, inferior or superior anterior portion, adult, calcite, probable thoracic |  |
| VIII | 13 | 397 | vertebra fragment |  | lamina fragment, adult, calcite, probable lumbar |  |
| VIII | 13 | 398 | vertebra fragment |  | possible subadult, fragment with two articular facets, possible lumbar |  |
| VIII | 13 | 399 | vertebra fragment |  | thoracic body fragment, adult, calcite |  |
| VIII | 13 | 400 | patella | left | adult calcite | 35.76 mm height, <br> 35.51 mm width |
| VIII | 13 | 401 | cervical vertebrae fragment |  | C1 fragment with only one superior and |  |

inferior articular facet

| VIII | 13 | 402 | intermediate manual phalanx fragment |  | distal fragment, adult, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 403 | proximal manual phalanx fragment |  | proximal fragment, adult, calcite |  |
| VIII | 13 | 404 | proximal pedal phalanx fragment |  | proximal fragment, adult, calcite |  |
| VIII | 13 | 405 | intermediate manual $\qquad$ |  | adult, calcite | 24.11 mm |
| VIII | 13 | 406 | scapula fragment | left | adult, calcite, spine fragment |  |
| VIII | 13 | 407 | cervical vertebrae fragment |  | adult, body only, calcite |  |
| VIII | 13 | 408 | second cuneiform | left | adult, calcite |  |
| VIII | 13 | 409 | scapula fragment | undetermined | glenoid fragment |  |
| VIII | 13 | 410 | epiphysis fragment | undetermined | possible radius distal epiphysis, calcite |  |
| VIII | 13 | 411 | ilium fragment | undetermined | calcite |  |
| VIII | 13 | 412 | humerus fragment | possible left | proximal head epiphysis, calcite |  |
| VIII | 13 | 413 | humerus fragment | undetermined | capitulum epiphysis, calcite |  |
| VIII | 13 | 414 | ulna fragment | left | shaft fragment, adult, calcite |  |
| VIII | 13 | 415 | shaft fragment | undetermined | subadult shaft fragment, calcite |  |
| VIII | 13 | 416 | radius fragment | right | proximal and most of the shaft fragment, |  |


|  |  |  |  |  | subadult, approximately 1.5 years old |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 417 | shaft fragment | undetermined | subadult shaft fragment, calcite |
| VIII | 13 | 418 | cranial fragment |  | subadult, pin prick porosity, calcite |
| VIII | 13 | 419 | cranial fragment |  | subadult, pin prick porosity, calcite |
| VIII | 13 | 420 | tibia fragment | undetermined | adult, proximal end, calcite |
| VIII | 13 | 421 | tibia fragment | undetermined | subadult, calcite, shaft fragment, probably around 5 years old |
| VIII | 13 | 422 | humerus fragment | undetermined | subadult, calcite, shaft fragment, probably around 5 years old |
| VIII | 13 | 423 | radius fragment | undetermined | adult, shaft fragment, calcite |
| VIII | 13 | 424 | scapula fragment | undetermined | acromion fragment, calcite, adult |
| VIII | 13 | 425 | scapula fragment | undetermined | acromion fragment, calcite, adult |
| VIII | 13 | 426 | humerus fragment | undetermined | adult, distal fragment with trochlea and capitulum, calcite |
| VIII | 13 | 427 | maxilla fragment | undetermined | adult, calcite |


| VIII | 13 | 428 | ilium fragment | right | perinate, calcite, only part of the blade and inferior margin of auricular surface |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 429 | clavicle fragment | left | lateral fragment, adult, calcite |  |
| VIII | 13 | 430 | pubis fragment | right | perinate, calcite |  |
| VIII | 13 | 431 | capitate | left | adult, calcite |  |
| VIII | 13 | 432 | second cuneiform | left | adult, calcite |  |
| VIII | 13 | 433 | first metacarpal | undetermined | adult, calcite, distal fragment |  |
| VIII | 13 | 434 | cervical vertebra fragment |  | body and right transverse process, adult, calcite, numerous fragments stuck to it |  |
| VIII | 13 | 435 | first metacarpal fragment | undetermined | distal end, adult, calcite |  |
| VIII | 13 | 436 | third cuneiform | possible left | adult, calcite |  |
| VIII | 13 | 437 | cranial fragment | undetermined | adult, calcite |  |
| VIII | 13 | 438 | second cuneiform | probable left | adult, calcite |  |
| VIII | 13 | 439 | first distal pedal phalanx |  | adult, calcite | 22.23 mm |
| VIII | 13 | 440 | metatarsal fragment | undetermined | head fragment, adult, calcite |  |
| VIII | 13 | 441 | fifth metacarpal fragment | left | proximal fragment, adult, calcite |  |
| VIII | 13 | 442 | 16 unidentified shaft fragments |  |  |  |


| VIII | 13 | 443 | metacarpal fragment | undetermined | adult, calcite, head <br> only |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 444 | third metacarpal <br> fragment | right | adult, calcite, distal <br> portion |
| VIII | 13 | 445 | metacarpal fragment | undetermined | adult, calcite, head <br> only |
| VIII | 13 | 446 | metatarsal fragment | undetermined | subadult, proximal <br> fragment, calcite |
| VIII | 13 | 447 | hamate | right | adult, calcite |
| VIII | 13 | 448 | rib fragment | undetermined | possible subadult, <br> mid rib, calcite |
| VIII | 13 | 449 | rib fragment | left | adult, vertebral end, <br> lower rib, calcite |
| VIII | 13 | 450 | rib fragment |  | possible subadult, <br> vertebral end, calcite |
| VIII | 13 | 451 | rib fragment |  | possible subadult, <br> vertebral end, calcite |
| VIII | 13 | 452 | metacarpal fragment |  | subadult, calcite |
| VIII | 13 | 453 | metacarpal fragment |  | subadult, calcite |
| VIII | 13 | 454 | metatarsal fragment | subadult, calcite |  |
| VIII | 13 | 455 | metatarsal fragment | subadult, calcite |  |
| VIII | 13 | 456 | proximal manual <br> phalanx fragment |  | possible subadult, |
| calcite |  |  |  |  |  |

$\left.\begin{array}{lccccc}\text { VIII } & 13 & 460 & \text { vertebra fragment } & & \begin{array}{c}\text { spinous process, } \\ \text { calcite }\end{array} \\ \hline \text { VIII } & 13 & & & \begin{array}{c}\text { body fragment, } \\ \text { calcite, possible adult } \\ \text { thoracic }\end{array} \\ \hline \text { VIII } & 13 & 461 & \text { vertebra fragment } & & \text { adult, calcite } \\ \hline \text { VIII } & 13 & 462 & \text { scaphoid } & \text { left } & \text { adult, calcite } \\ \hline \text { VIII } & 13 & 463 & \text { triquetral } & \text { left } & \text { adult, calcite } \\ \hline \text { VIII } & 13 & 464 & \text { lunate } & \text { left } & \text { adult, calcite } \\ \hline \text { VIII } & 13 & 465 & \text { capitate } & \text { left } & \text { adult, calcite, head } \\ \text { fragment }\end{array}\right]$

| VIII | 13 | 477 | triquetral | right | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 478 | rib fragment | undetermined | subadult, shaft fragment, calcite, mid rib |
| VIII | 13 | 479 | rib fragment | undetermined | subadult, shaft fragment, calcite, mid rib |
| VIII | 13 | 480 | rib fragment | left | subadult, vertebral end fragment, calcite, upper rib |
| VIII | 13 | 481 | rib fragment | right | subadult, neck fragment, upper rib, calcite |
| VIII | 13 | 482 | rib fragment | right | subadult, vertebral end fragment, calcite, mid rib |
| VIII | 13 | 483 | clavicle fragment | left | lateral fragment, possible perinate, calcite |
| VIII | 13 | 484 | neural arch fragment | right | thoracic, subadult, under 5 probably |
| VIII | 13 | 485 | rib fragment | left | first rib, head and sternal ends broken off, probable subadult, calcite |
| VIII | 13 | 486 | vertebra fragment |  | body fragment, possible cervical, subadult, calcite |
| VIII | 13 | 487 | vertebra fragment |  | body fragment, possible cervical, |

calcite

|  |  |  |  |  | calcit |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 488 | scapula fragment | left | coracoid fragment, adult, calcite |
| VIII | 13 | 489 | vertebra fragment |  | lamina fragment with inferior articular facets, adult, calcite, possible upper lumbar |
| VIII | 13 | 490 | vertebra fragment |  | lamina fragment, thoracic, adult, calcite |
| VIII | 13 | 491 | scapula fragment | undetermined | adult, inferior angle, calcite |
| VIII | 13 | 492 | vertebra fragment |  | lamina fragment, adult, calcite, probable lumbar |
| VIII | 13 | 493 | first metatarsal fragment |  | adult, calcite, distal fragment |
| VIII | 13 | 494 | intermediate manual phalanx fragment |  | adult, calcite, distal fragment |
| VIII | 13 | 495 | metatarsal fragment |  | subadult, calcite |
| VIII | 13 | 496 | vertebra fragment |  | spinous process, calcite, possibly thoracic, adult |
| VIII | 13 | 497 | metacarpal fragment |  | distal end, subadult, calcite |
| VIII | 13 | 498 | rib fragment | undetermined | subadult, shaft fragment, calcite, mid rib |
| VIII | 13 | 499 | calcaneus fragment | left | adult, calcite, posterior fragment |
| VIII | 13 | 500 | calcaneus fragment | right | adult, calcite, |


|  |  |  |  |  | posterior fragment |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 501 | scapula fragment | right | spine fragment, adult, calcite |
| VIII | 13 | 502 | proximal pedal phalanx fragments |  | adult, calcite, a proximal facet fragment and shaft fragment |
| VIII | 13 | 503 | femur fragment | undetermined | shaft fragments, adult, calcite |
| VIII | 13 | 504 | femur fragment | undetermined | numerous flakes, distal end fragments, badly deteriorated |
| VIII | 13 | 505 | cranial fragments |  | frontal and parietal fragments of a subadult, probably about a year old, calcite |
| VIII | 13 | 506 | 10 shaft fragments |  | calcite, adult |
| VIII | 13 | 507 | rib fragment | undetermined | subadult, calcite, mid rib, shaft fragment |
| VIII | 13 | 508 | rib fragment | undetermined | subadult, calcite, mid rib, shaft fragment |
| VIII | 13 | 509 | rib fragment | undetermined | subadult, calcite, upper rib, shaft fragment |
| VIII | 13 | 510 | rib fragment | right | subadult, calcite, vertebral end, upper rib |
| VIII | 13 | 511 | rib fragment | undetermined | subadult, calcite, mid rib, shaft fragment |


| VIII | 13 | 512 | femur fragment | undetermined | adult, calcite, shaft fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 513 | tibia fragment | undetermined | adult, calcite, shaft fragment |  |
| VIII | 13 | 514 | 11 shaft fragments |  | adult, calcite |  |
| VIII | 13 | 515 | 30 unidentified fragments |  |  |  |
| VIII | 13 | 516 | 48 unidentified fragments |  |  |  |
| VIII | 13 | 517 | 30 shaft fragments |  |  |  |
| VIII | 13 | 518 | occipital fragment |  | subadult, calcite |  |
| VIII | 13 | 519 | talus fragment | undetermined | adult, calcite, fragment is small |  |
| VIII | 13 | 520 | humerus fragment | undetermined | adult, calcite, trochlea fragment |  |
| VIII | 13 | 521 | proximal manual phalanx |  | adult, calcite | 33.56 mm |
| VIII | 13 | 522 | third metatarsal fragment | right | adult, calcite, proximal fragment |  |
| VIII | 13 | 523 | metacarpal fragment | undetermined | adult, shaft fragment, damage to the cortical layer |  |
| VIII | 13 | 524 | rib fragment | possible left | vertebral end, possible subadult, mid rib |  |
| VIII | 13 | 525 | radius fragment | undetermined | shaft fragment, adult, calcite |  |
| VIII | 13 | 526 | rib fragment | undetermined | adult, calcite, shaft fragment, mid rib |  |


| VIII | 13 | 527 | rib fragment | undetermined | subadult, calcite, shaft fragment, mid rib |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 528 | rib fragment | undetermined | subadult, calcite, shaft fragment, mid rib |
| VIII | 13 | 529 | tibia fragment | undetermined | adult, calcite, proximal fragment |
| VIII | 13 | 530 | tibia fragment | undetermined | adult, calcite, proximal fragment |
| VIII | 13 | 531 | vertebra fragment |  | adult, calcite, superior or inferior margin of a body, probably lumbar or sacral |
| VIII | 13 | 532 | ilium fragment | undetermined | adult, calcite, part of the crest |
| VIII | 13 | 533 | radius fragment | right | subadult, probably around 9 years old, distal epiphysis, calcite |
| VIII | 13 | 534 | patella fragment | undetermined | adult, calcite, only part of one of the condyles is present |
| VIII | 13 | 535 | vertebra fragment |  | superior or inferior margin of the body, adult, calcite, probably thoracic |
| VIII | 13 | 536 | rib fragment | undetermined | adult, calcite, shaft fragment |
| VIII | 13 | 537 | rib fragment | undetermined | adult, calcite, shaft |


| fragment |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 538 | rib fragment | undetermined | adult, calcite, shaft fragment |
| VIII | 13 | 539 | rib fragment | undetermined | adult, calcite, vertebral end fragment |
| VIII | 13 | 540 | scapula fragment | undetermined | adult, calcite, spine fragment |
| VIII | 13 | 541 | scapula fragment | undetermined | adult, calcite, border fragment |
| VIII | 13 | 542 | vertebra fragment |  | adult, transverse process fragment, thoracic, calcite |
| VIII | 13 | 543 | navicular fragment | undetermined | adult, calcite, small fragment |
| VIII | 13 | 544 | vertebra fragment |  | adult, fragment of a vertebral body, calcite |
| VIII | 13 | 545 | vertebra fragment |  | adult, fragment of a vertebral body, calcite |
| VIII | 13 | 546 | vertebra fragment |  | adult, fragment of a vertebral body, calcite |
| VIII | 13 | 547 | vertebra fragment |  | adult, fragment of a vertebral body, calcite |
| VIII | 13 | 548 | cranial fragment |  | adult, calcite |
| VIII | 13 | 549 | epiphysis fragment |  | subadult, probably 5 years of age, possible distal tibia epiphysis |
| VIII | 13 | 550 | epiphysis fragment |  | subadult, possible humerus proximal epiphysis fragment, |

calcite

| VIII | 13 | 551 | radius fragment | undetermined | subadult, probably <br> around 5 years of age, <br> distal fragment, <br> unfused epiphysis, <br> calcite |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 | 552 | proximal manual <br> phalanx fragment |  | adult, distal fragment, <br> calcite |
| VIII | 13 | 553 | distal manual phalanx |  | adult, calcite |
| VIII | 13 | 554 | first metacarpal <br> fragment | undetermined | adult, proximal <br> fragment, calcite |
| VIII | 13 | 555 | possible scapula <br> fragment | undetermined | adult, calcite, lateral |
| VIII | 13 | 556 | cunerder |  |  |


| VIII | 13 | 562 | vertebra fragment |  | subadult, lamina <br> fragment, calcite, <br> probable thoracic |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 13 |  |  |  | subadult, cervical <br> fragment with two <br> articular facets and <br> part of the body |
| VIII | 13 | 563 | vertebra fragment |  | subadult, cervical <br> fragment with an <br> articular facets and <br> part of the body |
| VIII | 13 | 564 | vertebra fragment |  | vertebral end, <br> possible subadult, <br> calcite |
| VIII | 13 |  | 565 | rib fragment | undetermined |


| VIII | 14 | A | 23 | ulna fragment | right | proximal fragment, adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 24 | cuboid | left | adult |  |
| VIII | 14 | A | 25 | temporal fragment | left | adult, mastoid is broken, so sexing cannot be determined |  |
| VIII | 14 | A | 26 | probable occipital fragment |  | indicated by the internal fossa |  |
| VIII | 14 | A | 27 | second metatarsal | right | adult | 67.40 mm |
| VIII | 14 | A | 28 | third metacarpal fragment | right | adult, defined ridge on the medial surface |  |
| VIII | 14 | A | 29 | first metacarpal | right | adult, defined ridge on the lateral surface | 41.81 mm |
| VIII | 14 | A | 30 | third metacarpal fragment | right | adult, proximal fragment |  |
| VIII | 14 | A | 31 | metacarpal fragment |  | probably fifth, very defined ridge on the manual surface |  |
| VIII | 14 | A | 32 | first cuneiform | left |  |  |
| VIII | 14 | A | 33 | scaphoid | right |  |  |
| VIII | 14 | A | 34 | hamate | right |  |  |
| VIII | 14 | A | 35 | third cuneiform | right |  |  |
| VIII | 14 | A | 36 | lunate | right |  |  |
| VIII | 14 | A | 37 | trapezoid | right |  |  |
| VIII | 14 | A | 38 | capitate | right |  |  |
| VIII | 14 | A | 39 | fourth metacarpal fragment | right | proximal and shaft fragment |  |
| VIII | 14 | A | 40 | intermediate manual phalanx |  | defined ridges on the lateral margins | 24.6 mm |


| VIII | 14 | A | 41 | intermediate manual phalanx |  | defined ridges on the lateral margins | 26.37 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 42 | intermediate manual phalanx fragment |  | defined ridges on the lateral margins, distal end fractured |  |
| VIII | 14 | A | 43 | intermediate manual phalanx |  | defined ridges on the lateral margins | 27.77 mm |
| VIII | 14 | A | 44 | metacarpal fragment | undetermined | adult, shaft fragment |  |
| VIII | 14 | A | 45 | proximal manual phalanx |  | defined ridges on the lateral margins | 31.43 mm |
| VIII | 14 | A | 46 | proximal manual $\qquad$ |  | defined ridges on the lateral margins | 37.33 mm |
| VIII | 14 | A | 47 | proximal manual phalanx |  |  | 27.52 mm |
| VIII | 14 | A | 48 | metacarpal |  | neonate, probably the first | 13.55 mm |
| VIII | 14 | A | 49 | metacarpal |  |  | 17.14 mm |
| VIII | 14 | A | 50 | metacarpal |  |  | 14.71 mm |
| VIII | 14 | A | 51 | distal manual phalanx |  | probably first, if so then it is of an adolescent $\sim 15$ years old | 17.58 mm |
| VIII | 14 | A | 52 | distal manual phalanx |  | unfused, between 8 and 15 years old | 12.63 mm |
| VIII | 14 | A | 53 | ulna fragment | left | perinate to 1.5 years old based on size and development |  |
| VIII | 14 | A | 54 | radius fragment | undetermined | proximal fragment this bone suggests the |  |

\(\left.$$
\begin{array}{cccccc} & & & & \begin{array}{c}\text { child is more a } \\
\text { perinate based on size }\end{array} \\
\hline \text { VIII } & 14 & \text { A } & 55 & \text { humerus fragment } & \text { left }\end{array}
$$ \begin{array}{c}distal fragment, <br>

perinate\end{array}\right]\)| proximal fragment of |
| :---: |
| a perinate |


| VIII | 14 | A | 69 | unfused vertebral body | probable thoracic <br> vertebra, perinate |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 70 | unfused vertebral body | probable thoracic <br> vertebra, perinate |
| VIII | 14 | A | 71 | unfused vertebral body | probable thoracic <br> vertebra, perinate |
| VIII | 14 | A | 72 | unfused vertebral body | probable lumbar <br> vertebra, perinate |
| VIII | 14 | A | 73 | unfused vertebral body | probable lumbar <br> vertebra, perinate |
| VIII | 14 | A | 74 | unfused vertebral body | probable lumbar <br> vertebra, perinate |
| VIII | 14 | A | 75 | unfused vertebral body | probable lumbar <br> vertebra, perinate |
| VIII | 14 | A | 76 | unfused vertebral body | probable lumbar <br> vertebra, perinate |
| VIII | 14 | A | 77 | unfused vertebral body | probable sacral <br> vertebra, perinate |
| VIII | 14 | A | 78 | unfused vertebral body | probable sacral <br> vertebra, perinate |
| VIII | 14 | A | 79 | unfused vertebral body | fragmentary, perinate |
| VIII | 14 | A | 80 | unfused vertebral body | fragmentary, perinate |
| VIII | 14 | A | 81 | unfused vertebral body | neagmentary, perinate |
| VIII | 14 | A | 82 | metatarsal | nenate, probable the |
| fernd or third |  |  |  |  |  |


| VIII | 14 | A | 83 | phalanx | neonate, possible <br> proximal manual |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 84 | phalanx fragment | neonate, possible <br> proximal manual |
| VIII | 14 | A | 85 | phalanx fragment | neonate, possible <br> proximal manual |
| VIII | 14 | A | 86 | phalanx fragment | neonate, possible <br> proximal manual |
| VIII | 14 | A | 87 | phalanx | neonate, possible <br> proximal pedal |
| VIII | 14 | A | 88 | phalanx | neonate, possible <br> proximal pedal |
| VIII | 14 | A | 89 | phalanx | nenate, possible first <br> proximal manual |
| VIII | 14 | A | 90 | phalanx | neonate, possible first <br> proximal manual |
| VIII | 14 | A | 91 | phalanx | neonate, possible first <br> proximal pedal |
| VIII | 14 | A | 92 | phalanx |  |
| VIII | 14 | A | 93 | scapula fragment |  |
| VIII | 14 | A | 94 | rib fragment | undetermined |


| VIII | 14 | A | 97 | rib fragment | undetermined | neonate, sternal fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 98 | rib fragment | undetermined | neonate, sternal fragment |  |
| VIII | 14 | A | 99 | rib fragment | undetermined | neonate, sternal fragment |  |
| VIII | 14 | A | 100 | rib fragment | undetermined | neonate, sternal fragment |  |
| VIII | 14 | A | 101 | rib fragment | undetermined | neonate, sternal fragment |  |
| VIII | 14 | A | 102 | rib fragment | undetermined | neonate, sternal fragment |  |
| VIII | 14 | A | 103 | 12 unidentified fragments |  |  |  |
| VIII | 14 | A | 104 | humerus fragment | left | distal fragment beginning at the top of the olecranon fossa and includes a large portion of the shaft |  |
| VIII | 14 | A | 105 | talus fragment | right | adult, lateral section is broken off |  |
| VIII | 14 | A | 106 | deciduous incisor |  | probably the right upper first | 6.67 mm anterior <br> to posterior, 4.69 mm lingual to labial, 6.98 mm crown height, 11.22 mm root length |
| VIII | 14 | A | 107 | trapezium | left | adult |  |
| VIII | 14 | A | 108 | triquetral | left | adult |  |


| VIII | 14 | A | 109 | trapezium | right |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 110 | trapezoid | right |  |
| VIII | 14 | A | 111 | interproximal manual phalanx |  | defined ridges on the lateral margins |
| VIII | 14 | A | 112 | pubis | right | perinate |
| VIII | 14 | A | 113 | neural arch | right | cervical vertebra |
| VIII | 14 | A | 114 | thoracic neural arch | both | fused |
| VIII | 14 | A | 115 | thoracic neural arch | right | unfused |
| VIII | 14 | A | 116 | thoracic neural arch | right | unfused |
| VIII | 14 | A | 117 | thoracic neural arch | left | unfused |
| VIII | 14 | A | 118 | cervical neural arch | left | unfused |
| VIII | 14 | A | 119 | cervical neural arch | left | unfused |
| VIII | 14 | A | 120 | cervical neural arch | right | unfused |
| VIII | 14 | A | 121 | cervical neural arch | right | unfused |
| VIII | 14 | A | 122 | cervical neural arch fragment | undetermined | unfused |
| VIII | 14 | A | 123 | cervical neural arch fragment | undetermined | unfused |
| VIII | 14 | A | 124 | cervical neural arch fragment | undetermined | unfused |
| VIII | 14 | A | 125 | lumbar neural arch | left | unfused |
| VIII | 14 | A | 126 | lumbar neural arch | right | unfused |
| VIII | 14 | A | 127 | lumbar neural arch | right | unfused |
| VIII | 14 | A | 128 | neural arch fragment |  |  |
| VIII | 14 | A | 129 | neural arch fragment |  |  |
| VIII | 14 | A | 130 | neural arch fragment |  |  |
| VIII | 14 | A | 131 | neural arch fragment |  |  |
| VIII | 14 | A | 132 | neural arch fragment |  |  |


| VIII | 14 | A | 133 | cervical neural arch | right |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 134 | neural arch fragment |  |  |  |
| VIII | 14 | A | 135 | humerus fragment | undetermined | badly deteriorated, possible subadult |  |
| VIII | 14 | A | 136 | femur fragment | undetermined | possible unfused head |  |
| VIII | 14 | A | 137 | thoracic vertebra fragment |  | body fragment with left transverse process, young adult, only minimal lipping, calcite |  |
| VIII | 14 | A | 138 | tibia fragment | left | adult, proximal fragment with the condyles |  |
| VIII | 14 | A | 139 | proximal pedal phalanx |  |  | 21.24 mm |
| VIII | 14 | A | 140 | proximal pedal phalanx |  |  | 21.01 mm |
| VIII | 14 | A | 141 | proximal pedal phalanx |  |  | 24.72 mm |
| VIII | 14 | A | 142 | proximal pedal phalanx |  |  | 25.58 mm |
| VIII | 14 | A | 143 | proximal pedal phalanx |  |  | 23.17 mm |
| VIII | 14 | A | 144 | proximal pedal phalanx |  |  | 21.5 mm |
| VIII | 14 | A | 145 | proximal pedal phalanx |  |  | 22.42 mm |
| VIII | 14 | A | 146 | proximal pedal phalanx |  |  | 24.28 mm |


| VIII | 14 | A | 147 | patella | left | subadult, small | 33.95 mm height, 34.45 mm width |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 148 | navicular | right |  |  |
| VIII | 14 | A | 149 | third cuneiform | left |  |  |
| VIII | 14 | A | 150 | metatarsal fragment |  | adult, shaft and head |  |
| VIII | 14 | A | 151 | metatarsal fragment |  | adult, shaft and head |  |
| VIII | 14 | A | 152 | first metatarsal | right |  | 54.91 mm |
| VIII | 14 | A | 153 | fourth metatarsal fragment | left |  |  |
| VIII | 14 | A | 154 | first proximal pedal phalanx |  | abnormal bone growth on proximal superior surface, similar to early stage gout | 26.95 mm |
| VIII | 14 | A | 155 | proximal pedal phalanx |  |  | 21.96 mm |
| VIII | 14 | A | 156 | interproximal manual phalanx |  |  | 19.26 mm |
| VIII | 14 | A | 157 | interproximal manual phalanx |  | subadult, proximal end is not fused | 21.7 mm |
| VIII | 14 | A | 158 | proximal manual phalanx |  |  | 29.72 mm |
| VIII | 14 | A | 159 | fifth metatarsal | probable left | subadult, unfused head |  |
| VIII | 14 | A | 160 | second metatarsal | right | subadult, unfused head |  |
| VIII | 14 | A | 161 | fifth metacarpal | right |  | 46.82 mm |
| VIII | 14 | A | 162 | talus fragment | left |  |  |


| VIII | 14 | A | 163 | fibula fragment | left |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 164 | navicular | right |  |
| VIII | 14 | A | 165 | first cuneiform | right |  |
| VIII | 14 | A | 166 | rib fragment |  | adult, shaft fragment |
| VIII | 14 | A | 167 | rib fragment | right | subadult, vertebral end |
| VIII | 14 | A | 168 | rib fragment | left | possibly rib one or 2 shaft fragment, subadult |
| VIII | 14 | A | 169 | rib fragment | probable right | shaft fragment, subadult |
| VIII | 14 | A | 170 | rib fragment | left | rib 1, subadult |
| VIII | 14 | A | 171 | rib fragment | right | rib 1, different individual than 170, subadult, slightly larger than 170 |
| VIII | 14 | A | 172 | cervical vertebra |  | C 3-6 |
| VIII | 14 | A | 173 | cervical vertebra fragment |  | body and left transverse process, left superior articular facet has additional bone growth but does not appear very arthritic yet |
| VIII | 14 | A | 174 | cervical vertebra fragment |  | just the body |
| VIII | 14 | A | 175 | thoracic vertebra |  | superior and inferior margins of the body are still wavy and undulated, indicating |

it has not fused,
subadult

| VIII | 14 | A | 176 | mandibular fragment | left | mandibular condyle <br> and coronoid process <br> fragment, calcite |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| VII | 14 | A | 177 | navicular | left |  |
| VIII | 14 | A | 178 | cuboid | right |  |
| VIII | 14 | A | 179 | hamate | left |  |
| VIII | 14 | A | 180 | tibia epiphysis | right | proximal epiphysis, <br> subadult under 9 |
| VIII | 14 | A | 181 | tibia epiphysis | right | distal epiphysis, <br> subadult under 9 |
| VIII | 14 | A | 182 | coccyx | superior portion |  |
| VIII | 14 | A | 183 | distal manual phalanx |  |  |
| VIII | 14 | A | 184 | distal manual phalanx |  |  |
| VIII | 14 | A | 185 | first distal manual |  |  |
| VIII | 14 | A | 186 | first distal pedal |  |  |
| VIII | 14 | A | 187 | distal pedal phalanx |  |  |
| VIII | 14 | A | 188 | distal pedal phalanx |  | fused with a |
| VIII | 14 | A | 189 | intermediate pedal | phalanx |  |
| VIII | 14 | A | 190 | rib fragment |  |  |
| VIII | 14 | A | 191 | metacarpal epiphysis | head |  |
| VIII | 14 | A | 192 | metatarsal epiphysis | head |  |

$\left.\begin{array}{lccccc}\text { VIII } & 14 & \text { A } & 193 & \text { metacarpal epiphysis } & \text { head } \\ \hline \text { VIII } & 14 & \text { A } & 194 & \text { metacarpal epiphysis } & \text { head } \\ \hline \text { VIII } & 14 & \text { A } & 195 & \text { clavicle fragment } & \text { left }\end{array} \begin{array}{c}\text { subadult, no older } \\ \text { than 1-2 years based } \\ \text { on size }\end{array}\right]$

| VIII | 14 | A | 208 | pisiform | left |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 209 | pisiform | right |  |
| VIII | 14 | A | 210 | sesamoid |  |  |
| VIII | 14 | A | 211 | triquetral | right |  |
| VIII | 14 | A | 212 | lunate | left |  |
| VIII | 14 | A | 213 | trapezium | left |  |
| VIII | 14 | A | 214 | cuneiform fragment |  | second or third |
| VIII | 14 | A | 215 | second cuneiform | left |  |
| VIII | 14 | A | 216 | humerus fragment | undetermined | subadult, morphological damage |
| VIII | 14 | A | 217 | ilium fragment |  | unfused iliac crest, subadult |
| VIII | 14 | A | 218 | thoracic vertebra fragment |  | upper thoracic t2-5 probably, body and left pedicle |
| VIII | 14 | A | 219 | thoracic vertebra fragment |  | middle thoracic, t4-8 probably, left portion of the body and pedicle are present |
| VIII | 14 | A | 220 | thoracic vertebra fragment |  | body fragment, lower thoracic t7-10 most likely, macroporosity on the body |
| VIII | 14 | A | 221 | second metacarpal fragment | left |  |
| VIII | 14 | A | 222 | second metatarsal fragment | right | proximal and shaft fragment |
| VIII | 14 | A | 223 | fifth metatarsal | undetermined | subadult, head is |

unfused

| unfused |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 224 | first metatarsal fragment | left | proximal fragment, adult |
| VIII | 14 | A | 225 | scapula fragment | right | glenoid fossa fragment |
| VIII | 14 | A | 226 | thoracic vertebra fragment |  | lamina fragment |
| VIII | 14 | A | 227 | first cuneiform fragment | right |  |
| VIII | 14 | A | 228 | metatarsal fragment |  | possible fourth, proximal fragment |
| VIII | 14 | A | 229 | thoracic vertebra fragment |  | anterior/right body fragment |
| VIII | 14 | A | 230 | vertebra fragment |  | subadult, unfused anterior portion of a body, possibly lumbar or sacrum |
| VIII | 14 | A | 231 | vertebra fragment |  | subadult, unfused anterior portion of a body, probably first sacral |
| VIII | 14 | A | 232 | ischium fragment | undetermined | badly deteriorated, possible subadult |
| VIII | 14 | A | 233 | ischium fragment |  | part of the greater sciatic notch visible, badly deteriorated |
| VIII | 14 | A | 234 | pubis fragment |  | subadult, unfused, deep billows, small in size |


| VIII | 14 | A | 235 | clavicle fragment | left | lateral fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | A | 236 | metacarpal/metatarsal fragment |  | proximal fragment, subadult, unfused proximal epiphysis |
| VIII | 14 | A | 237 | intermediate manual phalanx fragment |  |  |
| VIII | 14 | A | 238 | phalanx fragment |  | unfused proximal end |
| VIII | 14 | A | 239 | tibia epiphysis | left | proximal epiphysis, subadult under 9, closer to 5 |
| VIII | 14 | A | 240 | ischium | left | perinate |
| VIII | 14 | A | 241 | incisor | right | lower second deciduous |
| VIII | 14 | A | 242 | canine fragment | undetermined | possible upper, too little tooth available to determine |
| VIII | 14 | A | 243 | frontal fragments |  | child, right and left fragments, the right is much larger |
| VIII | 14 | A | 244 | 11 unidentified fragments |  |  |
| VIII | 14 | B | , | scaphoid | left | adult |
| VIII | 14 | B | 2 | hamate | right |  |
| VIII | 14 | B | 3 | lunate | right |  |
| VIII | 14 | B | 4 | lunate | right |  |
| VIII | 14 | B | 5 | capitate | left |  |
| VIII | 14 | B | 6 | pisiform | right |  |
| VIII | 14 | B | 7 | pisiform | left |  |
| VIII | 14 | B | 8 | trapezoid | right |  |


| VIII | 14 | B | 9 | metacarpal head | subadult, unfused |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 10 | metatarsal head | subadult, unfused |  |
| VIII | 14 | B | 11 | metacarpal fragment | distal fragment, adult |  |
| VIII | 14 | B | 12 | cervical vertebra fragment | second vertebra fragment with only the dens, adult |  |
| VIII | 14 | B | 13 | first proximal manual phalanx |  | 32.10 mm |
| VIII | 14 | B | 14 | proximal manual phalanx |  | 31.51 mm |
| VIII | 14 | B | 15 | proximal manual phalanx |  | 36.19 mm |
| VIII | 14 | B | 16 | proximal manual phalanx |  | 48.25 mm |
| VIII | 14 | B | 17 | interproximal manual phalanx fragment |  |  |
| VIII | 14 | B | 18 | interproximal manual phalanx |  | 28.7 mm |
| VIII | 14 | B | 19 | interproximal manual phalanx |  | 25.71 mm |
| VIII | 14 | B | 20 | interproximal manual phalanx |  | 24.94 mm |
| VIII | 14 | B | 21 | interproximal manual phalanx |  | 20.39 mm |
| VIII | 14 | B | 22 | interproximal manual phalanx | subadult, proximal end unfused | 24.8 mm |
| VIII | 14 | B | 23 | interproximal manual $\qquad$ | subadult, proximal end unfused | 16.32 mm |


| VIII | 14 | B | 24 | first proximal pedal phalanx |  | adult | 32.78 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 25 | proximal pedal phalanx |  |  |  |
| VIII | 14 | B | 26 | proximal pedal phalanx |  |  | 16.69 mm |
| VIII | 14 | B | 27 | first intermediate pedal phalanx |  | subadult | 18.25 mm |
| VIII | 14 | B | 28 | first distal manual phalanx |  |  | 19.37 mm |
| VIII | 14 | B | 29 | first distal manual phalanx |  |  | 20.49 mm |
| VIII | 14 | B | 30 | patella | right | adult | 39.57 mm height, 40.53 mm width |
| VIII | 14 | B | 31 | proximal manual phalanx fragments |  | distal end broken, adult |  |
| VIII | 14 | B | 32 | proximal manual phalanx |  | adult, possible pathology, circular depression with smooth margins on the distal manual surface measures 3.97 mm in diameter | 32.2 mm |
| VIII | 14 | B | 33 | proximal manual phalanx |  | adult | 36.15 mm |
| VIII | 14 | B | 34 | interproximal pedal phalanx |  |  |  |


| VIII | 14 | B | 35 | interproximal pedal phalanx |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 36 | interproximal pedal phalanx |  |  |  |
| VIII | 14 | B | 37 | interproximal manual phalanx |  |  | 24.35 mm |
| VIII | 14 | B | 38 | interproximal manual phalanx |  |  | 20.01 mm |
| VIII | 14 | B | 39 | interproximal manual phalanx |  | possible subadult | 19.25 mm |
| VIII | 14 | B | 40 | interproximal manual phalanx |  |  | 20.21 mm |
| VIII | 14 | B | 41 | distal pedal phalanx |  | possible subadult | 11.64 mm |
| VIII | 14 | B | 42 | distal manual phalanx |  |  | 15.39 mm |
| VIII | 14 | B | 43 | distal manual phalanx |  |  | 17.17 mm |
| VIII | 14 | B | 44 | distal manual phalanx fragment |  | broken distal end |  |
| VIII | 14 | B | 45 | distal manual phalanx |  |  | 15.35 mm |
| VIII | 14 | B | 46 | distal manual phalanx |  |  | 18.17 mm |
| VIII | 14 | B | 47 | distal manual phalanx |  |  | 20.01 mm |
| VIII | 14 | B | 48 | distal manual phalanx |  | probable first | 20.79 mm |
| VIII | 14 | B | 49 | fifth metatarsal | right |  | 62.37 mm |
| VIII | 14 | B | 50 | third metatarsal | right |  | 51.2 mm |
| VIII | 14 | B | 51 | fifth metacarpal | right |  | 62.86 mm |
| VIII | 14 | B | 52 | fifth metatarsal | left |  |  |
| VIII | 14 | B | 53 | third cuneiform | right |  |  |
| VIII | 14 | B | 54 | metacarpal fragment |  | distal end broken, adult, possible fifth? |  |

$\left.\begin{array}{ccccccc}\text { VIII } & 14 & \text { B } & 55 & \text { metacarpal fragment } & & \begin{array}{c}\text { distal end broken, } \\ \text { adult, possible fifth? }\end{array} \\ \hline \text { VIII } & 14 & \text { B } & 56 & \text { distal tibia epiphysis } & \text { left } & \begin{array}{c}\text { subadult, same size as } \\ \text { in Baker page 119 }\end{array} \\ \hline \text { VIII } & 14 & \text { B } & 57 & \begin{array}{c}\text { proximal tibia epiphysis } \\ \text { fragment }\end{array} & \text { possible left } & \begin{array}{c}\text { subadult, same size as } \\ \text { in Baker page 119 }\end{array} \\ \hline \text { VIII } & 14 & \text { B } & 58 & \text { radius fragment } & \text { subadt, over 5 years } \\ \text { of age, distal } \\ \text { fragment }\end{array}\right]$

| VIII | 14 | B | 66 | rib fragment | undetermined | shaft fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 67 | cuneiform fragment | undetermined | either the second or <br> third, adult |
| VIII | 14 | B | 68 | first cuneiform <br> fragment | right | adult, badly <br> deteriorated |
| VIII | 14 | B | 69 | triquetral | right | squished in <br> appearance, adult |
| VIII | 14 | B | 70 | sesamoid | undetermined |  |
| VIII | 14 | B | 71 | first metacarpal <br> proximal epiphysis | probable left | at least 4 or 5 years <br> old, probably older |
| VIII | 14 | B | 72 | thoracic vertebra <br> fragment |  | body fragment |


| VIII | 14 | B | 81 | cervical vertebra fragment |  | first cervical, right side, superior articular facet |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 82 | vertebra fragment |  | possible cervical fragment, maybe part of the lamina on c 1 or c2 |
| VIII | 14 | B | 83 | unidentified fragment |  | maybe part of the pelvis? |
| VIII | 14 | B | 84 | talus fragment | left | adult, treated with treated with B72, posterior portion, blackened |
| VIII | 14 | B | 85 | talus fragment | right | adult, probable mate to 84 , treated with treated with B72, blackened, damage to the medial and posterior surface prevents measurements |
| VIII | 14 | B | 86 | calcaneus fragment | possible right | adult, badly deteriorated, treated with treated with B72, blackened, breakage prevents measurement |
| VIII | 14 | B | 87 | first cuneiform | right | adult, badly deteriorated, treated with treated with B72, blackened |


| VIII | 14 | B | 88 | proximal manual phalanx | undetermined | adult, anterior portion is broken, first digit, treated with treated with B72 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 89 | rib fragment | undetermined | shaft fragment, possible subadult, calcite, treated with treated with B72 |  |
| VIII | 14 | B | 90 | radius fragment | undetermined | head fragment, possibly an unfused radial head, damage prevents confirmation, treated with treated with B72 |  |
| VIII | 14 | B | 91 | capitate (probable) | left | subadult, probably around 8 years of age, badly deteriorated, treated with treated with B72 |  |
| VIII | 14 | B | 92 | vertebral body |  | subadult, probably thoracic, possibly 2-4 years of age |  |
| VIII | 14 | B | 93 | cervical vertebra fragment |  | subadult, right lamina and pedicle fragment, unfused to body, 2-4 years of age |  |
| VIII | 14 | B | 94 | unidentified fragments |  | 4 unidentified fragments |  |
| VIII | 14 | B | 95 | proximal pedal phalanx | undetermined | adult, first digit, slightly deteriorated | 32.72 mm |

around the proximal
margin

| margin |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 96 | proximal manual phalanx | undetermined | adult, some damage to the proximal posterior surface | 38.5 mm |
| VIII | 14 | B | 97 | first metatarsal | right | adult, some damage to the proximal and medial surfaces | 58.85 mm |
| VIII | 14 | B | 98 | metatarsal fragment | right | adult, probably the fourth, damage to the proximal and distal ends, head is absent |  |
| VIII | 14 | B | 99 | proximal pedal phalanx fragment | undetermined | adult, proximal fragment |  |
| VIII | 14 | B | 100 | interproximal manual phalanx | undetermined | adult, some damage to the proximal facet | 28.27 mm |
| VIII | 14 | B | 101 | horn of cornu | right | subadult, unfused, but well developed |  |
| VIII | 14 | B | 102 | scaphoid | left | adult |  |
| VIII | 14 | B | 103 | sacral vertebral body |  | subadult, probably less than two based on the lack of fusion to lamina or other bodies |  |
| VIII | 14 | B | 104 | lumbar body |  | subadult, probably around 2-4, carbon |  |
| VIII | 14 | B | 105 | lumbar body |  | subadult, probably around 2-4, carbon |  |
| VIII | 14 | B | 106 | thoracic body |  | subadult, probably around 2-4, carbon |  |


| VIII | 14 | B | 107 | intermediate manual phalanx | undetermined | adult, blackened by burning |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 108 | rib fragment | left | neck fragment, adult, cortical layer destroyed |
| VIII | 14 | B | 109 | rib fragment | left | subadult, lower rib |
| VIII | 14 | B | 110 | rib fragment | left | subadult, upper rib |
| VIII | 14 | B | 111 | fibula fragment | undetermined | subadult, probably 1.5 years of age |
| VIII | 14 | B | 112 | ischium | left | perinate |
| VIII | 14 | B | 113 | metacarpal fragment | undetermined | perinate to a year or two, some light carbon |
| VIII | 14 | B | 114 | metatarsal fragment | undetermined | adult, head fragment, some carbon |
| VIII | 14 | B | 115 | sacral neural arch | right | subadult, not fused to the body 2-4 years of age |
| VIII | 14 | B | 116 | cervical neural arch | left | subadult, it appears that it may have fused to the body, but the body is just broken off |
| VIII | 14 | B | 117 | thoracic neural arch | left | subadult, not fused to the body 2-4 years of age |
| VIII | 14 | B | 118 | thoracic neural arch | right | subadult, not fused to the body 2-4 years of age |


| VIII | 14 | B | 119 | proximal manual phalanx |  | subadult, perinate | 14.19 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 120 | proximal manual phalanx |  | subadult, perinate | 18.85 mm |
| VIII | 14 | B | 121 | proximal manual phalanx |  | subadult, perinate | 18.99 mm |
| VIII | 14 | B | 122 | first metacarpal | undetermined | subadult, perinate | 17.54 mm |
| VIII | 14 | B | 123 | distal manual phalanx | undetermined | adult, calcite | 20.45 mm |
| VIII | 14 | B | 124 | distal manual phalanx | undetermined | adult, calcite | 19.11 mm |
| VIII | 14 | B | 125 | distal manual phalanx | undetermined | perinate | 8.87 mm |
| VIII | 14 | B | 126 | distal manual phalanx | undetermined | perinate | 7.93 mm |
| VIII | 14 | B | 127 | intermediate manual $\qquad$ phalanx | undetermined | adult, calcite |  |
| VIII | 14 | B | 128 | metatarsal | undetermined | perinate |  |
| VIII | 14 | B | 129 | metacarpal | undetermined | perinate |  |
| VIII | 14 | B | 130 | rib fragment | right | perinate, first rib, neck and shaft fragment |  |
| VIII | 14 | B | 131 | distal manual phalanx | undetermined | perinate | 8.02 mm |
| VIII | 14 | B | 132 | distal manual phalanx | undetermined | perinate | 8.84 mm |
| VIII | 14 | B | 133 | distal manual phalanx | undetermined | perinate | 8.41 mm |
| VIII | 14 | B | 134 | distal manual phalanx | undetermined | subadult, proximal end is unfused, first $\qquad$ digit | 16.84 mm |
| VIII | 14 | B | 135 | proximal manual phalanx | undetermined | adult, calcite, some damage to a lateral aspect |  |

adult, calcite and
carbon, damage to the distal end prevents

| VIII | 14 | B | 136 | proximal manual <br> phalanx | undetermined | distal end prevents <br> measurement |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 137 | proximal manual <br> phalanx | undetermined | adult, calcite and <br> carbon |  |
| VIII | 14 | B | 138 | proximal pedal phalanx | undetermined | adult, calcite and <br> carbon |  |
| VIII | 14 | B | 139 | proximal manual <br> phalanx | undetermined | probable perinate | 19.86 mm |
| VIII | 14 | B | 140 | proximal pedal phalanx | undetermined | adult | 22.66 mm |
| VIII | 14 | B | 141 | metatarsal | undetermined | probable perinate | 20.54 mm |
| VIII | 14 | B | 142 | metacarpal | undetermined | probable perinate | 21.7 mm |
| VIII | 14 | B | 143 | metatarsal | undetermined | probable perinate | 23.55 mm |
| VIII | 14 | B | 144 | metatarsal | undetermined | probable perinate | 24.77 mm |
| VIII | 14 | B | 145 | distal manual phalanx | undetermined | adult, first digit, | carbon |

## two old

| VIII | 14 | B | 151 | distal pedal phalanx | undetermined | perinate probably, first digit | 9.97 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 152 | intermediate pedal phalanx | undetermined | probably an adult | 6.19 mm |
| VIII | 14 | B | 153 | proximal manual phalanx fragment | undetermined | damage to the distal and proximal end, probably perinate |  |
| VIII | 14 | B | 154 | distal pedal phalanx | undetermined | adult | 9.88 mm |
| VIII | 14 | B | 155 | temporal fragment | undetermined | adult, tympanic portion fragment |  |
| VIII | 14 | B | 156 | cuboid | left | adult, badly deteriorated |  |
| VIII | 14 | B | 157 | cervical vertebra fragment |  | adult, inferior and superior articular facet fragment |  |
| VIII | 14 | B | 158 | lumbar vertebra |  | adult, probably L5, damage to the lamina, calcite |  |
| VIII | 14 | B | 159 | patella | probable left | adult, calcite, the lateral aspect is absent along with the inferior aspect |  |
| VIII | 14 | B | 160 | metatarsal fragment | undetermined | probable perinate to a year or two, shaft fragment |  |
| VIII | 14 | B | 161 | intermediate manual phalanx | undetermined | young subadult, damage to the distal end prevents |  |

measurement

| VIII | 14 | B | 162 | proximal manual phalanx | undetermined | perinate | 12.2 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 163 | intermediate pedal phalanx | undetermined | adult | 8.94 mm |
| VIII | 14 | B | 164 | second metatarsal fragment | right | adult, head is broken off |  |
| VIII | 14 | B | 165 | third metatarsal | right | adult | 69.43 mm |
| VIII | 14 | B | 166 | metatarsal fragment | undetermined | adult, distal fragment with head and most of the shaft |  |
| VIII | 14 | B | 167 | fifth metatarsal | left | adult | 69.05 mm |
| VIII | 14 | B | 168 | triquetral | right | adult |  |
| VIII | 14 | B | 169 | greater multangular fragment | right | adult, palmar aspect is broken off |  |
| VIII | 14 | B | 170 | proximal manual phalanx | undetermined | perinate | 10.67 mm |
| VIII | 14 | B | 171 | manual phalanx fragment | undetermined | adult, distal fragment |  |
| VIII | 14 | B | 172 | rib fragment | right | subadult, neck and shaft fragment, some calcite, upper rib |  |
| VIII | 14 | B | 173 | thoracic vertebra fragment |  | subadult, lamina fragment unfused to the body |  |
| VIII | 14 | B | 174 | vertebra fragment |  | adult, spinous process probably from a thoracic vertebra |  |


| VIII | 14 | B | 175 | cervical vertebra fragment |  | subadult, neural arch of C1 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 176 | long bone fragment | undetermined | adult, burned |  |
| VIII | 14 | B | 177 | probable sesamoid |  | if not, then it is a subadult carpal or tarsal |  |
| VIII | 14 | B | 178 | rib fragment | undetermined | adult, shaft fragment, carbon, calcite |  |
| VIII | 14 | B | 179 | rib fragment | undetermined | adult, shaft fragment |  |
| VIII | 14 | B | 180 | 4 unidentifiable fragments | undetermined | undetermined |  |
| VIII | 14 | B | 181 | molar | right | first upper, complete with calcite, slightly worn cusps | 12.63 mm anterior to posterior, 11.55 mm lingual to buccal 7.15 mm |
| VIII | 14 | B | 182 | molar | left | upper, possibly second, carabelli's cusp is more than slight, calcite, roots broken | 11 mm anterior to posterior, 12.02 mm lingual to buccal 7.45 mm |
| VIII | 14 | B | 183 | molar | right | third upper | 10.97 mm anterior <br> to posterior, 11.78 mm lingual to buccal 7.43 mm |
| VIII | 14 | B | 184 | premolar | left | first upper, complete with calcite, slightly worn cusps, some calcite | 6.85 mm anterior to posterior, 9.33 mm lingual to buccal 8.99 mm |
| VIII | 14 | B | 185 | premolar | right | second upper, broken root, some calcite | 7.84 mm anterior to posterior, |


|  |  |  |  |  |  |  | 10.09 mm lingual to buccal 8.01 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 186 | premolar | possible left | second lower, no root | 7.55 mm anterior to posterior, 8.56 mm lingual to buccal 7.11 mm |
| VIII | 14 | B | 187 | canine | right | upper, possibly modified with two linear grooves that extend lateral to medial mid way on the enamel crown, calculus on the anterior surface at the CEJ | 7.34 mm anterior to posterior, 8.46 mm lingual to buccal 9.37 mm |
| VIII | 14 | B | 188 | incisor | left | first upper, pronounced shoveling, intact, calculus on anterior surface at the CEJ | 8.99 mm anterior <br> to posterior, <br> 7.8 mm lingual to buccal 11.18 mm |
| VIII | 14 | B | 189 | incisor | probable right | second upper, intact, calculus on anterior surface at the CEJ | 7.28 mm anterior to posterior, 7.05 mm lingual to buccal 10.13 mm |
| VIII | 14 | B | 190 | incisor | probable right | second upper, modified with an Ik that is slightly spaded | 7.28 mm anterior to posterior, 6.56 mm lingual to buccal 9.4 mm |


| VIII | 14 | B | 191 | canine | undetermined | root broken off, might be lower due to the size, worn on the cusp, dentine exposed | 6.87 mm anterior <br> to posterior, <br> 7.27 mm lingual to buccal 10.11 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 192 | incisor | right | upper first, complete, calcite, shoveling | 8.52 mm anterior <br> to posterior, <br> 7.4 mm lingual to buccal 10.14 mm |
| VIII | 14 | B | 193 | canine | undetermined | possible upper due to size, root broken off, slightly worn cusps | 8.33 mm anterior <br> to posterior, 8.45 mm lingual to buccal 10.65 mm |
| VIII | 14 | B | 194 | root fragment | undetermined | possible incisor root |  |
| VIII | 14 | B | 195 | molar | right | lower, probable second, broken roots, some calcite | 10.55 mm anterior <br> to posterior, 10.79 mm lingual to buccal 6.4 mm |
| VIII | 14 | B | 196 | molar | right | lower, probable second, broken roots, some calcite, caries in the grooves | 11.37 mm anterior to posterior, 10.45 mm lingual to buccal 6.97 mm |
| VIII | 14 | B | 197 | molar | right | lower, probable third, crown broke off from root, some calcite | 11.73 mm anterior to posterior, 10.64 mm lingual to buccal 7.3 mm |
| VIII | 14 | B | 198 | molar | left | lower, first molar, broken roots | 12.32 mm anterior to posterior, 10.9 mm lingual |


|  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 199 | molar | right | upper, probably second molar, tips of roots are broken | 10.51 mm anterior to posterior, 11.78 mm lingual to buccal 7.38 mm |
| VIII | 14 | B | 200 | molar | undetermined | upper, possible third right with an extra small cusp or second left with a reduced cusp, roots broken off | 9.7 mm anterior to posterior, 11.67 mm lingual to buccal 6.26 mm |
| VIII | 14 | B | 201 | molar | left | lower first molar, roots broken off | 12.12 mm anterior <br> to posterior, 10.97 mm lingual to buccal 7.23 mm |
| VIII | 14 | B | 202 | molar | left | upper, probable second molar, roots broken off, carabelli's present | 11.61 mm anterior to posterior, 12.38 mm lingual to buccal 6.69 mm |
| VIII | 14 | B | 203 | premolar | right | upper, second, complete, calcite | 7.7 mm anterior to posterior, 10.12 mm lingual to buccal 7.25 mm |
| VIII | 14 | B | 204 | incisor | right | upper lateral, linear enamel defect 3.6 mm above CEJ | 7.17 mm anterior to posterior, 7.43 mm lingual to buccal 11.27 mm |
| VIII | 14 | B | 205 | molar | right | lower, possible third, possibly still developing | 11.79 mm anterior to posterior, 10.48 mm lingual |

to buccal

| VIII | 14 | B | 206 | molar | undetermined | still developing, upper, either right or left second probably |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | B | 207 | molar | undetermined | still developing, upper, either right or left second probably |  |
| VIII | 14 | B | 208 | incisor | undetermined | lower, no roots, worn, anterior chip at occlusal surface | 6.52 mm anterior <br> to posterior, 6.05 mm lingual to buccal |
| VIII | 14 | B | 209 | incisor | undetermined | lower, no roots, worn | 5.82 mm anterior <br> to posterior, <br> 5.76 mm lingual to buccal 9.39 mm |
| VIII | 14 | B | 210 | canine | probable right | lower, no roots, worn | 7.1 mm anterior to posterior, 7.34 mm lingual to buccal 11.32 mm |
| VIII | 14 | B | 211 | canine | undetermined | upper, possibly filed to a point, modified?, root broke off | 8.48 mm anterior to posterior, 9.02 mm lingual to buccal 11.66 mm |
| VIII | 14 | B | 212 | premolar | right | lower second, root broke off | 7.7 mm anterior to posterior, 8.74 mm lingual to buccal 7.63 mm |

upper central, calculus on anterior surface above the CEJ, modified, from the medial occlusal surface, a groove was created that goes up $\quad 8.82 \mathrm{apm} 6.87 \mathrm{~mm}$ towards the center of lingual to buccal

| VIII | 14 | B | 213 | incisor | possible right | the crown | 11.24ch |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 1 | rib fragment | right | adult, calcite, mid rib, <br> vertebral end |  |
| VIII | 14 | C | 2 | rib fragment | undetermined | adult, mid rib, calcite, <br> shaft fragment |  |
| VIII | 14 | C | 3 | rib fragment | undetermined | subadult, mid rib, <br> calcite, shaft fragment |  |
| VIII | 14 | C | 4 | rib fragment | right | subadult, calcite, mid <br> rib, vertebral end |  |
| VIII | 14 | C | 5 | intermediate pedal <br> phalanx |  | adult, calcite | 14.85 mm |
| VIII | 14 | C | 6 | first distal manual <br> phalanx | adult, calcite | 21.23 mm |  |
| VIII | 14 | C | 7 | distal manual phalanx | adult, calcite | 19.42 mm |  |
| VIII | 14 | C | 8 | proximal pedal phalanx |  | adult, calcite |  |
| VIII | 14 | C | 9 | metacarpal fragment |  | subadult, calcite, <br> unfused distal end |  |
| VIII | 14 | C | 10 | metacarpal fragment | subadult, calcite, |  |  |
| VIII | 14 | C | 11 | metacarpal fragment |  | subadult, calcite, <br> unfused distal end |  |


| VIII | 14 | C | 12 | distal manual phalanx |  | adult, calcite | 16.3 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 13 | intermediate manual phalanx |  | adult, calcite | 15.58 mm |
| VIII | 14 | C | 14 | scaphoid | right | adult, calcite, carbon |  |
| VIII | 14 | C | 15 | clavicle fragment | possible right | adult, calcite, shaft fragment |  |
| VIII | 14 | C | 16 | rib fragment | right | adult, calcite, vertebral end fragment, lower rib |  |
| VIII | 14 | C | 17 | rib fragment | right | adult, calcite, vertebral end fragment, lower rib |  |
| VIII | 14 | C | 18 | rib fragment | undetermined | subadult, calcite, shaft fragment, upper rib |  |
| VIII | 14 | C | 19 | rib fragment | undetermined | adult, calcite, shaft fragment, lower rib |  |
| VIII | 14 | C | 20 | rib fragment | undetermined | adult, calcite, shaft fragment, lower rib |  |
| VIII | 14 | C | 21 | phalanx fragment |  | adult, shaft and distal portion, calcite and carbon |  |
| VIII | 14 | C | 22 | neural arch | left | cervical, perinate, calcite |  |
| VIII | 14 | C | 23 | metacarpal fragment | undetermined | adult, calcite, proximal and shaft fragment are badly deteriorated |  |
| VIII | 14 | C | 24 | tibia fragment | left | distal epiphysis, subadult under 9 |  |

## years of age

| VIII | 14 | C | 25 | patella | left | adult calcite | 41.97 mm height, <br> 41.83 mm width |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 26 | scapula fragment | undetermined | adult, glenoid fragment, badly deteriorated |  |
| VIII | 14 | C | 27 | tibia fragment | undetermined | adult, proximal epiphysis fragment with one condyle, probably between 9 and 15 years old |  |
| VIII | 14 | C | 28 | patella fragment | undetermined | superior portion, difficult to side due to morphological damage |  |
| VIII | 14 | C | 29 | intermediate pedal phalanx |  | adult, calcite |  |
| VIII | 14 | C | 30 | distal manual phalanx |  | adult, calcite |  |
| VIII | 14 | C | 31 | hamate | right | adult, calcite and carbon |  |
| VIII | 14 | C | 32 | fifth metatarsal fragment | undetermined | adult, calcite, proximal fragment |  |
| VIII | 14 | C | 33 | epiphysis fragment |  | subadult |  |
| VIII | 14 | C | 34 | proximal manual phalanx |  | adult, calcite, proximal fragment |  |
| VIII | 14 | C | 35 | fifth metatarsal fragment | undetermined | adult, calcite, proximal fragment |  |


| VIII | 14 | C | 36 | thoracic vertebra <br> fragment |  | lamina fragment, <br> possible subadult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 37 | cranial fragments | undetermined | possible parietal, <br> subadult, calcite |
| VIII | 14 | C | 38 | scapula fragment | possible left | coracoid fragment, <br> subadult, unfused |
| VIII | 14 | C | 39 | rib fragment | undetermined | shaft fragment, adult, <br> calcite, mid rib |
| VIII | 14 | C | 40 | vertebra fragment |  | thoracic vertebra <br> fragment, possible <br> subadult, calcite, <br> transverse fragment |
| VIII | 14 | C | 41 | intermediate manual <br> phalanx fragment |  | adult, calcite, damage <br> to proximal and distal <br> ends |
| VIII | 14 | C | 42 | rib fragments | undetermined | adult, calcite |
| VIII | 14 | C | 43 | possible tibia fragment |  | adult, badly <br> deteriorated, calcite |
| VIII | 14 | C | 44 | rib fragments | undetermined | perinate rib fragment, <br> shaft, calcite, |
| VIII | 14 | C | 45 | possible scapula |  |  |
| fragment | undetermined | possible subadult, <br> spine fragment |  |  |  |  |
| VIII | 14 | C | 47 | hamate | left | adult, calcite |
| VIII | 14 | C | 48 | phalanx fragment |  | adult, calcite, damage <br> to the larger facet |
| VII | 14 | C | 49 | adult, calcite, distal |  |  |
| fragment |  |  |  |  |  |  |

deteriorated

| VIII | 14 | C | 50 | vertebra fragment |  | subadult, vertebra body fragment, anterior portion, possible thoracic, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 51 | metacarpal fragment |  | adult, calcite, other material stuck to it, proximal and shaft end |
| VIII | 14 | C | 52 | possible scapula fragment | undetermined | possible coracoid fragment, possible subadult, calcite |
| VIII | 14 | C | 53 | vertebra fragment |  | transverse process with articular facet, adult, calcite |
| VIII | 14 | C | 54 | shaft fragment |  | subadult, shaft fragment, unidentified, calcite |
| VIII | 14 | C | 55 | shaft fragment |  | subadult, shaft fragment, unidentified, calcite |
| VIII | 14 | C | 56 | shaft fragment |  | subadult, shaft fragment, unidentified, calcite |
| VIII | 14 | C | 57 | rib fragment | undetermined | adult, shaft fragment, calcite |
| VIII | 14 | C | 58 | rib fragment | undetermined | adult, shaft fragment, calcite |


| VIII | 14 | C | 59 | radius fragment | undetermined |
| :---: | :---: | :---: | :---: | :---: | :---: | | proximal end, adult, |
| :---: |
| calcite |,

adult, calcite, damage to the lamina

| VIII | 14 | C | 73 | vertebra fragment |  | from blocked passage, thoracic vertebra, damage to right transverse process and body, upper from blocked passage, thoracic, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 74 | calcaneus fragment | left | from blocked passage, medial fragment from an adult, calcite |
| VIII | 14 | C | 75 | first cuneiform | right | from blocked passage, adult, calcite, damaged |
| VIII | 14 | C | 76 | calcaneus fragment | undetermined | from blocked passage, adult, posterior portion with most of the cortical bone missing, calcite |
| VIII | 14 | C | 77 | humerus fragment | undetermined | from blocked passage, head fragment, calcite, probable adult |
| VIII | 14 | C | 78 | humerus fragment | right | from blocked passage, , lateral portion of the distal |

end, adult, calcite

| VIII | 14 | C | 79 | talus fragment | undetermined | from blocked passage, most anterior condyle, adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 80 | vertebra fragment |  | from blocked passage, anterior portion of a body, possibly thoracic, adult, calcite |  |
| VIII | 14 | C | 81 | talus fragment | undetermined | from blocked passage, inferior condyle fragment, adult, calcite |  |
| VIII | 14 | C | 82 | radius fragment | undetermined | from blocked passage, subadult, proximal epiphysis, probably closer to 15 than 9, calcite | $\begin{gathered} 19.3 \mathrm{~mm} \text { head } \\ \text { diameter } \\ \hline \end{gathered}$ |
| VIII | 14 | C | 83 | possible talus fragment | undetermined | from blocked passage, adult, calcite |  |
| VIII | 14 | C | 84 | thoracic vertebra |  | b72, adult, slightly burned, calcite, upper thoracic |  |
| VIII | 14 | C | 85 | thoracic vertebra |  | b72, damage to the lamina and body (not too much), mid thoracic, adult, calcite |  |
| VIII | 14 | C | 86 | cuneiform fragment | right | b72, adult, slightly burned, calcite |  |


| VIII | 14 | C | 87 | humerus fragment | undetermined | b72, adult, slightly burned, calcite, proximal head fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 88 | cervical vertebra fragment |  | b72, mainly just the body, slightly burned, calcite, adult |
| VIII | 14 | C | 89 | vertebra fragment |  | b72, subadult, probably a sacral vertebra, burned with calcite |
| VIII | 14 | C | 90 | vertebra fragment |  | b72, adult, probably thoracic, calcite |
| VIII | 14 | C | 91 | talus fragment | left | b72, adult, slightly burned, calcite, posterior fragment |
| VIII | 14 | C | 92 | calcaneus fragment | left | b72, adult, slightly burned, cortical layer is destroyed, posterior medial fragment, calcite |
| VIII | 14 | C | 93 | humerus fragment | left | b72, subadult, unfused proximal epiphysis, probably closer to 9 than 15 |
| VIII | 14 | C | 94 | vertebra fragment |  | b72, adult, probably thoracic, calcite |
| VIII | 14 | C | 95 | calcaneus fragment | right | b72, adult, slightly burned, cortical layer is destroyed, posterior |



| VIII | 14 | C | 105 | tibia fragment | undetermined | b72, subadult, calcite, unfused distal fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 106 | vertebra fragment |  | b72, subadult, thoracic vertebra fragment of the body |  |
| VIII | 14 | C | 107 | second metatarsal | right | b72, adult, calcite, burnt | 61.04 mm |
| VIII | 14 | C | 108 | talus fragment | undetermined | b72, adult, anterior condyle portion, burnt |  |
| VIII | 14 | C | 109 | vertebra fragment |  | b72, adult, lumbar vertebra fragment, calcite, burnt |  |
| VIII | 14 | C | 110 | ulna fragment | probable left | b72, perinate, calcite, burnt, proximal end |  |
| VIII | 14 | C | 111 | proximal pedal phalanx |  | b72, adult, damage to the shaft, calcite |  |
| VIII | 14 | C | 112 | trapezoid | right | b72, adult, calcite |  |
| VIII | 14 | C | 113 | vertebra fragment |  | b72, adult, spine from a lumbar vertebra, calcite |  |
| VIII | 14 | C | 114 | third cuneiform | possible left | b72, adult, calcite, damaged |  |
| VIII | 14 | C | 115 | third cuneiform | possible right | b72, adult, calcite, damaged |  |
| VIII | 14 | C | 116 | cervical vertebra fragment |  | b72, part of the body and a transverse process, calcite, adult |  |
| VIII | 14 | C | 117 | radius fragment | left | b72, calcite and burnt, subadult, proximal |  |


|  |  |  |  |  |  | end, probably closer to 5 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 118 | 19 unidentified fragments |  | treated with treated with B72 |  |
| VIII | 14 | C | 119 | ulna fragment | right | at blocked passage, covered in a grey calcite, proximal fragment, adult, well defined interosseous crest |  |
| VIII | 14 | C | 120 | occipital fragment |  | at blocked passage, possible subadult based on thinness, there is some porosity evident on the exterior |  |
| VIII | 14 | C | 121 | patella | left | at blocked passage, adult, carbon and calcite | 46.87 mm height, <br> 47.17 mm width |
| VIII | 14 | C | 122 | navicular | right | at blocked passage, adult, carbon and calcite |  |
| VIII | 14 | C | 123 | talus | right | at blocked passage, adult, carbon and calcite, some damage to the anterior facet on the medial aspect | 49.58 mm length, <br> 35.18 mm width |


| VIII | 14 | C | 124 | proximal pedal phalanx | undetermined | at blocked passage, adult, additional bone growth and remodeling around the margin of the proximal facet, first digit, carbon and calcite | $\begin{aligned} & 31.39 \mathrm{~mm} \text { (some } \\ & \text { is growth) } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 125 | proximal pedal phalanx | undetermined | at blocked passage, adult, first digit | 29.36 mm |
| VIII | 14 | C | 126 | proximal manual phalanx | undetermined | at blocked passage, subadult based on size, carbon | 37.28 mm |
| VIII | 14 | C | 127 | proximal manual phalanx fragment | undetermined | at blocked passage, proximal fragment, adult, carbon and calcite |  |
| VIII | 14 | C | 128 | scaphoid | left | at blocked passage, adult, carbon covered |  |
| VIII | 14 | C | 129 | hamate | left | at blocked passage, adult, damage to the posterior surface |  |
| VIII | 14 | C | 130 | hamate | left | at blocked passage, subadult based on size, carbon |  |
| VIII | 14 | C | 131 | scaphoid | left | at blocked passage, subadult based on size, carbon |  |
| VIII | 14 | C | 132 | first metatarsal | right | at blocked passage, adult, carbon | 57.57 mm |


| VIII | 14 | C | 133 | fourth metatarsal | right | at blocked passage, adult, carbon | 62.07 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 134 | proximal pedal phalanx | undetermined | at blocked passage, adult, carbon, first digit | 29.29 mm |
| VIII | 14 | C | 135 | proximal pedal phalanx | undetermined | at blocked passage, adult, carbon, damage to the proximal and distal ends |  |
| VIII | 14 | C | 136 | proximal manual phalanx | undetermined | at blocked passage, subadult, proximal epiphysis is not fused, some damage to the proximal end, carbon | 31.22 mm |
| VIII | 14 | C | 137 | proximal manual phalanx | undetermined | at blocked passage, adult, carbon | 33.7 mm |
| VIII | 14 | C | 138 | proximal manual phalanx | undetermined | at blocked passage, adult, carbon, probably first digit | 25.18 mm |
| VIII | 14 | C | 139 | proximal pedal phalanx | undetermined | at blocked passage, adult, carbon | 26.18 mm |
| VIII | 14 | C | 140 | cervical vertebra fragment | undetermined | at blocked passage, left portion of C 1 , possibly older subadult |  |
| VIII | 14 | C | 141 | second cuneiform | left | at blocked passage, adult, carbon |  |
| VIII | 14 | C | 142 | neural arch fragment | right | at blocked passage, probably older subadult, lumbar |  |

at blocked passage, proximal fragment, adult, carbon and

| VIII | 14 | C | 143 | second metatarsal fragment | right | adult, carbon and calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 144 | third metacarpal | left | at blocked passage, subadult based on size, but fully fused | 54.54 mm |
| VIII | 14 | C | 145 | fourth metacarpal | left | at blocked passage, subadult based on size, but fully fused | 47.14 mm |
| VIII | 14 | C | 146 | fourth metatarsal | left | at blocked passage, adult, carbon | 62.86 mm |
| VIII | 14 | C | 147 | distal manual phalanx | undetermined | at blocked passage, probable adult, carbon | 15.84 mm |
| VIII | 14 | C | 148 | intermediate manual phalanx | undetermined | at blocked passage, adult, carbon | 13.63 mm |
| VIII | 14 | C | 149 | first metacarpal | undetermined | at blocked passage, subadult, epiphyses are not fused yet, carbon | 18.94 mm |
| VIII | 14 | C | 150 | proximal pedal phalanx | undetermined | at blocked passage, adult, carbon, damage to the proximal end | 21.56 mm |
| VIII | 14 | C | 151 | intermediate manual $\qquad$ | undetermined | at blocked passage, subadult, epiphyses are not fused yet, carbon | 20.84 mm |
| VIII | 14 | C | 152 | proximal manual phalanx | undetermined | at blocked passage, subadult, epiphyses | 21.76 mm |


|  |  |  |  |  |  | are not fused yet, carbon |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 153 | proximal manual phalanx | undetermined | at blocked passage, subadult, epiphyses are not fused yet, carbon | 15.57 mm |
| VIII | 14 | C | 154 | manual phalanx | undetermined | at blocked passage, subadult, probably the first digit either intermediate or distal | 12.64 mm |
| VIII | 14 | C | 155 | distal manual phalanx | undetermined | at blocked passage, subadult (older than number 155 probably), probably first digit | 19.22 mm |
| VIII | 14 | C | 156 | metacarpal | undetermined | at blocked passage, perinate to a year based on size, carbon | 28.63 mm |
| VIII | 14 | C | 157 | metacarpal | undetermined | at blocked passage, perinate to a year based on size, carbon | 26.62 mm |
| VIII | 14 | C | 158 | metatarsal | undetermined | at blocked passage, perinate to a year based on size, carbon | 23.94 mm |
| VIII | 14 | C | 159 | proximal manual phalanx | undetermined | at blocked passage, perinate to a year based on size, carbon | 20.7 mm |
| VIII | 14 | C | 160 | proximal manual phalanx | undetermined | at blocked passage, perinate to a year based on size, carbon | 18.87 mm |


| VIII | 14 | C | 161 | proximal manual phalanx | undetermined | at blocked passage, perinate to a year based on size, carbon, first digit | 29.48 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 162 | intermediate pedal phalanx | undetermined | at blocked passage, adult, carbon | 22.54 mm |
| VIII | 14 | C | 163 | metacarpal | undetermined | at blocked passage, perinate to a year based on size, carbon | 37.07 mm |
| VIII | 14 | C | 164 | lumbar body |  | at blocked passage, unfused body, probably under 2 years of age, carbon |  |
| VIII | 14 | C | 165 | thoracic body |  | at blocked passage, unfused body, probably under 2 years of age, carbon |  |
| VIII | 14 | C | 166 | fifth metacarpal | left | at blocked passage, adult, calcite and carbon, rather gracile |  |
| VIII | 14 | C | 167 | radius fragment | undetermined | at blocked passage, proximal fragment with some of the shaft, roughly 1.5 years old, carbon |  |
| VIII | 14 | C | 168 | rib fragment | right | at blocked passage, lower rib, subadult, carbon |  |
| VIII | 14 | C | 169 | horn of cornu | probable right | at blocked passage, probable older |  |

$\left.\begin{array}{ccccccccc} & & & & & & \begin{array}{c}\text { subadult, posterior } \\ \text { portion has a little } \\ \text { damage, carbon }\end{array} \\ \hline \text { VIII } & 14 & \text { C } & 170 & \text { rib fragment } & & \text { right } & \begin{array}{c}\text { at blocked passage, } \\ \text { adult, }\end{array} & \\ \hline \text { VIII } & 14 & \text { C } & 171 & \text { sesamoid } & & \text { at blocked passage, } \\ \text { adult }\end{array}\right]$

| VIII | 14 | C | 180 | second metacarpal | right | subadult, distal epiphysis is not fused yet, probably close to 15 years of age | 61.24 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 181 | third metacarpal | right | subadult, damage to the distal end, but it is still evident that the distal epiphysis is not fused yet, probably close to 15 years of age | 60.45 mm |
| VIII | 14 | C | 182 | fourth metacarpal | right | subadult, head is unfused, carbon | 50.55 mm |
| VIII | 14 | C | 183 | fifth metacarpal | left | adult, defined muscle attachments | 53.65 mm |
| VIII | 14 | C | 184 | metatarsal fragment | undetermined | adult, distal head fragment with some of the shaft |  |
| VIII | 14 | C | 185 | metatarsal fragment | undetermined | adult, distal head fragment with some of the shaft |  |
| VIII | 14 | C | 186 | patella | right | adult, carbon | 42.11 mm height, 44.14 mm width |
| VIII | 14 | C | 187 | patella | right | probable subadult based on size, carbon, damage to the medial and lateral edges | 14.8 mm height |
| VIII | 14 | C | 188 | thoracic vertebra |  | adult, significant damage throughout, demi facet indicates it |  |

is a lower thoracic

| VIII | 14 | C | 189 | radius fragment | probable right | adult, proximal fragment with the tibial tuberosity, carbon | 19.25 mm head diameter |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 190 | rib fragment | right | adult, first rib shaft fragment |  |
| VIII | 14 | C | 191 | rib fragment | right | adult, vertebral end, carbon, lower rib |  |
| VIII | 14 | C | 192 | rib fragment | undetermined | adult, shaft fragment mid to upper rib |  |
| VIII | 14 | C | 193 | metatarsal fragment | undetermined | adult, mostly a shaft fragment, but the little bit of proximal available is suggestive of the fourth metatarsal, blackened |  |
| VIII | 14 | C | 194 | fifth metacarpal fragment | left | adult, blackened, proximal and shaft fragment |  |
| VIII | 14 | C | 195 | fifth metatarsal fragment | probable left | subadult, head is not fused, probably around 15 years of age |  |
| VIII | 14 | C | 196 | proximal manual phalanx | undetermined | subadult, proximal epiphysis is not fused yet, blackened |  |
| VIII | 14 | C | 197 | rib fragment | right | adult, vertebral end, |  |


| carbon, upper rib |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 198 | rib fragment | right | adult, vertebral end, carbon, upper rib |  |
| VIII | 14 | C | 199 | rib fragment | undetermined | adult, shaft fragment, mid to lower rib |  |
| VIII | 14 | C | 200 | rib fragment | undetermined | adult, shaft fragment, mid to lower rib |  |
| VIII | 14 | C | 201 | radius fragment | undetermined | subadult, aprox. 1.5 years old, proximal end, blackened |  |
| VIII | 14 | C | 202 | humerus fragment | undetermined | distal fragment, subadult aprox. 1.5 years of age |  |
| VIII | 14 | C | 203 | navicular fragment | probable right | adult, mostly the dorsal aspect |  |
| VIII | 14 | C | 204 | proximal pedal phalanx | undetermined | adult, first digit, some damage to the distal end |  |
| VIII | 14 | C | 205 | radius epiphysis | right | subadult, distal epiphysis, probably a little over 5 years of age |  |
| VIII | 14 | C | 206 | shaft fragment | undetermined | blackened |  |
| VIII | 14 | C | 207 | canine | left | adult, upper, calcite | 6.88 mm lingual to buccal, 8.08 anterior to posterior |
| VIII | 14 | C | 208 | rib fragment | undetermined | adult, shaft fragment blackened |  |
| VIII | 14 | C | 209 | navicular | left | adult, slight |  |

blackening

| blackening |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 210 | navicular | left | adult, some damage and blackening |  |
| VIII | 14 | C | 211 | first cuneiform | right | adult, some damage to the plantar surface, blackening |  |
| VIII | 14 | C | 212 | intermediate manual phalanx | undetermined | adult, some blackening | 27.7 mm |
| VIII | 14 | C | 213 | proximal pedal phalanx | undetermined | adult, some blackening, first digit | 25.9 mm |
| VIII | 14 | C | 214 | proximal manual $\qquad$ | undetermined | subadult, proximal epiphysis is not fused, some blackening, probably around 8 years of age | 32.87 mm |
| VIII | 14 | C | 215 | proximal pedal phalanx | undetermined | adult, some blackening | 23 mm |
| VIII | 14 | C | 216 | fifth metacarpal fragment | left | adult, proximal end with most of the shaft, some blackening |  |
| VIII | 14 | C | 217 | second metatarsal fragment | left | adult, proximal and shaft fragment, some blackening |  |
| VIII | 14 | C | 218 | third metatarsal | right | adult, damage to the head prevents measurement, some blackening |  |


| VIII | 14 | C | 219 | metatarsal fragment | undetermined | adult, mostly a shaft fragment, blackened, damage to the proximal end prevents further identification |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 220 | scaphoid | left | adult, some blackening |  |
| VIII | 14 | C | 221 | intermediate manual phalanx | undetermined | adult, some blackening | 22.35 mm |
| VIII | 14 | C | 222 | metacarpal fragment | undetermined | perinate | 23.28 mm |
| VIII | 14 | C | 223 | proximal pedal phalanx fragment | undetermined | adult, distal and shaft end |  |
| VIII | 14 | C | 224 | ulna fragment | left | adult, proximal fragment, blackened |  |
| VIII | 14 | C | 225 | rib fragment | undetermined | adult, shaft fragment, lower rib, blackening |  |
| VIII | 14 | C | 226 | first metatarsal fragment | left | adult, blackened, distal end is badly damaged |  |
| VIII | 14 | C | 227 | humerus fragment | right | subadult, distal fragment with damage to the distal posterior surface, but most of the shaft, blackening, probably around 1.5-2 years of age |  |
| VIII | 14 | C | 228 | thoracic vertebra fragment |  | adult, body fragment, mid thoracic, slight |  |

blackening

| VIII | 14 | C | 229 | cervical vertebra fragment |  | adult, body fragment with part of the left transverse process |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 230 | third cuneiform | right | adult |
| VIII | 14 | C | 231 | rib fragment | left | subadult, most of the first rib, only light blackening |
| VIII | 14 | C | 232 | patella | right | adult, damage to the distal and medial edges prevents measurement, blackened |
| VIII | 14 | C | 233 | vertebra body |  | subadult 2-4 years old, probable thoracic |
| VIII | 14 | C | 234 | vertebra body |  | subadult 2-4 years old, possible lumbar or lower thoracic |
| VIII | 14 | C | 235 | neural arch fragment | left | subadult 2-4 years old, thoracic |
| VIII | 14 | C | 236 | neural arch fragment | right | subadult 2-4 years old, thoracic |
| VIII | 14 | C | 237 | neural arch fragment | right | subadult 2-4 years old, cervical |
| VIII | 14 | C | 238 | neural arch fragment | undetermined | subadult, probably closer to 4 or 5 based on size, possibly C1 based on the relationship between |

superior and inferior articular facets

| VIII | 14 | C | 239 | neural arch fragment | undetermined | subadult, probably closer to 4 or 5 based on size, possibly C1 based on the relationship between superior and inferior articular facets |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 240 | neural arch fragment | right | subadult, 2-4 years old, probable cervical |  |
| VIII | 14 | C | 241 | neural arch fragment | left | subadult, 2-4 years old, probable cervical |  |
| VIII | 14 | C | 242 | ischium fragment | right | perinate, posterior fragment without the section that will become the lunate surface |  |
| VIII | 14 | C | 243 | rib fragment | undetermined | possible perinate, shaft fragment |  |
| VIII | 14 | C | 244 | rib fragment | undetermined | possible perinate, shaft fragment |  |
| VIII | 14 | C | 245 | intermediate manual phalanx | undetermined | adult, burnt | 26.49 mm |
| VIII | 14 | C | 246 | unidentified fragments |  | 4 unidentified fragments |  |
| VIII | 14 | C | 247 | shaft fragments |  | 6 shaft fragments, heavily burned |  |

subadult, shaft fragment, one of the epiphyses is not fused, the other is broken off, burned adult, shaft fragments, needs

| VIII | 14 | C | 249 | ulna fragment | possible left | conservation, burned |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | possible perinate, <br> neck and shaft <br> fragment of the first |  |
| VIII | 14 | C | 250 | rib fragment | right | rib |
| VIII | 14 | C | 251 | neural arch fragment |  | possible perinate |
| VIII | 14 | C | 252 | neural arch fragment | possible perinate |  |


| VIII | 14 | C | 253 | proximal pedal phalanx | undetermined | perinate | 10.37 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 254 | canine | left | adult, upper, dental modification, groove extends from the medial edge at a slight upward angle to just beyond the center portion of the tooth, slight wear | 8.4 mm anterior <br> to posterior, 8.38 mm lingual to buccal 10 mm |
| VIII | 14 | C | 255 | incisor | left | adult, second lower, major shoveling, wear is a thin line | $6.76 \mathrm{~lm}, 6.06 \mathrm{~mm}$ lingual to buccal 8.85 mm |
| VIII | 14 | C | 256 | incisor | left | adult lower, calculus on the lingual and buccal surfaces at the | $4.93 \mathrm{ml}, 6.38 \mathrm{~mm}$ lingual to buccal 8.8 mm |


| VIII | 14 | C | 257 | incisor | right | deciduous, upper first | $6.86 \mathrm{ml}, 4.78 \mathrm{~mm}$ lingual to buccal 6.92ch |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 258 | neural arch fragment | right | perinate, thoracic probably |  |
| VIII | 14 | C | 259 | premolar | possible right | adult, lower first, root broken | 7.84 mm anterior to posterior, 9.14 mm lingual to buccal 7.38 mm |
| VIII | 14 | C | 260 | molar | left | adult, lower first, appears to have belonged to a younger individual because the crowns are not worn, roots are broken | 11.14 mm anterior to posterior, 9.4 mm lingual to buccal 7.46 mm |
| VIII | 14 | C | 261 | molar | right | adult, lower first, buccal carries in the groove | 11.58 mm anterior to posterior, 10.28 mm lingual to buccal 6.55 crown height |
| VIII | 14 | C | 262 | incisor | left | deciduous, upper first, root tip broken | 5.58 mm anterior to posterior, 5.14 mm lingual to buccal 5.86 mm |


| VIII | 14 | C | 263 | humerus fragment | right | adult, distal fragment in two pieces, already treated with treated with B72, cannot sex due to damage |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 264 | ulna fragment | left | proximal fragments, adult, needs conservation, already treated with treated with B72, blackened |
| VIII | 14 | C | 265 | femur fragment | left | adult, somewhat gracile, blackened, damage to the head prevents measurement, treated with b-72 |
| VIII | 14 | C | 266 | femur fragment | right | adult, somewhat gracile, blackened, head is broken off, treated with treated with B72 |
| VIII | 14 | C | 267 | femur fragment | left | adult, distal fragment of the medial condyle, many fragments, needs conservation, treated with treated with B72 |
| VIII | 14 | C | 268 | os coxa fragments | undetermined | adult, blackened and warped, needs conservation, treated with treated with B72 |

adult, blackened,
treated with treated

| VIII | 14 | C | 269 | calcaneus fragment | probable left | with B72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | C | 270 | thoracic vertebra fragment |  | subadult, lines at the pedicle still visible, probably around 5 or 6 years of age, lamina is broken off and the body is badly deteriorated, treated with treated with B72 |
| VIII | 14 | C | 271 | pubis fragment | right | probable adult, the pubic symphysis is too worn to age |
| VIII | 14 | C | 272 | long bone fragment | undetermined | subadult, possible tibia fragment, large unfused epiphysis on one end, burned, treated with treated with B72 |
| VIII | 14 | D | 1 | scaphoid | right | adult |
| VIII | 14 | D | 2 | scaphoid | left | adult |
| VIII | 14 | D | 3 | lunate | left | adult |
| VIII | 14 | D | 4 | lunate | right | adult |
| VIII | 14 | D | 5 | fourth metatarsal | right | 61.68 |
| VIII | 14 | D | 6 | fourth metatarsal | left | 60.41 |
| VIII | 14 | D | 7 | third metatarsal | left | 67.63 |
| VIII | 14 | D | 8 | fifth metatarsal | right | 60.59 |
| VIII | 14 | D | 9 | patella | left | $\begin{aligned} & 38.95 \text { height, } \\ & \text { 43.23idth } \end{aligned}$ |


| VIII | 14 | D | 10 | thoracic vertebra fragment |  | adult, lamina fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | D | 11 | occipital fragment | left | occipital condyle fragment |  |
| VIII | 14 | D | 12 | parietal fragments | left and right | suture still open, young adult |  |
| VIII | 14 | D | 13 | proximal pedal phalanx |  | adult, there is an abnormal growth on the proximal end's superior surface, it is characteristically similar to early development of gout without the destructive qualities | 26.72 mm |
| VIII | 14 | D | 14 | distal pedal phalanx |  |  |  |
| VIII | 14 | D | 15 | distal pedal phalanx |  |  |  |
| VIII | 14 | D | 16 | interproximal pedal phalanx |  |  |  |
| VIII | 14 | D | 17 | sesamoid |  |  |  |
| VIII | 14 | D | 18 | metatarsal fragment |  | unfused head |  |
| VIII | 14 | D | 19 | calcaneus fragment | right | medial fragment from an adult |  |
| VIII | 14 | D | 20 | cervical vertebra fragment |  | adult, body fragment with a transverse foramen |  |
| VIII | 14 | D | 21 | cervical vertebra fragment |  | right lamina fragment from an adult |  |


| VIII | 14 | D | 22 | first manual proximal <br> phalanx | subadult, unfused <br> proximal phalanx |
| :--- | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | D | 23 | hyoid fragment | unfused hyoid body |
| VIII | 14 | D | 24 | cranial fragment |  |
| VIII | 14 | D | 25 | cranial fragment | slight microporosity <br> and pitting, diploë <br> appears somewhat <br> expanded |
| VIII | 14 | D | 26 | zygomatic fragment | right |


| VIII | 14 | E | 1 | molar | right | root broken off, lower first | 11.85 mm anterior to posterior, 10.53 mm lingual to buccal7.27ch |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | E | 2 | molar | left | root broken off, lower first | 11.92 mm anterior to posterior, 10.39 mm lingual to buccal8.28ch |
| VIII | 14 | E | 3 | molar | right | lower deciduous molar, massive caries on the occlusal surface | 10.82 mm anterior to posterior, 9.23 mm lingual to buccal5.52ch |
| VIII | 14 | E | 4 | canine | right | possibly upper, deciduous | 6.77 mm anterior <br> to posterior, 6.16 mm lingual to buccal7.29ch |
| VIII | 14 | E | 5 | canine | left | possibly lower, deciduous | 5.64 mm anterior to posterior, 5.26 mm lingual to buccal7.29ch |
| VIII | 14 | E | 6 | incisor | undetermined | probably lower lateral, belonging to 8 and 9 , root not fully developed |  |
| VIII | 14 | E | 7 | incisor | undetermined | probable lower central, belonging to 8 and 9 , root not fully |  |


| VIII | 14 | E | 8 | mandible fragments | numerous small subadult mandible fragments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 14 | E | 9 | mandible fragment |  subadult, a premolar <br> is still in development  <br> in the crypt, probably  <br> around 4-5 years of  <br> age based on this and  <br> other teeth from the  <br> anterior/left  <br> portion deposit |
| VIII | 15 | a | 1 | tibia fragment |  |
| VIII | 15 | a | 2 | tibia fragments |  |
| VIII | 15 | a | 3 | proximal manual phalanx |  |
| VIII | 15 | a | 4 | proximal pedal phalanx |  |
| VIII | 15 | a | 5 | distal pedal phalanx |  |
| VIII | 15 | a | 6 | proximal pedal phalanx |  |
| VIII | 15 | a | 7 | metatarsal fragment |  |
| VIII | 15 | a | 8 | first metacarpal fragment |  |
| VIII | 15 | a | 9 | fourth metatarsal fragment |  |
| VIII | 15 | a | 10 | proximal pedal phalanx fragment |  |
| VIII | 15 | a | 11 | scaphoid |  |


| VIII | 15 | a | 12 | second cuneiform |
| :--- | :--- | :--- | :--- | :---: |
| VIII | 15 | a | 13 | third cuneiform |
| VIII | 15 | a | 14 | first cuneiform |
| VIII | 15 | a | 15 | talus fragment |
| VIII | 15 | a | 16 | proximal pedal phalanx |
|  |  |  |  | proximal pedal phalanx |
| VIII | 15 | a | 16 | prat |
|  |  |  |  | first metatarsal |
| VIII | 15 | a | 17 | fragment |
|  |  |  |  | first metatarsal |
| VIII | 15 | a | 17 | fragment |
| VIII | 15 | a | 18 | calcaneus fragment |
| VIII | 15 | a | 18 | calcaneus fragment |
| VIII | 15 | a | 19 | vertebra fragment |
| VIII | 15 | a | 19 | vertebra fragment |
| VIII | 15 | a | 20 | molar |
| VIII | 15 | a | 21 | molar |
| VIII | 15 | a | 22 | molar |
| VIII | 15 | a | 23 | premolar |
| VIII | 15 | a | 24 | incisor |
| VIII | 15 | a | 25 | premolar |
| VIII | 15 | a | 26 | canine |

upper central,

| ? (found |  | calculus on anterior <br> in a | 8.92 mm anterior <br> surface above the | to posterior, |
| :---: | :---: | :---: | :---: | :---: |

surface, a groove was created that goes up towards the center of the crown

| VIII | 16 | $\begin{gathered} ? \\ \text { (probably } \\ \text { a or B) } \end{gathered}$ | 1 | humerus fragments | left | distal fragment with much of the shaft, triangular shaped fossa, level medial epicondyle, spool shaped trochlea |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | $\begin{gathered} ? \\ (\text { probably } \\ \text { a or B) } \end{gathered}$ | 2 | ulna fragment | right | proximal fragment, adult, calcite |
| VIII | 16 | $\begin{gathered} ? \\ \text { (probably } \\ \text { a or B) } \end{gathered}$ | 3 | ulna fragment | left | proximal fragment, adult, calcite |
| VIII | 16 | $\begin{gathered} ? \\ \text { (probably } \\ \text { a or B) } \\ \hline \end{gathered}$ | 4 | calcaneus | right | adult, little calcite |
| VIII | 16 | $\begin{gathered} ? \\ \text { (probably } \\ \text { a or B) } \\ \hline \end{gathered}$ | 5 | clavicle fragment | left | lateral fragment, gracile, calcite |




| VIII | 16 | $\begin{gathered} ? \\ \text { (probably } \\ \text { a or B) } \end{gathered}$ | 19 | os coxa fragment | right | the iliopubic ramus, gracile, probably subadult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 1 | patella | right | covered in calcium and carbon | 45.12 mm height, 42.79 mm width |
| VIII | 16 | a | 2 | talus | right | $\begin{aligned} & 44.86 \text { length, } 37.28 \\ & \text { width } \\ & \hline \end{aligned}$ |  |
| VIII | 16 | a | 3 | patella | left | 37.11 height, different person than 1 |  |
| VIII | 16 | a | 4 | scapula fragment | right | lateral fragment, damage to the superior margin of the glenoid | 27.83 mm width |
| VIII | 16 | a | 5 | sternum fragment |  | most of the sternum, <br> light carbon and calcite |  |
| VIII | 16 | a | 6 | first metatarsal | right | darker staining on the superior surface, indicating it was plantar side up for a long period of time |  |
| VIII | 16 | a | 7 | radius fragment | right | proximal fragment | 19.22 diameter head |
| VIII | 16 | a | 8 | rib fragment | left | shaft fragment, calcite and carbon covered |  |
| VIII | 16 | a | 9 | rib fragment | left | shaft fragment, calcite and carbon covered |  |


| VIII | 16 | a | 10 | rib fragment | left | shaft fragment, calcite <br> and carbon covered |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 11 | rib fragment | left | vertebral and shaft <br> fragment, completely <br> covered in calcite |
| VIII | 16 | a | 12 | rib fragment | right | vertebral fragment |
| VIII | 16 | a | 13 | rib fragment | right | vertebral fragment, <br> completely covered in <br> calcite and carbon |
| VIII | 16 | a | 14 | rib fragment | right | vertebral fragment, <br> completely covered in <br> calcite and carbon |
| VIII | 16 | a | 15 | rib fragment | right | vertebral fragment, <br> completely covered in <br> calcite and carbon |
| VIII | 16 | a | 16 | rib fragment | right | vertebral fragment, <br> completely covered in <br> calcite and carbon |
| VIII | 16 | a | 17 | rib fragment | right | shaft fragment, calcite <br> and carbon covered |
| VIII | 16 | a | 18 | rib fragment | right | shaft fragment, calcite <br> and carbon covered |
| VIII | 16 | a | 19 | rib fragment | right | vertebral fragment, <br> completely covered in <br> calcite and carbon |
| VIII | 16 | a | 21 | rib fragment | rib fragment | undetermined |


| and carbon covered |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 23 | rib fragment | undetermined | shaft fragment, calcite and carbon covered |  |
| VIII | 16 | a | 24 | rib fragment | undetermined | shaft fragment, light calcium and carbon |  |
| VIII | 16 | a | 25 | rib fragment | right | shaft fragment, calcite and carbon covered |  |
| VIII | 16 | a | 26 | tibia fragment | right | proximal and shaft fragment, proximal epiphysis is not fused, probably younger than 16 , older than 9 , calcite on posterior surface |  |
| VIII | 16 | a | 27 | femur fragment | right | distal end, calcite and carbon, distal epiphysis unfused, probably same person as 26 |  |
| VIII | 16 | a | 28 | humerus fragment | right | shaft fragment right below the head, calcite on the anterior surface |  |
| VIII | 16 | a | 29 | talus | left | small, probably subadult | 45.49 mm length, 34.19 mm width |
| VIII | 16 | a | 30 | manubrium |  | epiphysis that connects to the body is not fused |  |
| VIII | 16 | a | 31 | navicular | right | small, probably subadult |  |


| VIII | 16 | a | 32 | occipital fragments |  | light calcite, subadult probably |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 33 | rib fragments | right | long shaft fragment and a sternal end fragment, phase 1 indicates a younger person, calcite covered |  |
| VIII | 16 | a | 34 | cervical fragments |  | small, probably subadult, probably <br> C3-C6 |  |
| VIII | 16 | a | 35 | rib fragment | undetermined | shaft fragment, calcite and carbon covered |  |
| VIII | 16 | a | 36 | rib fragment | undetermined | shaft fragment, calcite and carbon covered |  |
| VIII | 16 | a | 37 | radius fragment | left | proximal end, head too damaged to measure |  |
| VIII | 16 | a | 38 | clavicle | right | complete, almost completely covered in calcite, rather large | 17.1 cm long |
| VIII | 16 | a | 39 | cervical vertebra |  | C1, adult, covered in calcite |  |
| VIII | 16 | a | 40 | cervical vertebra fragment |  | C1, adult, covered in calcite, right portion |  |
| VIII | 16 | a | 41 | proximal manual phalanx |  | defined lateral ridges | 46.5 mm |
| VIII | 16 | a | 42 | proximal manual phalanx |  | defined lateral ridges | 36.77 mm |


| VIII | 16 | a | 43 | proximal manual phalanx fragment |  | distal fragment, reddish color |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 44 | first proximal manual phalanx |  |  | 34.11 mm |
| VIII | 16 | a | 45 | fourth metacarpal | right |  | 61.84 mm |
| VIII | 16 | a | 46 | proximal pedal phalanx |  | soil discoloration on the dorsal surface | 32.22 mm |
| VIII | 16 | a | 47 | humerus fragment | right | head and neck fragment, covered in calcite, damage to the head prevents measurement |  |
| VIII | 16 | a | 48 | scapula fragment | left | glenoid, lateral fragment, thick layer of calcite prevents measuring |  |
| VIII | 16 | a | 49 | scapula fragment | right | glenoid, lateral fragment, 1glenoid broken |  |
| VIII | 16 | a | 50 | femur fragment | left | distal fragment, very large, thick covering of calcite |  |
| VIII | 16 | a | 51 | rib fragment | left | neck fragment upper rib, covered in calcite |  |
| VIII | 16 | a | 52 | lumbar vertebra |  | second lumbar, body epiphyses are not fused |  |
| VIII | 16 | a | 53 | thoracic vertebra |  | upper thoracic |  |
| VIII | 16 | a | 54 | proximal manual phalanx |  |  | 43.15 mm |


| VIII | 16 | a | 55 | fifth metacarpal | right |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 56 | proximal manual phalanx |  | calcite and carbon covered | 38.84 mm |
| VIII | 16 | a | 57 | proximal pedal phalanx |  | subadult, proximal epiphysis is not fully fused | 28.86 mm |
| VIII | 16 | a | 58 | thoracic vertebra fragment |  | missing transverse processes, calcite covered, mid thoracic |  |
| VIII | 16 | a | 59 | thoracic vertebra fragment |  | body only, calcite covered |  |
| VIII | 16 | a | 60 | thoracic vertebra fragment |  | body is broken, covered in calcite, probably T2-5 |  |
| VIII | 16 | a | 61 | cervical vertebra |  | second cervical vertebra, covered in calcite |  |
| VIII | 16 | a | 62 | lumbar vertebra |  | third lumbar vertebra, covered in calcite |  |
| VIII | 16 | a | 63 | radius fragment | right | proximal fragment, light calcite, head unfused, older than 5 |  |
| VIII | 16 | a | 64 | clavicle fragment | left | shaft fragment, covered in calcite, mate to 65 |  |
| VIII | 16 | a | 65 | clavicle fragment | right | shaft fragment, covered in calcite, mate to 64 |  |
| VIII | 16 | a | 66 | second metacarpal | right |  |  |
| VIII | 16 | a | 67 | first metacarpal | right | calcite and carbon |  |


shaft only, covered in calcite, deltoid is well defined, lateral and anterior surfaces have

| VIII | 16 | a | 79 | humerus fragment | left | most of the calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 80 | fibula fragment | undetermined | shaft fragment, light <br> calcite and carbon |
| VIII | 16 | a | 81 | ulna fragment | left | shaft fragment |
| VIII | 16 | a | 82 | radius fragment | possible right |  |
| VIII | 16 | a | 83 | ulna fragment | right | shaft fragment, light <br> calcite and carbon |
| VIII | 16 | a | 84 | damage to the right <br> lamina, upper |  |  |
| thoracic vertebra |  |  |  |  |  |  |
| fragment |  | thoracic, covered in <br> calcite |  |  |  |  |
| VIII | 16 | a | 85 | damage to the <br> transverse processes, <br> mid thoracic, covered <br> in calcite |  |  | body only, lower thoracic most likely,


| VIII | 16 | a | 86 | thoracic vertebra |
| :--- | :---: | :---: | :---: | :---: |$\quad$| thoracic most likely |
| :---: |
| covered in calcite |

two pieces that mend, distal and proximal
epiphyses are not yet fused, between
perinate and 1.5 years
of age, covered in

| VIII | 16 | a | 87 | humerus fragments |  | calcite | 99.28 mm length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 88 | rib fragment | left | shaft fragment, |  |


|  |  |  |  |  |  | overed in calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 89 | rib fragment | undetermined | shaft fragment, covered in calcite |
| VIII | 16 | a | 90 | rib fragment | undetermined | shaft fragment, covered in calcite |
| VIII | 16 | a | 91 | rib fragment | right | only a little calcite and carbon |
| VIII | 16 | a | 92 | radius fragment | right | distal fragment |
| VIII | 16 | a | 93 | radius fragment | left | distal fragment |
| VIII | 16 | a | 94 | frontal fragments |  | two fragments over the left eye orbit, the orbital margin is blunt and there is a slight torus, indicating possible male |
| VIII | 16 | a | 95 | frontal fragment |  | fragment over the right eye, blunt margin, mild torus, possible male, possibly the same individual as 94 |
| VIII | 16 | a | 96 | mandible fragment |  | left part of the mandible with the second premolar and first two molars present, the first premolar root is in the socket, covered in calcite, chin is more masculine than |


| VIII | 16 | a | 97 | humerus fragment | right | distal fragment, calcite on anterior surface, triangle shaped fossa, level medial epicondyle, spool like trochlea, wide angle |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 98 | parietal fragment | undetermined | covered in calcium and carbon |
| VIII | 16 | a | 99 | humerus fragment | left | distal fragment, completely covered in calcite, triangular shaped fossa |
| VIII | 16 | a | 100 | ulna fragment | right | proximal fragment, completely covered in calcite |
| VIII | 16 | a | 101 | femur fragment | undetermined | shaft fragment, covered in calcite |
| VIII | 16 | a | 102 | humerus fragment | left | completely covered in calcite, triangular shaped fossa, level medial epicondyle |
| VIII | 16 | a | 103 | lumbar vertebra |  | probably third lumbar, completely covered in calcite |

probably fourth lumbar, completely

| VIII | 16 | a | 104 | lumbar vertebra |  | covered in calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 105 | lumbar vertebra fragments |  | upper lumbar, same quantity of calcite as 103 and 104 |  |
| VIII | 16 | a | 106 | lumbar vertebra |  | probably fifth lumbar, lamina broken off, completely covered in calcite |  |
| VIII | 16 | a | 107 | parietal fragment | undetermined | completely covered in calcite |  |
| VIII | 16 | a | 108 | rib fragment | right | vertebral end fragment, middle rib |  |
| VIII | 16 | a | 109 | rib fragment | undetermined | shaft fragment |  |
| VIII | 16 | a | 110 | rib fragment | left | shaft fragment, some calcite |  |
| VIII | 16 | a | 111 | radius fragment | undetermined | shaft fragment |  |
| VIII | 16 | a | 112 | proximal manual phalanx |  | well defined lateral ridges | 41.77 mm |
| VIII | 16 | a | 113 | intermediate manual phalanx |  | well defined lateral ridges | 24.93 mm |
| VIII | 16 | a | 114 | third metacarpal | right |  | 71.32 mm |
| VIII | 16 | a | 115 | first metatarsal | left | covered in calcium and carbon, only part of the superior surface is not covered | 61.46 mm |
| VIII | 16 | a | 116 | radius fragment | undetermined | completely covered in calcite |  |
| VIII | 16 | a | 117 | rib | left | first rib, calcite and |  |


|  |  |  |  |  | carbon covered |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 118 | thoracic vertebra |  | mid thoracic, subadult, body is not yet fused |  |
| VIII | 16 | a | 119 | thoracic vertebra |  | lipping on the superior and anterior portions of the body, damage to the lamina, mid thoracic, light calcite |  |
| VIII | 16 | a | 120 | thoracic vertebra |  | mid thoracic, subadult, body is not yet fused, calcite |  |
| VIII | 16 | a | 121 | os coxa fragment | left | acetabular fossa and most of the ischium |  |
| VIII | 16 | a | 122 | thoracic vertebra |  | upper thoracic, possibly the first, completely covered in calcite |  |
| VIII | 16 | a | 123 | thoracic vertebra fragment |  | lamina fragment, mid thoracic region, covered in calcite |  |
| VIII | 16 | a | 124 | first proximal pedal phalanx |  | subadult, proximal end epiphysis line still visible | 32.31 mm |
| VIII | 16 | a | 125 | proximal pedal phalanx |  | subadult, proximal end epiphysis line still visible | 24.52 mm |
| VIII | 16 | a | 126 | proximal pedal phalanx | left | dirt caused staining on the superior | 22.4 mm |

surface

| VIII | 16 | a | 127 | proximal pedal phalanx |  | subadult, unfused proximal facet | 17.97 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 128 | first distal pedal phalanx |  |  | 17.25 mm |
| VIII | 16 | a | 129 | first manual distal phalanx |  |  | 24.51 mm |
| VIII | 16 | a | 130 | intermediate manual $\qquad$ |  | subadult, unfused proximal end | 19.59 mm |
| VIII | 16 | a | 131 | intermediate manual phalanx |  | subadult, unfused proximal end | 18.68 mm |
| VIII | 16 | a | 132 | intermediate manual phalanx |  | very defined lateral margins | 18.76 mm |
| VIII | 16 | a | 133 | first distal pedal phalanx |  |  | 21.69 mm |
| VIII | 16 | a | 134 | lunate | right | calcite |  |
| VIII | 16 | a | 135 | intermediate manual phalanx |  | subadult, unfused proximal epiphysis |  |
| VIII | 16 | a | 136 | metacarpal/metatarsal fragment |  | subadult, proximal fragment, proximal epiphysis is unfused |  |
| VIII | 16 | a | 137 | metatarsal fragment |  | distal fragment |  |
| VIII | 16 | a | 138 | first proximal pedal phalanx |  | calcite on superior surface | 33.33 mm |
| VIII | 16 | a | 139 | first proximal pedal phalanx |  | calcite on superior surface | 35.53 mm |


| VIII | 16 | a | 140 | first proximal pedal $\qquad$ phalanx |  | some calcite | 34.64 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 141 | proximal pedal phalanx |  | some calcite | 23.71 mm |
| VIII | 16 | a | 142 | fibula fragment | undetermined | adult, some calcite |  |
| VIII | 16 | a | 143 | humerus fragment | undetermined | subadult, shaft fragment, calcite and carbon covered |  |
| VIII | 16 | a | 144 | cervical vertebra |  | second cervical vertebra, covered in calcite |  |
| VIII | 16 | a | 145 | cervical vertebra fragment |  | most of the cervical, lamina is absent |  |
| VIII | 16 | a | 146 | thoracic vertebra fragment |  | lamina fragment, mid thoracic region, covered in calcite |  |
| VIII | 16 | a | 147 | rib fragment | right | possibly second rib shaft fragment, light calcite and carbon |  |
| VIII | 16 | a | 148 | rib fragment | undetermined | shaft fragment, covered in calcite |  |
| VIII | 16 | a | 149 | rib fragment | left | neck fragment upper rib, covered in calcite |  |
| VIII | 16 | a | 150 | rib fragment | undetermined | shaft fragment, calcite and dirt stuck to inferior surface |  |
| VIII | 16 | a | 151 | cervical vertebra fragment |  | lamina is broken off, light calcium and carbon |  |
| VIII | 16 | a | 152 | cervical vertebra |  | possibly C7, |  |

completely covered in calcite
probable thoracic, lower, maybe 10, body only, completely covered in

| VIII | 16 | a | 153 | vertebra fragment |  | calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 154 | temporal bone fragment | undetermined | calcite, pin prick <br> porosity |
| VIII | 16 | a | 155 | temporal bone fragment | undetermined |  |
| VIII | 16 | a | 156 | cranial fragment | undetermined | unknown |
| VIII | 16 | a | 157 | temporal bone fragment | undetermined | completely covered in <br> calcite, inside and <br> out, suggests was <br> broken in antiquity |
| VIII | 16 | a | 158 |  |  | right orbit area, blunt <br> margin, no noticeable <br> torus, completely <br> covered in calcite <br> inside and out, |
| VIII | 16 | a | 159 | parietal fragment | undetermined | suggesting it was <br> broke in antiquity |
| VIII | 16 | a | 160 | cranial fragment | undetermined | porosity prick |


| VIII | 16 | a | 164 | cranial fragment | undetermined | unknown |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 165 | temporal bone fragment | undetermined | light calcite |
| VIII | 16 | a | 166 | cranial fragment | undetermined | unknown, light calcite |
| VIII | 16 | a | 167 | occipital fragments |  | light calcite |
| VIII | 16 | a | 168 | cranial fragment | undetermined | possible temporal fragment, light calcite |
| VIII | 16 | a | 169 | parietal fragment | undetermined | light calcite and pin prick porosity |
| VIII | 16 | a | 170 | cranial fragment | undetermined | possible temporal fragment, light calcite |
| VIII | 16 | a | 171 | mandible fragment |  | right portion with third molar still in crypt and all of the ramus and condyles, completely covered , including on the fractured surface, indicating it was broken in antiquity |
| VIII | 16 | a | 172 | cuboid | left | slightly damage, completely covered in calcite |
| VIII | 16 | a | 173 | cervical vertebra fragment |  | lower thoracic, completely covered in calcite, part of the lamina is gone |
| VIII | 16 | a | 174 | sternum fragment |  | subadult, superior epiphysis is not fused |


| VIII | 16 | a | 175 | thoracic vertebra fragment |  | subadult, unfused body |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 176 | thoracic vertebra fragment |  | subadult, unfused body |
| VIII | 16 | a | 177 | cranial fragment | undetermined | possible temporal fragment, light calcite |
| VIII | 16 | a | 178 | cranial fragment | undetermined | possible temporal fragment, light calcite |
| VIII | 16 | a | 179 | temporal bone fragment | right | had mandibular fossa, internal auditory meatus and the tympanic portion |
| VIII | 16 | a | 180 | humerus fragment | right | subadult unfused proximal epiphysis, under 14 |
| VIII | 16 | a | 181 | ilium fragment | undetermined | crest fragment, even the fracture is covered in calcite, suggesting broken in antiquity |
| VIII | 16 | a | 182 | humerus fragment | right | distal fragment, adult, calcite on fracture, indicating broken in antiquity |
| VIII | 16 | a | 183 | vertebra fragment |  | lamina fragment, of either a lower cervical or a thoracic |
| VIII | 16 | a | 184 | cervical vertebra fragment |  | pedicle fragment, completely covered in calcite |


| VIII | 16 | a | 185 | cervical vertebra |  | damage to the lamina, mid cervical region, probable subadult |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 186 | cervical vertebra fragment |  | lower thoracic, body is slightly compressed with some additional body growth along the margins, lamina broken off |
| VIII | 16 | a | 187 | temporal bone fragment | left | tympanic portion |
| VIII | 16 | a | 188 | temporal bone fragment | right | tympanic portion with more of the temporal, light calcite |
| VIII | 16 | a | 189 | parietal fragment | undetermined | completely covered in calcite, broke in antiquity |
| VIII | 16 | a | 190 | temporal bone fragment | left | area with mastoid, but it is broken, covered in calcite, broken in antiquity |
| VIII | 16 | a | 191 | humerus shaft fragment | undetermined | completely covered in calcite, modern break |
| VIII | 16 | a | 192 | femur fragment | right | subadult, proximal fragment with unfused epiphyses, roughly 1.5 years of age based on size |
| VIII | 16 | a | 193 | first metatarsal fragment | right | distal fragment with most of the shaft |


| VIII | 16 | a | 194 | rib fragment | left | shaft fragment, <br> covered in calcite and <br> carbon |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 195 | distal manual phalanx |  |  |
| VIII | 16 | a | 196 | intermediate manual <br> phalanx |  | subadult, proximal <br> epiphysis is not fused |
| VIII | 16 | a | 197 | trapezoid | left | subadult, epiphyseal <br> line still visible |
| VIII | 16 | a | 198 | lunate | left |  |
| VIII | 16 | a | 199 | trapezoid | right | much larger than 197 |
| VIII | 16 | a | 200 | tibia fragment |  | left |
| VIII | 16 | a | 201 | femur fragment | undetermined | distal fragment of a <br> condyle, calcite |
| VIII | 16 | a | 202 | ischium fragment | undetermined | calcite |


| VIII | 16 | a | 209 | rib fragment | right | vertebral end fragment, covered in calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 210 | rib fragment | undetermined | shaft fragment |
| VIII | 16 | a | 211 | rib fragment | undetermined | shaft fragment |
| VIII | 16 | a | 212 | rib fragment | undetermined | subadult shaft fragment |
| VIII | 16 | a | 213 | rib fragment | undetermined | shaft fragment |
| VIII | 16 | a | 214 | rib fragment | undetermined | shaft fragment with calcite |
| VIII | 16 | a | 215 | maxilla and zygomatic fragments | right | relatively complete third molar did not erupt yet, but the first molar (only other tooth, is heavily worn, with dentine exposure on 3 cusps, the other cusp is covered with calcite |
| VIII | 16 | a | 216 | rib fragments | undetermined | small, possible subadult, calcite |
| VIII | 16 | a | 217 | cranial fragment | undetermined | calcite |
| VIII | 16 | a | 218 | cranial fragment | undetermined | calcite |
| VIII | 16 | a | 219 | temporal fragment | undetermined | calcite |
| VIII | 16 | a | 220 | cranial fragment | undetermined | calcite |
| VIII | 16 | a | 221 | femur fragment | undetermined | subadult, shaft fragment, calcite |
| VIII | 16 | a | 222 | humerus fragment | possible right | subadult, shaft fragment, calcite |
| VIII | 16 | a | 223 | femur fragment | left | distal fragment with |


|  |  |  |  |  |  | an unfused epiphysis |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 224 | scapula fragment | right | glenoid fragment, appears small, may be subadult, broken and unable to measure |
| VIII | 16 | a | 225 | occipital fragment |  | calcite and carbon |
| VIII | 16 | a | 226 | maxilla fragment | left | most of the maxilla and part of a few other bones, no teeth visible due to breakage, calcite |
| VIII | 16 | a | 227 | clavicle fragment | right | lateral fragment, calcite |
| VIII | 16 | a | 228 | proximal pedal phalanx |  | calcite |
| VIII | 16 | a | 229 | rib fragment | left | vertebral end fragment, some lipping on the facet |
| VIII | 16 | a | 230 | cervical vertebra fragment |  | left lamina fragment, rather wide spinous process |
| VIII | 16 | a | 231 | cervical vertebra fragment |  | all but a lamina, small, subadult, unfused body |
| VIII | 16 | a | 232 | ulna fragment | probable right | proximal and shaft fragment, proximal epiphysis is unfused, older than 5, calcite |
| VIII | 16 | a | 233 | fibula fragment | undetermined | shaft fragment, calcite |
| VIII | 16 | a | 234 | femur fragment | undetermined | subadult shaft |


|  |  |  |  |  |  | fragment, calc |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 235 | shaft fragment | undetermined | subadult, possible humerus |
| VIII | 16 | a | 236 | shaft fragment | undetermined | subadult, possible tibia or ulna?, calcite |
| VIII | 16 | a | 237 | possible metatarsal fragment |  | possibly an unfused fifth metatarsal with a broken head, abnormal bone growth on the side near the facet (proximal), subadult, calcite |
| VIII | 16 | a | 238 | possible radius fragment | undetermined | shaft fragment, calcite |
| VIII | 16 | a | 239 | metacarpal/metatarsal fragment |  | shaft fragment, covered in calcite |
| VIII | 16 | a | 240 | maxilla fragment | undetermined | small fragment with incisor sockets, pin prick porosity on palate |
| VIII | 16 | a | 241 | thoracic vertebra fragments |  | lamina fragments, mid thoracic region |
| VIII | 16 | a | 242 | rib fragment | probable right | sternal end, probably the first rib, calcite |
| VIII | 16 | a | 243 | cranial fragment | undetermined | unknown |
| VIII | 16 | a | 244 | cranial fragment | undetermined | possible maxilla fragment |
| VIII | 16 | a | 245 | cranial fragment | undetermined | possible maxilla fragment |


| VIII | 16 | a | 246 | rib fragments | undetermined | shaft fragments, possible subadult, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 247 | first cuneiform | left | badly deteriorated |  |
| VIII | 16 | a | 248 | second cuneiform | undetermined | badly deteriorated |  |
| VIII | 16 | a | 249 | third cuneiform | right |  |  |
| VIII | 16 | a | 250 | second cuneiform | right |  |  |
| VIII | 16 | a | 251 | triquetral | right |  |  |
| VIII | 16 | a | 252 | metatarsal fragment |  | unfused metatarsal head |  |
| VIII | 16 | a | 253 | vertebra fragment |  | unfused body, subadult |  |
| VIII | 16 | a | 254 | hyoid fragment | left | horn of cornu |  |
| VIII | 16 | a | 255 | unidentified fragments |  | covered in calcite and sticking together |  |
| VIII | 16 | a | 256 | femur fragments | right | b72, covered in calcite, unfused proximal and distal epiphyses, probably $\sim 1.5$ years old | $\sim 11.9 \mathrm{~cm}$ long |
| VIII | 16 | a | 257 | femur fragment | right | b72, proximal fragment, adult, badly deteriorated | 41.4 mm head diameter |
| VIII | 16 | a | 258 | femur fragment | right | b72, proximal epiphysis for 259, under 15 , calcite | 37.42 mm head diameter |


|  | n |  |  |  | b-72, proximal <br> fragment, unfused <br> proximal epiphysis, <br> greater and lesser <br> trochater not fused <br> either, older than 9, <br> younger than 15, <br> calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 259 | femur fragment | right | femur fragment |
| VIII | 16 | a | 260 | possible left | b-72, unfused distal <br> epiphysis fragment, <br> calcite |  |
| VIII | 16 | a | 261 | femur fragment |  | b-72, distal fragment <br> of a condyle, calcite |
| VIII | 16 | a | 262 | calcaneus fragment | right | b-72, anterior portion |


| VIII | 16 | a | 267 | vertebra fragment |  | b-72, possibly a thoracic vertebra, body only, covered in calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 268 | possible tibia fragment | undetermined | b-72, distal fragment, calcite |  |
| VIII | 16 | a | 269 | femur fragment | right | b-72, calcite, broke off of 270 |  |
| VIII | 16 | a | 270 | femur fragment | right | b-72, calcite, adult, distal fragment with condyles |  |
| VIII | 16 | a | 271 | rib fragment | undetermined | adult, shaft fragment, calcite |  |
| VIII | 16 | a | 272 | rib fragment | undetermined | adult, shaft fragment, calcite |  |
| VIII | 16 | a | 273 | rib fragment | undetermined | adult, shaft fragment, calcite |  |
| VIII | 16 | a | 274 | rib fragment | undetermined | adult, shaft fragment, calcite |  |
| VIII | 16 | a | 275 | parietal fragment | undetermined | adult, calcite and carbon covered |  |
| VIII | 16 | a | 276 | temporal fragment | left | part of the mastoid process and internal auditory meatus, calcite |  |
| VIII | 16 | a | 277 | cranial fragment | undetermined | adult, calcite, possible occipital fragment |  |
| VIII | 16 | a | 278 | first distal pedal phalanx |  | adult, calcite | 21.44 mm |

$\left.\begin{array}{lccccccc}\text { VIII } & 16 & \text { a } & 279 & \begin{array}{c}\text { proximal manual } \\ \text { phalanx fragment }\end{array} & & \begin{array}{c}\text { subadult, calcite, } \\ \text { distal fragment }\end{array} \\ \hline \text { VIII } & 16 & \text { a } & 280 & \begin{array}{c}\text { first proximal manual } \\ \text { phalanx }\end{array} & & \begin{array}{c}\text { subadult, calcite, } \\ \text { distal fragment }\end{array} & 20.87 \mathrm{~mm} \\ \hline \text { VIII } & 16 & \text { a } & 281 & \text { distal manual phalanx } & \text { adult, calcite } & 18.76 \mathrm{~mm} \\ \hline \text { VIII } & 16 & \text { a } & 282 & \begin{array}{c}\text { first distal pedal } \\ \text { phalanx }\end{array} & & \text { adult, calcite } & 23.63 \mathrm{~mm} \\ \hline \text { VIII } & 16 & \text { a } & 283 & \text { first metacarpal } & \text { undetermined } & \text { subadult, calcite } & 19.63 \mathrm{~mm} \\ \hline \text { VIII } & 16 & \text { a } & 284 & \begin{array}{c}\text { proximal manual } \\ \text { phalanx fragment }\end{array} & & \text { adult, calcite, distal } \\ \text { fragment }\end{array}\right]$

| VIII | 16 | a | 294 | rib fragment | left | adult, calcite, shaft fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 295 | rib fragment | undetermined | adult, calcite, shaft fragment |  |
| VIII | 16 | a | 296 | rib fragment | undetermined | subadult, calcite, sternal end |  |
| VIII | 16 | a | 297 | rib fragment | undetermined | subadult, calcite, shaft fragment |  |
| VIII | 16 | a | 298 | distal manual phalanx |  | possible subadult, calcite |  |
| VIII | 16 | a | 299 | distal manual phalanx |  | possible subadult, calcite |  |
| VIII | 16 | a | 300 | first distal manual phalanx |  | adult, calcite |  |
| VIII | 16 | a | 301 | proximal pedal phalanx |  | subadult, proximal epiphysis is fused but the line is visible, calcite |  |
| VIII | 16 | a | 302 | patella | left | adult, calcite | 37.49 mm height, <br> 33.81 mm width |
| VIII | 16 | a | 303 | thoracic vertebra fragment |  | body only, adult, covered in calcite |  |
| VIII | 16 | a | 304 | thoracic vertebra fragment |  | body only, adult, covered in calcite |  |
| VIII | 16 | a | 305 | frontal fragment |  | adult, forehead fragment, rounded margin, no real torus, groove above the crest on the interior, calcite |  |


| VIII | 16 | a | 306 | frontal fragment |  | adult, groove present, may be same individual as 305, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 307 | proximal pedal phalanx |  | adult, calcite | 29.02 mm |
| VIII | 16 | a | 308 | proximal pedal phalanx |  | subadult, proximal epiphysis is fused but the line is visible, calcite | 25.46 mm |
| VIII | 16 | a | 309 | proximal pedal phalanx |  | subadult, proximal epiphysis is not fused, calcite | 21.68 mm |
| VIII | 16 | a | 310 | proximal pedal phalanx |  | subadult, proximal epiphysis is fused but the line is visible, calcite | 21.26 mm |
| VIII | 16 | a | 311 | trapezium | left | adult, calcite |  |
| VIII | 16 | a | 312 | hamate | left | adult, calcite |  |
| VIII | 16 | a | 313 | lunate | right | adult, calcite |  |
| VIII | 16 | a | 314 | capitate | right | adult, calcite |  |
| VIII | 16 | a | 315 | proximal manual phalanx fragment |  | adult, calcite, distal fragment |  |
| VIII | 16 | a | 316 | intermediate manual phalanx |  | adult, calcite | 23.95 mm |
| VIII | 16 | a | 317 | intermediate pedal phalanx |  | adult, calcite | 20.28 mm |
| VIII | 16 | a | 318 | first distal pedal phalanx |  | adult, calcite | 25.68 mm |

$\left.\begin{array}{lcccccc}\text { VIII } & 16 & \text { a } & 319 & \begin{array}{c}\text { proximal manual } \\ \text { phalanx }\end{array} & \text { adult, calcite } \\ \text { VIII } & 16 & \text { a } & 320 & \begin{array}{c}\text { first proximal manual } \\ \text { phalanx }\end{array} & \text { adult, calcite }\end{array}\right]$

| VIII | 16 | a | 331 | tibia fragment | left | subadult, proximal end, epiphysis not yet fused, under 15, probably closer to 9 years based on size, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 332 | thoracic vertebra fragments |  | subadult based upon body, mid thoracic, calcite |
| VIII | 16 | a | 333 | temporal fragment | undetermined | probable perinate, calcite |
| VIII | 16 | a | 334 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 335 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 336 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 337 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 338 | parietal fragment | undetermined | adult, calcite, pin prick porosity |
| VIII | 16 | a | 339 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 340 | parietal fragment | undetermined | adult, calcite, porosity with new bone growth, best case of porotic hyperostosis so far |
| VIII | 16 | a | 341 | cranial fragment | undetermined | adult, calcite, pin prick porosity |
| VIII | 16 | a | 342 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 343 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 344 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 345 | cranial fragment | undetermined | adult, calcite |


| VIII | 16 | a | 346 | cranial fragment | undetermined | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 347 | cranial fragment | undetermined | adult, calcite |
| VIII | 16 | a | 348 | parietal fragment | undetermined | possible subadult, calcite |
| VIII | 16 | a | 349 | occipital fragment | undetermined | possible subadult, calcite |
| VIII | 16 | a | 350 | parietal fragment | undetermined | adult, calcite |
| VIII | 16 | a | 351 | rib fragment | left | shaft fragment, adult, calcite, upper rib |
| VIII | 16 | a | 352 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 353 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 354 | rib fragment | right | shaft fragment, adult, calcite, upper rib |
| VIII | 16 | a | 355 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 356 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 357 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 358 | rib fragment | left | shaft fragment, adult, calcite, upper rib |
| VIII | 16 | a | 359 | rib fragment | left | shaft fragment, adult, calcite, upper rib |
| VIII | 16 | a | 360 | rib fragment | left | shaft fragment, adult, calcite, upper rib |
| VIII | 16 | a | 361 | rib fragment | left | shaft fragment, adult, calcite, upper rib |


| VIII | 16 | a | 362 | rib fragment | left | vertebral end fragment, adult, calcite, upper rib |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 363 | rib fragment | left | shaft fragment, subadult, calcite, upper rib |
| VIII | 16 | a | 364 | rib fragment | undetermined | shaft fragment, subadult, calcite, mid rib |
| VIII | 16 | a | 365 | rib fragment | undetermined | shaft fragment, subadult, calcite, mid rib |
| VIII | 16 | a | 366 | rib fragment | right | shaft fragment, subadult, calcite, lower rib |
| VIII | 16 | a | 367 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 368 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 369 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 370 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 371 | rib fragment | undetermined | shaft fragment, adult, calcite, mid rib |
| VIII | 16 | a | 372 | rib fragment | right | shaft fragment, subadult, calcite, upper rib |
| VIII | 16 | a | 373 | rib fragment | left | shaft fragment, adult, calcite, upper rib |

shaft fragment,

| VIII | 16 | a | 374 | rib fragment | undetermined | subadult, calcite, mid rib |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 375 | os coxa fragments | right | lunate surface and a large portion of the blade, badly damaged, narrow sciatic notch, adult, calcite, possible male, auricular surface has a few parallel billows, but most of it is damaged to declare a phase |
| VIII | 16 | a | 376 | rib fragment | undetermined | shaft fragment, subadult, calcite, mid rib |
| VIII | 16 | a | 377 | rib fragment | undetermined | sternal fragment, subadult, calcite, mid rib |
| VIII | 16 | a | 378 | rib fragment | undetermined | sternal fragment, subadult, calcite, mid rib |
| VIII | 16 | a | 379 | rib fragment | left | vertebral end fragment, subadult, calcite, upper rib |
| VIII | 16 | a | 380 | rib fragment | left | vertebral end fragment, subadult, calcite, upper rib |
| VIII | 16 | a | 381 | rib fragment | undetermined | sternal fragment, subadult, calcite, mid |

sternal fragment,
subadult, calcite, mid

| VIII | 16 | a | 382 | rib fragment | undetermined | rib |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 383 | rib fragment | undetermined | shaft fragment, adult |
| calcite, mid rib |  |  |  |  |  |  |


| VIII | 16 | a | 383 | rib fragment | undetermined | calcite, mid rib |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 384 | intermediate manual <br> phalanx |  | adult, calcite | 32.73 mm |
| VIII | 16 | a | 385 | intermediate manual <br> phalanx | adult, calcite | 37.47 mm |  |
| VIII | 16 | a | 386 | proximal manual <br> phalanx fragment | adult, calcite |  |  |
| VIII | 16 | a | 387 | proximal pedal phalanx <br> fragment |  | adult, calcite |  |
| VIII | 16 | a | 388 | first metacarpal | right | adult, calcite | 52.96 mm |


| VIII | 16 | a | 389 | first proximal manual |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| phalanx |  | adult, calcite | 31.53 mm |  |  |  |  |
| VIII | 16 | a | 390 | third metacarpal | right | adult, calcite | 61.07 mm |
| VIII | 16 | a | 391 | fifth metatarsal | fragment | left | subadult, calcite, head <br> is not fused yet |
| VIII | 16 | a | 392 | first metatarsal | possible right | perinate, calcite |  |
| VIII | 16 | a | 393 | distal manual phalanx |  | adult, calcite |  |
| VIII | 16 | a | 394 | fifth metacarpal | left | adult, calcite |  |
|  |  |  |  |  |  | proximal fragment, <br> adult, calcite, other <br> bone fragments stuck <br> to it |  |
| VIII | 16 | a | 395 | fourth metacarpal | fragment | left |  |


| VIII | 16 | a | 396 | proximal pedal phalanx fragment |  | distal end, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 397 | manual phalanx fragment |  | distal end, calcite |
| VIII | 16 | a | 398 | metatarsal fragment |  | proximal end, subadult, unfused proximal epiphysis, calcite |
| VIII | 16 | a | 399 | lunate | right | adult, calcite |
| VIII | 16 | a | 400 | lumbar vertebra |  | third lumbar vertebra, covered in calcite, adult |
| VIII | 16 | a | 401 | thoracic vertebra fragment |  | covered in calcite, adult, upper thoracic |
| VIII | 16 | a | 402 | thoracic vertebra fragment |  | subadult, fused lamina not fused to the body, age est. 3-5 years, calcite |
| VIII | 16 | a | 403 | second metacarpal fragment |  | proximal fragment, adult, calcite |
| VIII | 16 | a | 404 | third metatarsal | right | subadult, calcite, head is not fused on |
| VIII | 16 | a | 405 | metacarpal fragment |  | subadult, distal end is unfused, calcite |
| VIII | 16 | a | 406 | metacarpal fragment |  | subadult, distal end is broken, calcite |
| VIII | 16 | a | 407 | cuboid | right | adult, calcite |
| VIII | 16 | a | 408 | navicular | left | adult, calcite |
| VIII | 16 | a | 409 | second cuneiform | left | adult, calcite |


| VIII | 16 | a | 410 | third cuneiform | right | adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 411 | sternum fragment |  | possible subadult, calcite |
| VIII | 16 | a | 412 | cervical vertebra fragment |  | perinate, unfused body, calcite |
| VIII | 16 | a | 413 | lumbar vertebra fragments |  | perinate, unfused body, calcite |
| VIII | 16 | a | 414 | lumbar vertebra fragments |  | perinate, unfused body, calcite |
| VIII | 16 | a | 415 | calcaneus fragment | right | adult, posterior fragment, calcite |
| VIII | 16 | a | 416 | humerus fragment | possible right | capitulum fragment, adult, calcite |
| VIII | 16 | a | 417 | ilium fragment | possible left | subadult, roughly 6 years of age, calcite |
| VIII | 16 | a | 418 | radius fragment | right | distal epiphysis, between 9 and 15 years of age |
| VIII | 16 | a | 419 | fourth metatarsal fragment | left | adult, calcite, proximal fragment |
| VIII | 16 | a | 420 | metatarsal fragment | undetermined | distal head fragment, adult |
| VIII | 16 | a | 421 | sternum fragment |  | possible subadult, calcite |
| VIII | 16 | a | 422 | occipital fragment |  | subadult, basioccipital fragment with an unfused suture, indicating under 18 years old, calcite |


| VIII | 16 | a | 423 | clavicle fragment | right | lateral fragment, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 424 | metatarsal fragment |  | head fragment, adult, calcite |
| VIII | 16 | a | 425 | triquetral fragment | right | adult, calcite, posterior surface is damaged |
| VIII | 16 | a | 426 | neural arch | left | perinate, lumbar, calcite |
| VIII | 16 | a | 427 | neural arch | left | perinate, thoracic, calcite |
| VIII | 16 | a | 428 | neural arch | right | perinate, thoracic, calcite |
| VIII | 16 | a | 429 | neural arch | right | perinate, thoracic, calcite |
| VIII | 16 | a | 430 | cervical vertebra fragment |  | adult, part of the body and left transverse process, calcite, mid cervical |
| VIII | 16 | a | 431 | scapula fragment | left | part of the glenoid, adult, calcite |
| VIII | 16 | a | 432 | thoracic vertebra fragment |  | lamina fragment, adult, calcite, mid thoracic |
| VIII | 16 | a | 433 | metatarsal fragment | undetermined | perinate, calcite, unfused epiphysis, proximal end |
| VIII | 16 | a | 434 | metatarsal/metacarpal fragment |  | perinate, calcite, unfused epiphysis |


| VIII | 16 | a | 435 | metatarsal/metacarpal fragment |  | subadult, calcite, shaft fragment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 436 | proximal manual phalanx fragment |  | possibly the first, proximal fragment, adult, calcite |  |
| VIII | 16 | a | 437 | metacarpal fragment | undetermined | distal portion, calcite |  |
| VIII | 16 | a | 438 | mandible fragment |  | mandibular condyle |  |
| VIII | 16 | a | 439 | thoracic vertebra fragment |  | adult, transverse process, calcite |  |
| VIII | 16 | a | 440 | triquetral | right | adult, calcite |  |
| VIII | 16 | a | 441 | manual phalanx fragment |  | distal fragment, adult, calcite, possibly proximal manual phalanx |  |
| VIII | 16 | a | 442 | intermediate pedal phalanx |  | adult calcite | 12.66 mm |
| VIII | 16 | a | 443 | sphenoid fragment |  | adult, calcite, part of the greater wing |  |
| VIII | 16 | a | 444 | radius fragment | undetermined | proximal end up to and including most of the tuberosity, adult, calcite | 19.37 mm |
| VIII | 16 | a | 445 | radius fragment | left | subadult, distal epiphysis, calcite, between the ages of 9 and 15 |  |
| VIII | 16 | a | 446 | vertebra fragment |  | adult, spinous process, either lower cervical or upper thoracic, calcite |  |


| VIII | 16 | a | 447 | scapula fragment | probable right | acromion fragment, adult, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 448 | zygomatic | left | adult, calcite |
| VIII | 16 | a | 449 | humerus fragment | undetermined | subadult, shaft fragment, calcite and carbon covered |
| VIII | 16 | a | 450 | tibia fragment | undetermined | possible subadult, shaft fragment, calcite |
| VIII | 16 | a | 451 | femur fragment | possible right | shaft fragment, subadult at least 6 years or older, calcite |
| VIII | 16 | a | 452 | parietal fragments | possible right | pin prick porosity, sample was taken for isotope analysis, adult, calcite |
| VIII | 16 | a | 453 | scapula fragment | undetermined | adult, calcite |
| VIII | 16 | a | 454 | scapula fragment | undetermined | adult, calcite |
| VIII | 16 | a | 455 | radius fragment | right | subadult, distal portion with unfused epiphysis, older than 5, calcite |
| VIII | 16 | a | 456 | scapula fragment | undetermined | coracoid process fragment, adult, calcite |
| VIII | 16 | a | 457 | radius fragment | left | distal epiphysis, between 9 and 15 years of age, calcite |
| VIII | 16 | a | 458 | radius fragment | undetermined | proximal head fragment, covered in calcite |


| VIII | 16 | a | 459 | vertebra fragment |  | perinate, probable thoracic vertebra body unfused, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 460 | cervical vertebra fragment |  | body and right transverse process, covered in calcite |
| VIII | 16 | a | 461 | cervical vertebra fragment |  | C2 dense fragment with parts of the superior articular facets |
| VIII | 16 | a | 462 | rib fragment | undetermined | shaft fragment, calcite, adult, mid rib |
| VIII | 16 | a | 463 | vertebra fragment |  | body fragment, adult, calcite, probably thoracic vertebra |
| VIII | 16 | a | 464 | fibula fragment | right | adult, distal portion, calcite |
| VIII | 16 | a | 465 | femur fragment | undetermined | adult, condyle fragment, covered in calcite |
| VIII | 16 | a | 466 | femur fragment | undetermined | adult, condyle fragment, calcite |
| VIII | 16 | a | 467 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |
| VIII | 16 | a | 468 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |


| VIII | 16 | a | 469 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 470 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |
| VIII | 16 | a | 471 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |
| VIII | 16 | a | 472 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |
| VIII | 16 | a | 473 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |
| VIII | 16 | a | 474 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |
| VIII | 16 | a | 475 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based upon the small size |
| VIII | 16 | a | 476 | rib fragment | undetermined | small rib fragment, calcite, not much can be determined based |

upon the small size
$\left.\begin{array}{cccccc}\hline \text { VIII } & 16 & \text { a } & 477 & \text { temporal fragment } & \text { adult, calcite } \\ \hline \text { VIII } & 16 & \text { a } & 478 & \text { temporal fragment } & \text { adult, calcite } \\ \hline \text { VIII } & 16 & \text { a } & 479 & \text { temporal fragment } & \text { adult, calcite } \\ \hline \text { VIII } & 16 & \text { a } & 480 & \text { temporal fragment } & \begin{array}{c}\text { adult, calcite, mastoid } \\ \text { fragment }\end{array} \\ \hline \text { VIII } & 16 & \text { a } & 481 & \text { sphenoid fragment } & \begin{array}{c}\text { right portion with the } \\ \text { spheno occipital } \\ \text { suture, which is open, } \\ \text { subadult, under 18 }\end{array} \\ \hline \text { VIII } & 16 & \text { a } & 482 & \text { vertebra fragment } & \begin{array}{c}\text { adult, calcite, } \\ \text { possibly thoracic } \\ \text { fragment of lamina } \\ \text { and transverse } \\ \text { process }\end{array} \\ \hline \text { VIII } & 16 & \text { a } & 483 & \text { vertebra fragment } & \begin{array}{c}\text { adult, calcite, } \\ \text { possibly thoracic }\end{array} \\ \text { fragment of lamina } \\ \text { and transverse } \\ \text { process }\end{array}\right]$
epiphysis, subadult,
probably $\sim 5$ years of

| VIII | 16 | a | 488 | radius fragment | possible left | age |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 489 | humerus fragment |  | subadult, medial <br> epicondyle epiphysis, <br> age 5 or slightly older |
| VIII | 16 | a | 490 | probable ulna fragment | undetermined | distal ulna epiphysis <br> subadult, around 5 <br> years old, calcite |
| VIII | 16 | a | 491 | epiphysis fragment | unknown epiphysis, <br> possibly the glenoid <br> of the scapula |  |
| VIII | 16 | a | 492 | proximal phalanx <br> fragment |  |  |
| VIII | 16 | a | 493 | probable scaphoid <br> fragment | vertebral end <br> fragment |  |
| VIII | 16 | a | 494 | rib fragment | lower permanent <br> premolar crown, root <br> broken off |  |
| VIII | 16 | a | 495 | premolar | lower permanent <br> premolar crown, root <br> broken off |  |
| VIII | 16 | a | 496 | premolar | right upper deciduous <br> molar |  |
| VIII | 16 | a | 497 | a molar | 498 | scapula fragments |

## lunate surface,

 calcite, too small and lacks features to determine anything| VIII | 16 | a | 499 | os coxa fragments |  | else |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 500 | radius fragments | left | subadult, covered in calcite, distal end is unfused, probably around 9 years of age |  |
| VIII | 16 | a | 501 | radius fragments | right | adult, calcite, head is broken off |  |
| VIII | 16 | a | 502 | maxillary fragments | left | adult, anterior teeth are no longer in crypts, first molar is present | anterior to posterior 11.30 mm , lingual to buccal 10.92 mm |


| VIII | 16 | a | 502 | maxillary fragments | left | present |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | a | 503 | 58 unidentified |  |  |  |

subadult, third molars
in process of
erupting, all other
molars are present
(some broken along with other teeth),
$\left.\begin{array}{cccccc}\text { VIII } & 16 & \text { a } & 504 & \text { mandible fragments } & \text { calcite } \\ \hline & & & & & \begin{array}{c}\text { covered in calcite, } \\ \text { distal and shaft } \\ \text { fragment, ovate }\end{array} \\ \text { VIII } & 16 & \text { B } & 1 & \text { humerus fragments } & \text { left }\end{array} \begin{array}{c}\text { shaped fossa, medial } \\ \text { epicondyle is level }\end{array}\right]$
as 1 , shaft fragments
numerous shaft
fragments, broke in
route, bleached white
by taphonomic

| VIII | 16 | B | 3 | femur fragments | undetermined | processes, adult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 4 | humerus fragments | undetermined | shaft fragments, adult, large deltoid tubercle |  |
| VIII | 16 | B | 5 | femur fragments | left | shaft fragment beginning at the lesser trochater, most of the shaft, possible cut marks, mid shaft on the lateral surface |  |
| VIII | 16 | B | 6 | mandible fragment |  | right section, first molar may have been lost antemortem, with full resorption, second and third molar present |  |
| VIII | 16 | B | 7 | ulna fragment | left | most of the bone, proximal with most of the shaft | 15.91 mm medial to lateral, 19.21 mm anterior to posterior, diameter 6.6 cm |
| VIII | 16 | B | 8 | tibia fragment | undetermined | shaft fragment |  |
| VIII | 16 | B | 9 | radius fragment | right | pronator teras insertion is well pronounced, shaft | 16.17 mm medial to lateral, 12.18 mm anterior to |


| VIII | 16 | B | 10 | ulna fragment | right | proximal fragment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 11 | humerus fragment | probable left | shaft fragment with prominent deltoid tubercle, gnaw marks |
| VIII | 16 | B | 12 | femur fragment | left | child, proximal fragment with unfused epiphyses, close to 5 years of age based on size, calcite |
| VIII | 16 | B | 13 | fibula fragment | undetermined | shaft fragment |
| VIII | 16 | B | 14 | rib fragment | left | most of a rib, light calcite, rib 5-9 most likely |
| VIII | 16 | B | 15 | rib fragment | left | second rib, most of it, light calcite |
| VIII | 16 | B | 16 | rib fragment | left | probably rib 5-9, light calcite |
| VIII | 16 | B | 17 | rib fragment | left | first rib, light calcite |
| VIII | 16 | B | 18 | thoracic vertebra fragment |  | lamina fragment, mid thoracic region, covered in calcite |
| VIII | 16 | B | 19 | thoracic vertebra |  | most of the vertebra, damage to the spine, upper thoracic, calcite |
| VIII | 16 | B | 20 | radius fragment | left | distal fragment, adult, calcite |


| VIII | 16 | B | 21 | ulna fragment | left | medial aspect of the proximal end |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 22 | radius fragment | right | distal fragment, adult, damaged, light calcite |  |
| VIII | 16 | B | 23 | humerus fragment | right | subadult, probably 5 years of age, proximal fragment with unfused epiphysis |  |
| VIII | 16 | B | 24 | proximal manual phalanx |  | calcite, defined lateral ridges | 47.63 mm |
| VIII | 16 | B | 25 | first proximal pedal phalanx | left | calcite | 33.72 mm |
| VIII | 16 | B | 26 | first proximal pedal phalanx | right | calcite | 33.96 mm |
| VIII | 16 | B | 27 | proximal manual phalanx |  | calcite, defined lateral ridges | 41.22 mm |
| VIII | 16 | B | 28 | fourth metatarsal | left |  | 63.36 mm |
| VIII | 16 | B | 29 | third metacarpal | left |  | 61.83 mm |
| VIII | 16 | B | 30 | third metatarsal | right |  | 64.95 mm |
| VIII | 16 | B | 31 | second metatarsal | left |  | 69.23 mm |
| VIII | 16 | B | 32 | proximal manual phalanx |  | calcite, defined lateral ridges | 47.61 mm |


| VIII | 16 | B | 33 | proximal manual phalanx |  | calcite, defined lateral ridges | 39.86 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 34 | proximal manual phalanx |  | calcite, defined lateral $\qquad$ ridges | 38.6 mm |
| VIII | 16 | B | 35 | proximal manual phalanx |  | calcite, defined lateral ridges | 29.83 mm |
| VIII | 16 | B | 36 | scaphoid | right |  |  |
| VIII | 16 | B | 37 | navicular | right |  |  |
| VIII | 16 | B | 38 | metacarpal fragment |  | distal portion, adult |  |
| VIII | 16 | B | 39 | scapula fragment | right | glenoid fossa fragment | 35.89 mm height, 24.15 mm width |
| VIII | 16 | B | 40 | rib fragment | right | vertebral end, mid rib |  |
| VIII | 16 | B | 41 | second metacarpal | right | calcite | 69.56 mm |
| VIII | 16 | B | 42 | first metacarpal | left | calcite | 42.74 mm |
| VIII | 16 | B | 43 | ulna fragment | left | distal fragment, calcite |  |
| VIII | 16 | B | 44 | radius fragment | right | proximal end, big radial tuberosity!, calcite | 25.49 mm |
| VIII | 16 | B | 45 | ilium | left | child probably ~6 years of age, calcite |  |
| VIII | 16 | B | 46 | ilium | right | child, calcite, damage to the t , probably $\sim 6$ years of age, mate to 45 |  |
| VIII | 16 | B | 47 | ulna | left | complete, proximal and distal epiphyses are not fused, roughly 1.5 years of age, | 8.4 cm length |

calcite

| VIII | 16 | B | 48 | tibia fragment | probable right | proximal fragment, proximal epiphysis is not fused, size appears to be $\sim 1.5$ years old, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 49 | radius fragment | possible left | distal end with and unfused epiphysis, width is similar to a 5 year old, but the length suggests older, calcite |
| VIII | 16 | B | 50 | cervical vertebra |  | lower cervical vertebra, calcite |
| VIII | 16 | B | 51 | thoracic vertebra fragment |  | body only, probably upper thoracic |
| VIII | 16 | B | 52 | mandible fragment |  | right portion, subadult, canine crown formed, not erupted, molar crown visible in crypt, dental growth suggests 5 years +/16 months, two deciduous molars, calcite |
| VIII | 16 | B | 53 | mandible fragments |  | left portion, more fragmentary, same as individual 52, two |

premolar crowns, deciduous molars
present, calcite

| VIII | 16 | B | 54 | scapula fragment | right | spine fragment, adult, <br> calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 55 | cuboid | left | calcite |
| VIII | 16 | B | 56 | capitate | left | huge, calcite |
| VIII | 16 | B | 57 | third cuneiform | right | calcite |
| VIII | 16 | B | 58 | patella fragment | right | damage to the distal <br> end, calcite |
| VIII | 16 | B | 59 | proximal pedal phalanx |  | calcite |

much, calcite

| VIII | 16 | B | 67 | tibia fragment | right | proximal fragment, unfused epiphysis, roughly 1.5 years of age, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 68 | vertebra fragment |  | probably a lumbar body, calcite |
| VIII | 16 | B | 69 | cervical vertebra |  | damage to the left portion of the lamina, mid cervical, adult |
| VIII | 16 | B | 70 | fibula fragment | undetermined | subadult, calcite |
| VIII | 16 | B | 71 | radius fragment | undetermined | proximal fragment, probably older than a 5 year old, calcite |
| VIII | 16 | B | 72 | radius fragment | left | distal end, unfused, calcite |
| VIII | 16 | B | 73 | humerus fragment | right | proximal fragment, perinate based on size (unless I have the wrong bone) |
| VIII | 16 | B | 74 | first metacarpal | undetermined | unfused proximal and distal ends, older than 8 but younger than 15, calcite |
| VIII | 16 | B | 75 | thoracic vertebra fragment |  | lamina fragment, calcite |
| VIII | 16 | B | 76 | rib fragment |  | shaft fragment, subadult, calcite |


| VIII | 16 | B | calcaneus fragment | left | unfused epiphyses, <br> probably around 5-8 <br> years of age, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 78 | sacrum fragment |  | unfused first sacral, <br> adolescent, calcite |
| VIII | 16 | B | 79 | cervical |  | second, adult, light <br> calcite |
| VIII | 16 | B | 80 | cuboid | right | calcite |
| VIII | 16 | B | 81 | third metacarpal <br> fragment | right | proximal fragment, <br> calcite |
| VIII | 16 | B | 82 | shaft fragment | undetermined | subadult, calcite |
| VIII | 16 | B | 83 | femur fragment | right | proximal fragment, <br> unfused epiphyses, <br> roughly 5 years of <br> age, calcite |
| VIII | 16 | B | 84 | rib fragment | left | vertebral end, upper <br> rib, subadult, calcite |
| VII | 16 | B | 85 | rib fragment | undetermined | shaft fragment, calcite |

$\left.\begin{array}{ccccccc}\text { VIII } & 16 & \text { B } & 90 & \text { femur fragments } & \text { right } & \begin{array}{c}\text { b72, distal end, adult, } \\ \text { calcite }\end{array} \\ \hline \text { VIII } & 16 & \text { B } & 91 & \text { femur fragments } & \text { left } & \begin{array}{c}\text { b72, distal end, adult, } \\ \text { calcite }\end{array} \\ \hline \text { VIII } & 16 & \text { B } & 92 & \text { tibia fragments } & \text { right } & \begin{array}{c}\text { b72, proximal end, } \\ \text { adult, calcite }\end{array} \\ \hline \text { VIII } & 16 & \text { B } & 93 & \text { os coxa fragments } & \text { left } & \begin{array}{c}\text { b72, subadult, light } \\ \text { calcite, possible cut } \\ \text { mark across the } \\ \text { ischium? }\end{array} \\ \hline \text { VIII } & 16 & \text { B } & 94 & \text { humerus fragment } & \text { right } & \begin{array}{c}\text { b72, distal end, adult, } \\ \text { calcite, narrower } \\ \text { notch, level medial } \\ \text { epicondyle }\end{array} \\ \hline \text { VIII } & 16 & \text { B } & 95 & \text { humerus fragment } & & \text { left }\end{array} \begin{array}{c}\text { b72, distal end, adult, } \\ \text { calcite, wide notch }\end{array}\right]$
angle, calcite
$\left.\begin{array}{ccccccc}\hline \text { VIII } & 16 & \text { B } & 100 & \text { rib fragment } & \text { undetermined } & \begin{array}{c}\text { b72, shaft fragment, } \\ \text { calcite, mid rib }\end{array} \\ \hline \text { VIII } & 16 & \text { B } & 101 & \text { rib fragment } & \text { undetermined } & \begin{array}{c}\text { b72, shaft fragment, } \\ \text { calcite, upper rib }\end{array} \\ \hline \text { VIII } & 16 & \text { B } & 102 & \text { cranial fragment } & \text { undetermined } & \text { b72, subadult, calcite } \\ \hline \text { VIII } & 16 & \text { B } & 103 & \text { cranial fragment } & \text { undetermined } & \text { b72, adult, calcite } \\ \hline \text { VIII } & 16 & \text { B } & 104 & \text { cranial fragment } & \text { undetermined } & \text { b72, adult, calcite } \\ \hline \text { VIII } & 16 & \text { B } & 105 & \text { lumbar fragment } & \begin{array}{c}\text { b72, adult, } \\ \text { macroporosity, } \\ \text { calcite, body only }\end{array} \\ \hline \text { VIII } & 16 & \text { B } & 106 & \text { lumbar fragment } & & \begin{array}{c}\text { b72, adult, } \\ \text { macroporosity, } \\ \text { calcite, body only, } \\ \text { syndesmophytes on }\end{array} \\ \text { the inferior margin of } \\ \text { the body indicative of } \\ \text { arthritis }\end{array}\right]$

|  |  |  |  | one of the body <br> surfaces |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 109 | lumbar fragment |  |
| VIII | 16 | B | 110 | lumbar fragment | b72, adult, <br> macroporosity, <br> calcite, body only |
| VIII | 16 | B | 111 | b72, adult, <br> macroporosity, <br> calcite, body only |  |
| VIII | 16 | B |  | 112 | thagment |


| VIII | 16 | B | 118 | thoracic vertebra fragment |  | b72, body, adult, calcite, probably T10 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 119 | fibula fragment | right | b72, distal end, adult, calcite |
| VIII | 16 | B | 120 | ulna fragment | right | b72, distal fragment, adult, calcite |
| VIII | 16 | B | 121 | os coxa fragment | possible left | b72, calcite, appears to have the same auricular surface morphology as 107, hard to side this one |
| VIII | 16 | B | 122 | femur fragment | possible left | b72, calcite, distal epiphysis, probably 5 years or slightly older |
| VIII | 16 | B | 123 | vertebra fragment |  | b72, body only, calcite, probably thoracic |
| VIII | 16 | B | 124 | ulna fragment | left | b72, adult, proximal fragment, calcite |
| VIII | 16 | B | 125 | vertebra fragment |  | b72, body only, calcite, probably thoracic |
| VIII | 16 | B | 126 | vertebra fragment |  | b72, body only, calcite, probably thoracic |
| VIII | 16 | B | 127 | calcaneus fragment | left | b72, subadult, unfused, 2-3 years of age based on size, calcite |


| VIII | 16 | B | 128 | pubis fragment | right | b72, subadult, probably close to 6 years old, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 129 | ischium fragment | left | b72, subadult, probably close to 6 years old, calcite |
| VIII | 16 | B | 130 | metacarpal fragment | undetermined | b72, adult, head fragment, calcite |
| VIII | 16 | B | 131 | metacarpal fragment | undetermined | b72,proximal/shaft fragment, calcite |
| VIII | 16 | B | 132 | second cuneiform | probable right | b72, broken, calcite, adult |
| VIII | 16 | B | 133 | mandible fragment |  | b72, child, anterior portion, central incisor is formed but has not erupted, all other teeth lost post mortem, 3-6 years of age with standard deviations based on what is visible of that one tooth |
| VIII | 16 | B | 134 | tibia fragment | undetermined | b72, adult, distal portion, taphonomic damage has distorted morphology, calcite |
| VIII | 16 | B | 135 | ilium fragment | undetermined | b72, subadult, calcite, much older than 5, closer to teen years |
| VIII | 16 | B | 136 | cranial fragment | undetermined | b72, adult, calcite |


| VIII | 16 | B | 137 | long bone fragment | undetermined | b72, subadult, possible tibia proximal portion, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 138 | vertebra fragment |  | b72, adult, either a lumbar or sacral body fragment, calcite |
| VIII | 16 | B | 139 | temporal fragment | undetermined | b72, adult, tympanic portion |
| VIII | 16 | B | 140 | rib fragment | left | b72, upper rib, adult, calcite, sternal end, too badly deteriorated to make any estimate |
| VIII | 16 | B | 141 | possible ilium fragment | undetermined | b72, adult, calcite |
| VIII | 16 | B | 142 | humerus fragment | right | b72, proximal epiphysis, older than 5, probably closer to 9 |
| VIII | 16 | B | 143 | lumbar vertebra |  | adult, probably L4 or <br> 5 , some damage throughout |
| VIII | 16 | B | 144 | lumbar vertebra |  | adult, probably L1, some damage throughout, especially the left lamina section |
| VIII | 16 | B | 145 | tibia fragment | left | adult, proximal fragment, heavy calcite coating |


| VIII | 16 | B | 146 | vertebra fragment |  | badly damaged |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 147 | thoracic vertebra fragment |  | body, adult, heavy calcite coating, probably T10 or 11 |  |
| VIII | 16 | B | 148 | thoracic vertebra fragment |  | body, adult, heavy calcite coating, probably T10 or 11 |  |
| VIII | 16 | B | 149 | proximal manual phalanx |  | adult, heavily coated in calcite | 41.83 mm |
| VIII | 16 | B | 150 | proximal pedal phalanx |  | adult, heavily coated in calcite | 24.77 mm |
| VIII | 16 | B | 151 | proximal pedal phalanx |  | adult, heavily coated in calcite | 22.55 mm |
| VIII | 16 | B | 152 | distal manual phalanx |  | adult, heavily coated in calcite | 18.5621 mm |
| VIII | 16 | B | 153 | first metatarsal fragment | left | proximal fragment, adult, calcite |  |
| VIII | 16 | B | 154 | fifth metacarpal | left | adult, calcite | 56.41 mm |
| VIII | 16 | B | 155 | third metacarpal fragment | right | proximal fragment, adult, calcite |  |
| VIII | 16 | B | 156 | third metacarpal fragment | right | proximal fragment, adult, calcite |  |
| VIII | 16 | B | 157 | patella | right | adult, calcite | 44.49 mm height, <br> 42.87 mm width |
| VIII | 16 | B | 158 | vertebra fragment |  | lamina, possible lower cervical or |  |

upper thoracic

| VIII | 16 | B | 159 | vertebra fragment |  | lamina, possible <br> lower mid thoracic |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 160 | rib fragment | right | shaft fragment, <br> subadult, mid rib, <br> calcite |
| VIII | 16 | B | 161 | rib fragment | right | shaft fragment, adult, <br> calcite |
| VIII | 16 | B | 162 | rib fragment | right | shaft fragment, adult, <br> calcite |
| VIII | 16 | B | 163 | cranial fragment |  | adult, calcite covered |
| VIII | 16 | B | 164 | cranial fragment |  | adult, calcite covered |
| VIII | 16 | B | 165 | cranial fragment |  | adult, calcite covered |
| VIII | 16 | B | 166 | occipital fragment |  | adult, calcite covered |
| VIII | 16 | B | 167 | tibia fragment | undetermined | adult, calcite covered |
| VIII | 16 | B | 168 | rib fragment | right | first rib, calcite, adult |
| VIII | 16 | B | 169 | shaft fragment | undetermined | adult, calcite covered |
| VIII | 16 | B | 170 | shaft fragment | undetermined | adult, calcite covered |
| VIII | 16 | B | 171 | first metatarsal |  | fragment |
| VIII | 16 | B | 172 | right | distal fragment, adult, |  |
| calcite |  |  |  |  |  |  |

on the posterior

| VIII | 16 | B | 176 | neural arch | right | subadult, 3-4 years of <br> age, C1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 177 | vertebra fragment |  | body, perinate, <br> probable lumbar |
| VIII | 16 | B | 178 | vertebra fragment |  | body, subadult, <br> probable lumbar or <br> thoracic |
| VIII | 16 | B | 179 | vertebra fragment |  | transverse process of <br> an adult lumbar |
| VIII | 16 | B | 180 | intermediate manual <br> phalanx |  | night |
| VIII | 16 | B | 181 | pisiform | adult, calcite |  |


| VIII | 16 | B | 189 | metatarsal | undetermined | subadult, younger than 8, calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 190 | neural arch | right | mid sacrum, subadult, young, body present, left arch is not, calcite |
| VIII | 16 | B | 191 | temporal fragment | left | petrous portion, adult, calcite |
| VIII | 16 | B | 192 | femur fragment | left | subadult, proximal end, epiphyses not fused, calcite, roughly 1.5 years old |
| VIII | 16 | B | 193 | vertebra fragment |  | subadult, possibly perinate, transverse process, possibly from a neural arch |
| VIII | 16 | B | 194 | clavicle fragment | left | lateral portion, subadult, calcite |
| VIII | 16 | B | 195 | rib fragment | undetermined | subadult, shaft fragment, mid rib, calcite |
| VIII | 16 | B | 196 | rib fragment | undetermined | subadult, shaft fragment, mid rib, calcite |
| VIII | 16 | B | 197 | thoracic vertebra fragment |  | subadult, upper thoracic, lamina fragment, calcite |
| VIII | 16 | B | 198 | tibia fragment | right | subadult, probably between 5 and 9 years of age, proximal epiphysis, calcite |


| VIII | 16 | B | 199 | tibia fragment | left | subadult, probably between 5 and 9 years of age, proximal epiphysis, calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | B | 200 | probable femur fragment | left | subadult, probably close to 5 years of age, distal epiphysis |  |
| VIII | 16 | B | 201 | incisor | right | upper right incisor with modification, I-1 by standards classification, slight dentine exposed |  |
| VIII | 16 | B | 202 | 4 unidentified fragments |  |  |  |
| VIII | 16 | B | 203 | proximal manual phalanx fragment |  | distal end, adult |  |
| VIII | 16 | B | 204 | shaft fragments | undetermined | adult, heavily coated in calcite |  |
| VIII | 16 | B | 205 | metacarpal fragments | undetermined | subadult, unfused proximal end, damaged |  |
| VIII | 16 | B | 206 | deciduous molar | right | lower, partial crown formation only, second molar, 9 months +/- 3 months |  |
| VIII | 16 | B | 207 | deciduous molar | right | lower first molar, see 207 for age |  |
| VIII | 16 | C | 1 | radius | right | covered in calcite, cannot measure shaft | 25.8 cm length, 23.99 mm head diameter |


| VIII | 16 | C | 2 | ulna fragment | left | proximal and shaft fragment, covered in calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | C | 3 | ulna fragment | right | proximal and shaft fragment, covered in calcite |  |
| VIII | 16 | C | 4 | radius | left | covered in calcite, cannot measure shaft | 25.6 cm length, 24.78 mm head diameter |
| VIII | 16 | C | 5 | tibia fragment | left | proximal and shaft fragment, covered in calcite |  |
| VIII | 16 | C | 6 | rib fragment | right | shaft fragment, covered in calcite |  |
| VIII | 16 | C | 7 | rib fragment | right | shaft fragment, covered in calcite |  |
| VIII | 16 | C | 8 | rib fragment | left | shaft fragment, covered in calcite |  |
| VIII | 16 | C | 9 | femur fragment | right | distal fragment of the condyles, covered in calcite |  |
| VIII | 16 | C | 10 | mandible fragment |  | right portion, adult, first molar still in crypt, other molars and second premolar lost post mortem, damage to anterior teeth (roots still in sockets), covered in calcite |  |


| VIII | 16 | C | 11 | rib fragment | right | vertebral end, covered <br> in calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | C | 12 | rib fragment | undetermined | shaft fragment, <br> covered in calcite |
| VIII | 16 | C | 13 | rib fragment | undetermined | shaft fragment, <br> covered in calcite |
| VIII | 16 | C | 14 | rib fragment | right | neck fragment upper <br> rib, covered in calcite |
| VIII | 16 | C | 15 | thoracic vertebra | mid thoracic, covered <br> in calcite, adult |  |
| VIII | 16 | C | 16 | thoracic vertebra | lower thoracic, <br> covered in calcite, <br> adult |  |
| VIII | 16 | C | 17 | thoracic vertebra | mid thoracic, covered <br> in calcite, adult |  |
| VIII | 16 | C | 18 | thoracic vertebra | mid thoracic, covered <br> in calcite, adult |  |
| VIII | 16 | C | 19 | thoracic vertebra | upper thoracic, <br> covered in calcite, <br> adult |  |
| VIII | 16 | C | 20 | thoracic vertebra | upper thoracic, <br> covered in calcite, <br> adult |  |
| VIII | 16 | C | 21 | thoracic vertebra | C |  |
| VIII | 16 | C | 22 | thoracic vertebra | mid thoracic, covered <br> in calcite, adult |  |
| VIII thoracic, covered |  |  |  |  |  |  |
| in calcite, adult |  |  |  |  |  |  |


| VIII | 16 | C | 24 | vertebra fragment |  | probable thoracic body, adult, covered in calcite |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | C | 25 | vertebra fragment |  | possible thoracic or lumbar vertebra body, adult, covered in calcite |
| VIII | 16 | C | 26 | lumbar fragment |  | damage to the superior portion of the lamina, adult, covered in calcite, probable L5, possibly some lipping on the body |
| VIII | 16 | C | 27 | lumbar fragment |  | lamina completely gone, adult, covered in calcite |
| VIII | 16 | C | 28 | scapula fragment | right | inferior angle, calcite on the posterior surface, adult |
| VIII | 16 | C | 29 | scapula fragment | right | spine fragment, adult, calcite |
| VIII | 16 | C | 30 | scapula fragment | left | spine fragment, adult, calcite |
| VIII | 16 | C | 31 | long bone fragment | undetermined | covered in calcite, adult, possible femur fragment |
| VIII | 16 | C | 32 | long bone fragment | undetermined | covered in calcite, adult, possible femur fragment |


| VIII | 16 | C | 33 | scapula fragment | left | glenoid fragment, covered in calcite, cannot measure |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | C | 34 | patella | left | large, posterior covered in calcite | 46.02 mm height, <br> 44.37 mm width |
| VIII | 16 | C | 35 | navicular | left | covered in calcite |  |
| VIII | 16 | C | 36 | mandible fragment |  | left portion, covered in calcite |  |
| VIII | 16 | C | 37 | cervical vertebra |  | lower cervical vertebra, calcite |  |
| VIII | 16 | C | 38 | vertebra fragment |  | probably an upper lumbar lamina, covered in calcite |  |
| VIII | 16 | C | 39 | cervical vertebra |  | first cervical, covered in calcite |  |
| VIII | 16 | C | 40 | thoracic vertebra fragment |  | mid thoracic, covered in calcite, adult, lamina fragment |  |
| VIII | 16 | C | 41 | mandible fragment |  | condyle only, probably left, adult, covered in calcite |  |
| VIII | 16 | C | 42 | clavicle | left | covered in calcite damage to medial section, part of the anterior superior portion has no calcite | 15.5 cm long |
| VIII | 16 | C | 43 | clavicle fragment | right | lateral fragment, pair to 42 , covered in calcite |  |


| VIII | 16 | C | 44 | proximal manual phalanx |  | more calcite is on the palmar surface | 42.74 mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | C | 45 | proximal manual phalanx fragment |  | distal fragment, more calcite on palmar surface |  |
| VIII | 16 | C | 46 | intermediate manual phalanx |  | more calcite is on the palmar surface | 28.51 mm |
| VIII | 16 | C | 47 | proximal manual phalanx |  | more calcite is on the palmar surface | 34.71 mm |
| VIII | 16 | C | 48 | proximal manual phalanx |  | more calcite is on the palmar surface | 44.74 mm |
| VIII | 16 | C | 49 | first proximal manual phalanx |  | more calcite on the posterior surface | 31.5 mm |
| VIII | 16 | C | 50 | intermediate manual phalanx |  | calcite covered | 24.36 mm |
| VIII | 16 | C | 51 | intermediate manual phalanx |  | calcite covered | 25.41 mm |
| VIII | 16 | C | 52 | rib fragment | undetermined | calcite, shaft fragment mostly on posterior surface |  |
| VIII | 16 | C | 53 | rib fragment | right | vertebral end fragment, covered in calcite |  |
| VIII | 16 | C | 54 | rib fragment | right | vertebral end fragment, covered in calcite |  |
| VIII | 16 | C | 55 | rib fragment | right | vertebral end fragment, covered in calcite |  |


| VIII | 16 | C | 56 | rib fragment | undetermined | shaft fragment covered in calcite |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | C | 57 | distal manual phalanx |  | first, covered in calcite | 25.89 mm |
| VIII | 16 | C | 58 | distal manual phalanx |  | calcite | 18.58 mm |
| VIII | 16 | C | 59 | intermediate manual phalanx |  | calcite | 18.3 mm |
| VIII | 16 | C | 60 | proximal pedal phalanx |  | calcite | 26.24 mm |
| VIII | 16 | C | 61 | scapula fragment | left | coracoid process, covered in calcite |  |
| VIII | 16 | C | 62 | third metacarpal fragment | right | proximal fragment, covered in calcite |  |
| VIII | 16 | C | 63 | metacarpal/metatarsal fragment |  | shaft and distal fragment, covered in calcite |  |
| VIII | 16 | C | 64 | fourth metacarpal | left | covered in calcite | 60.91 mm |
| VIII | 16 | C | 65 | fifth metatarsal |  | covered in calcite, cannot side | 73.74 mm |
| VIII | 16 | C | 66 | scaphoid | left | large, covered in calcite |  |
| VIII | 16 | C | 67 | capitate | right | covered in calcite |  |
| VIII | 16 | C | 68 | hamate | right | covered in calcite |  |
| VIII | 16 | C | 69 | capitate | left | mate to 67 , less calcite |  |
| VIII | 16 | C | 70 | tibia | right | just under 5 years of age most likely, calcite, most on the medial and posterior | 10 cm in length |


| VIII | 16 | C | 71 | femur fragment | right | proximal fragment, epiphysis unfused, close to 5 years of age, same individual as 70 , calcite is thicker on posterior surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | C | 72 | pubis fragment | probable right | perinate, light calcite covering |
| VIII | 16 | C | 73 | ischium | left | perinate, light calcite covering |
| VIII | 16 | C | 74 | trapezoid | probable left | covered in calcite |
| VIII | 16 | C | 75 | vertebra fragment |  | lamina fragment, either lower thoracic or upper lumbar |
| VIII | 16 | C | 76 | fibula fragment | right | distal fragment, calcite covered |
| VIII | 16 | C | 77 | fibula fragment | undetermined | shaft fragment |
| VIII | 16 | C | 78 | ulna fragment | undetermined | shaft fragment, calcite covered |
| VIII | 16 | C | 79 | shaft fragment | undetermined | calcite covered |
| VIII | 16 | C | 80 | shaft fragment | undetermined | calcite covered |
| VIII | 16 | C | 81 | shaft fragment | undetermined | calcite covered |
| VIII | 16 | C | 82 | possible first metatarsal |  | perinate, calcite |
| VIII | 16 | C | 83 | rib fragment | left | perinate, mid rib, |


| VIII | 16 | C | neural arch | right | calcite <br> calcite, perinate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | C | 85 | neural arch | right | lower thoracic, <br> calcite, perinate |
| VIII | 16 | C | 86 | neural arch | left | lower thoracic, <br> calcite, perinate |
| VIII | 16 | C | 87 | rib fragment | right | first rib, covered in <br> calcite |
| VIII | 16 | C | 88 | scapula fragment | probable right | inferior margin |
| fragment, calcite |  |  |  |  |  |  |
| mostly on the |  |  |  |  |  |  |
| posterior surface |  |  |  |  |  |  |

$\left.\begin{array}{lcccccc} & & & & & \begin{array}{c}\text { posterior surface, } \\ \text { adult }\end{array} \\ \hline \text { VIII } & 16 & \text { C } & 96 & \text { vertebra fragment } & & \begin{array}{c}\text { body fragment, } \\ \text { thoracic or upper }\end{array} \\ \hline \text { VIII } & 16 & \text { C } & 97 & \text { ossified cartilage } & & \text { calcite calcite }\end{array}\right]$
$\left.\begin{array}{lcccccc}\text { VIII } & 16 & \text { D } & 7 & \text { femur fragment } & \text { undetermined } & \begin{array}{c}\text { distal femur fragment, } \\ \text { treated with B72 }\end{array} \\ \hline \text { VIII } & 16 & \text { D } & 8 & \text { femur fragment } & \text { undetermined } & \begin{array}{c}\text { distal femur fragment, } \\ \text { treated with B72 }\end{array} \\ \hline \text { VIII } & 16 & \text { D } & 9 & \text { tibia fragment } & \text { undetermined } & \begin{array}{c}\text { distal fragment, } \\ \text { calcite and carbon, } \\ \text { treated with B72 }\end{array} \\ \hline \text { VIII } & 16 & \text { D } & 10 & \begin{array}{c}3 \text { unidentified } \\ \text { fragments }\end{array} & & \text { b72 } \\ \hline \text { VIII } & 16 & \text { E } & 1 & \text { cranial fragment } & & \\ \hline \text { VIII } & 16 & \text { E } & 2 & \text { cranial fragment } & & \\ \hline \text { VIII } & 16 & \text { E } & 3 & \text { cranial fragment } & & \text { subadult } \\ \hline \text { VIII } & 16 & \text { E } & 4 & \text { 3 frontal fragments } & & \begin{array}{c}\text { most of the temporal } \\ \text { bone, same subadult } \\ \text { as 4 probably }\end{array} \\ \hline \text { VIII } & 16 & \text { E } & 5 & \text { temporal bone fragment } & \text { right } & \begin{array}{c}\text { most of the bone } \\ \text { same individual as 4 } \\ \text { and 5 }\end{array} \\ \hline \text { VIII } & 16 & \text { E } & 6 & \text { occipital fragment } & & \begin{array}{c}\text { adult, calcite and } \\ \text { carbon covered }\end{array} \\ \hline \text { VIII } & 16 & \text { E } & 7 & \text { navicular } & \text { right } & \text { calcite and carbon } \\ \text { covered }\end{array}\right]$

|  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | E | 12 | rib fragment | left | shaft fragment, calcite and carbon covered |
| VIII | 16 | E | 13 | rib fragment | undetermined | shaft fragment, calcite and carbon covered |
| VIII | 16 | E | 14 | rib fragment | undetermined | shaft fragment, calcite and carbon covered |
| VIII | 16 | E | 15 | rib fragment | undetermined | shaft fragment, calcite and carbon covered |
| VIII | 16 | E | 16 | rib fragment | right | rib 2 probably, shaft fragment, calcite and carbon covered |
| VIII | 16 | E | 17 | metacarpal fragment |  | distal end with part of the shaft, calcite and carbon covered |
| VIII | 16 | E | 18 | third metacarpal | right | calcite and carbon covered |
| VIII | 16 | E | 19 | proximal manual phalanx |  | calcite and carbon covered |
| VIII | 16 | E | 20 | first proximal pedal phalanx |  | calcite and carbon covered, additional bone growth on the superior proximal surface |
| VIII | 16 | E | 21 | humerus fragment | right | distal posterior fragment, wide angle, spool shaped, triangular fossa, medial epicondyle is level, calcium and |

carbon covered

| VIII | 16 | E | 22 | ilium fragment | undetermined | iliac crest fragment, epiphyseal line is visible, calcium and carbon covered |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | E | 23 | thoracic vertebra |  | probably t 3-8, calcium and carbon covered |
| VIII | 16 | E | 24 | sphenoid fragment | left | left part of the lesser wings, unfused spheno occipital synchondrosis, under 18 |
| VIII | 16 | E | 25 | sphenoid fragment | right | right part of the lesser wings, unfused spheno-occipital synchondrosis, under 18 |
| VIII | 16 | E | 26 | occipital fragment |  | basioccipital portion, unfused, same person as 25 and 27 |
| VIII | 16 | E | 27 | occipital fragment |  | unfused portion with the occipital condyle |
| VIII | 16 | E | 28 | scapula fragment | left | coracoid, unfused, covered in carbon and calcite |
| VIII | 16 | E | 29 | vertebra fragment |  |  |


| VIII | 16 | E | 30 | proximal manual phalanx fragment |  | distal fragment, calcite and carbon |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | E | 31 | long bone fragments |  |  |
| VIII | 16 | E | 32 | 17 cranial fragments |  |  |
| VIII | 16 | E | 33 | tibia fragments | left | unfused, at least 5 years of age, calcite and carbon on the posterior surface and lateral and medial |
| VIII | 16 | E | 34 | tibia fragments | right | unfused, at least 5 years of age, calcite and carbon on the posterior surface and lateral and medial |
| VIII | 16 | E | 35 | radius fragment | right | distal fragment, calcite and carbon |
| VIII | 16 | E | 36 | third cuneiform | probable right | covered in calcium and carbon |
| VIII | 16 | E | 37 | frontal fragment |  | same as 4, 5, 6 |
| VIII | 16 | E | 38 | frontal fragment |  | same as 4, 5, 6 |
| VIII | 16 | E | 39 | rib fragment | left | shaft fragment, calcite and carbon covered |
| VIII | 16 | E | 40 | rib fragment | undetermined | shaft fragment, calcite and carbon covered |
| VIII | 16 | E | 41 | rib fragment | undetermined | subadult, shaft fragment, calcite and carbon covered |
| VIII | 16 | E | 42 | rib fragment | probable right | first rib, shaft fragment, calcite and carbon covered |


| VIII | 16 | E | 43 | rib fragment | undetermined | sternal end, possible <br> subadult, stage 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VIII | 16 | E | 44 | 31 unidentified <br> fragments |  |  |

## APPENDIX C R CODE FOR SILER MODELS

/*Fit Siler Model Life Table Mortality Model Using Horticulturalist Average from Gurven and Kaplan 2007*/

```
a1<-0.418
b1<-1.657
a3<-0.012
b3<-0.074
t<-matrix(c(1,5,10,15,20,25,30,35,40,45,50,55))
St<-exp((-a1/b1*(1-exp(-b1*t)))*exp(a3/b3*(1-exp(b3*t))))
s1<-St[1,]
s2<-St[2,]
s3<-St[3,]
s4<-St[4,]
s5<-St[5,]
s6<-St[6,]
s7<-St[7,]
s8<-St[8,]
s9<-St[9,]
s10<-St[10,]
s11<-St[11,]
s12<-St[12,]
10<-1
11<-10-(1-s1)
12<-10-(1-(s1*s2))
13<-10-(1-(s1*s2*s3))
14<-10-(1-(s1*s2*s3*s4))
15<-10-(1-(s1*s2*s3*s4*s5))
16<-10-(1-(s1*s2*s3*s4*s5*s6))
17<-10-(1-(s1*s2*s3*s4*s5*s6*s7))
18<-10-(1-(s1*s2*s3*s4*s5*s6*s7*s8))
19<-10-(1-(s1*s2*s3*s4*s5*s6*s7*s8*s9))
110<-10-(1-(s1*s2*s3*s4*s5*s6*s7*s8*s9*s10))
111<-10-(1-(s1*s2*s3*s4*s5*s6*s7*s8*s9*s10*s11))
112<-10-(1-(s1*s2*s3*s4*s5*s6*s7*s8*s9*s10*s11*s12))
Lt<-matrix(c(10,11,12,13,14,15,16,17,18,19,110,111,112))
t2<-matrix(c(0,t))
plot(t2,Lt,type="l",col="red")
/*create "observed" dx function from model LT*/
```

```
mtcobs<-read.table(file="C:/Users/Kieffer/Documents/SantaCatalina.csv",sep=",")
mtc<-as.matrix(mtcobs)
mtctot<-colSums(mtcobs)
d1<-mtctot*(1-s1)
d2<-(mtctot-d1)*(1-s2)
d3<-(mtctot-(d1+d2))*(1-s3)
d4<-(mtctot-(d1+d2+d3))*(1-s4)
d5<-(mtctot-(d1+d2+d3+d4))*(1-s5)
d6<-(mtctot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(mtctot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(mtctot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(mtctot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(mtctot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(mtctot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(mtctot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
Dt<-as.integer(matrix(c(d1,d2,d3,d4,d5,d6,d7,d8,d9,d10,d11,d12)))
plot(t,Dt,type="l",col="red")
lines(t,mtc,col="green")
diff<-(Dt-mtc)
plot(t,diff,type="l",col="red")
tbl<-table(Dt,mtc)
tbl
chisq.test(tbl)
fisher.test(tbl)
/*simulated corrections of death counts based on observability*/
o01m<-.80
o01s<-. 05
o14m<-.55
o14s<-.066
o59m<-.35
059s<-.033
o1014m<-. }1
o1014s<-.033
o1519m<-. }1
o1519s<-.033
o2024m<-. }1
o2024s<-.033
o2529m<-. }1
02529s<-.033
o3034m<-. }1
```

o3034s<-. 033
o3539m<-. 15
o3539s<-. 033
o4044m<-. 25
o4044s<-. 033
o4549m<-. 35
o4549s<-. 066
05054m<-. 45
$05054 \mathrm{~s}<-.066$
/*execute calibrated monte-carlo resampling with thinning*/
obs01sim<-replicate(10000,matrix(c(rnorm(10000,o01m,o01s)),nrow=10000,ncol=1)) t01<-obs01sim[seq(100,10000,100),1:1,100]
obs14sim<-replicate(10000,matrix(c(rnorm(10000,o14m,o14s)),nrow=10000,ncol=1)) t14<-obs14sim[seq(100,10000,100),1:1,100]
obs59sim<-replicate(10000,matrix(c(rnorm(10000,o59m,o59s)),nrow=10000,ncol=1))
t59<-obs59sim[seq(100,10000,100),1:1,100]
obs1014sim<-
replicate(10000,matrix(c(rnorm(10000,o1014m,o1014s)),nrow=10000,ncol=1)) t1014<-obs1014sim[seq(100,10000,100), 1:1,100]
obs1519sim<-
replicate(10000,matrix(c(rnorm(10000,o1519m,o1519s)),nrow=10000,ncol=1)) t1519<-obs1519sim[seq(100,10000,100),1:1,100]
obs2024sim<-
replicate(10000,matrix(c(rnorm(10000,o2024m,o2024s)),nrow=10000,ncol=1)) t2024<-obs2024sim[seq(100,10000,100),1:1,100]
obs2529sim<-
replicate(10000,matrix(c(rnorm(10000,o2529m,o2529s)),nrow=10000,ncol=1))
t2529<-obs2529sim[seq(100,10000,100), 1:1,100]
obs3034sim<-
replicate (10000,matrix(c(rnorm(10000,o3034m,o3034s)),nrow=10000,ncol=1))
t3034<-obs3034sim[seq(100,10000,100),1:1,100]
obs3539sim<-
replicate (10000, matrix(c(rnorm(10000,o3539m,o3539s)), nrow=10000,ncol=1))
t3539<-obs3539sim[seq(100,10000,100),1:1,100]
obs4044sim<-
replicate(10000,matrix(c(rnorm(10000,o4044m,o4044s)),nrow=10000,ncol=1)) t4044<-obs4044sim[seq(100,10000,100),1:1,100]
obs4549sim<-
replicate(10000,matrix(c(rnorm(10000,o4549m,o4549s)),nrow=10000,ncol=1))
t4549<-obs4549sim[seq(100,10000,100),1:1,100]
obs5054sim<-
replicate (10000,matrix(c(rnorm(10000,05054m,o5054s)), nrow=10000,ncol=1))
t5054<-obs5054sim[seq(100,10000,100),1:1,100]
/*Compute Observability Raising Factors*/

```
ht01<-t(1/(1-t01))
ht14<-t(1/(1-t14))
ht59<-t(1/(1-t59))
ht1014<-t(1/(1-t1014))
ht1519<-t(1/(1-t1519))
ht2024<-t(1/(1-t2024))
ht2529<-t(1/(1-t2529))
ht3034<-t(1/(1-t3034))
ht3539<-t(1/(1-t3539))
ht4044<-t(1/(1-t4044))
ht4549<-t(1/(1-t4549))
ht5054<-t(1/(1-t5054))
```

ht<-rbind(ht01,ht14,ht59,ht1014,ht1519,ht2024,ht2529,ht3034,ht3539,ht4044, ht4549,ht5054)
h1<-as.matrix(ht[,1])
h2<-as.matrix (ht[,2])
h3<-as.matrix (ht[,3])
h4<-as.matrix (ht[,4])
h5<-as.matrix(ht[,5])
h6<-as.matrix (ht[,6])
h7<-as.matrix(ht[,7])
h8<-as.matrix(ht[,8])
h9<-as.matrix (ht[,9])
h10<-as.matrix(ht[,10])
h11<-as.matrix(ht[,11])
h12<-as.matrix(ht[,12])
h13<-as.matrix(ht[,13])
h14<-as.matrix(ht[,14])
h15<-as.matrix(ht[,15])
h16<-as.matrix(ht[,16])
h17<-as.matrix(ht[,17])
h18<-as.matrix(ht[,18])
h19<-as.matrix (ht[,19])
h20<-as.matrix (ht[,20])
h21<-as.matrix(ht[,21])
h22<-as.matrix (ht[,22])
h23<-as.matrix(ht[,23])
h24<-as.matrix (ht[,24])
h25<-as.matrix (ht[,25])
h26<-as.matrix(ht[,26])
h27<-as.matrix(ht[,27])
h28<-as.matrix(ht[,28])
h29<-as.matrix(ht[,29])
h30<-as.matrix (ht[,30])
h31<-as.matrix(ht[,31])
h32<-as.matrix(ht[,32])
h33<-as.matrix (ht[,33])
h34<-as.matrix (ht[,34])
h35<-as.matrix(ht[,35])
h36<-as.matrix(ht[,36])
h37<-as.matrix(ht[,37])
h38<-as.matrix (ht[,38])
h39<-as.matrix(ht[,39])
h40<-as.matrix (ht[,40])
h41<-as.matrix(ht[,41])
h42<-as.matrix(ht[,42])
h43<-as.matrix (ht[,43])
h44<-as.matrix(ht[,44])
h45<-as.matrix(ht[,45])
h46<-as.matrix (ht[,46])
h47<-as.matrix (ht[,47])
h48<-as.matrix (ht[,48])
h49<-as.matrix(ht[,49])
h50<-as.matrix(ht[,50])
h51<-as.matrix (ht[,51])
h52<-as.matrix (ht[,52])
h53<-as.matrix(ht[,53])
h54<-as.matrix(ht[,54])
h55<-as.matrix (ht[,55])
h56<-as.matrix (ht[,56])
h57<-as.matrix (ht[,57])
h58<-as.matrix(ht[,58])
h59<-as.matrix (ht[,59])
h60<-as.matrix(ht[,60])
h61<-as.matrix(ht[,61])
h62<-as.matrix(ht[,62])
h63<-as.matrix(ht[,63])
h64<-as.matrix(ht[,64])
h65<-as.matrix(ht[,65])
h66<-as.matrix (ht[,66])
h67<-as.matrix(ht[,67])
h68<-as.matrix(ht[,68])
h69<-as.matrix(ht[,69])
h70<-as.matrix(ht[,70])
h71<-as.matrix (ht[,71])
h72<-as.matrix(ht[,72])
h73<-as.matrix(ht[,73])
h74<-as.matrix(ht[,74])
h75<-as.matrix(ht[,75])
h76<-as.matrix(ht[,76])
h77<-as.matrix(ht[,77])
h78<-as.matrix(ht[,78])
h79<-as.matrix(ht[,79])
h80<-as.matrix(ht[,80])
h81<-as.matrix(ht[,81])
h82<-as.matrix(ht[,82])
h83<-as.matrix(ht[,83])
h84<-as.matrix(ht[,84])
h85<-as.matrix(ht[,85])
h86<-as.matrix(ht[,86])
h87<-as.matrix(ht[,87])
h88<-as.matrix(ht[,88])
h89<-as.matrix(ht[,89])
h90<-as.matrix(ht[,90])
h91<-as.matrix(ht[,91])
h92<-as.matrix(ht[,92])
h93<-as.matrix(ht[,93])
h94<-as.matrix(ht[,94])
h95<-as.matrix(ht[,95])
h96<-as.matrix(ht[,96])
h97<-as.matrix(ht[,97])
h98<-as.matrix(ht[,98])
h99<-as.matrix(ht[,99])
h100<-as.matrix (ht[,100])
/*death count estimates upweighted by observability parameters--100 iterations*/
$\mathrm{dt} 1<-\mathrm{as}$. matrix(as.integer(mtc*h1))
d1tot<-colSums(dt1)
d1<-d1tot*(1-s1)
d2<-(d1tot-d1)*(1-s2)
d3<-(d1tot-(d1+d2))*(1-s3)

```
d4<-(d1tot-(d1+d2+d3))*(1-s4)
d5<-(d1tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d1tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d1tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d1tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d1tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d1tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d1tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d1tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp1<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt10<-as.matrix(as.integer(mtc*h10))
d10tot<-colSums(dt10)
d1<-d10tot*(1-s1)
d2<-(d10tot-d1)*(1-s2)
d3<-(d10tot-(d1+d2))*(1-s3)
d4<-(d10tot-(d1+d2+d3))*(1-s4)
d5<-(d10tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d10tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d10tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d10tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 10$ tot-(d1 + d2+d3+d4+d5+d6+d7+d8) $) *(1-s 9)$
d10<-(d10tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d10tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 10 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp10<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt20<-as.matrix(as.integer(mtc*h20))
d20tot<-colSums(dt20)
d1<-d20tot*(1-s1)
d2<-(d20tot-d1)*(1-s2)
d3<-(d20tot-(d1+d2))*(1-s3)
d4<-(d20tot-(d1+d2+d3))*(1-s4)
d5<-(d20tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d20tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d20tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d20tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d20tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d20tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d20tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d20tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp20<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt30<-as.matrix(as.integer(mtc*h30))
d30tot<-colSums(dt30)
d1<-d30tot*(1-s1)
d2<-(d30tot-d1)*(1-s2)
d3<-(d30tot-(d1+d2))*(1-s3)
d4<-(d30tot-(d1+d2+d3))*(1-s4)
d5<-(d30tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d30tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d30tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d30tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d30tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d30tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d30tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d30tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp30<-as.matrix(as.integer(rbind(d1,d2,d3,d4, d5, d6, d7,d8, d9, 10, d11, d12)))
$\mathrm{dt} 40<$-as.matrix(as.integer(mtc*h40))
d40tot<-colSums(dt40)
d1<-d40tot*(1-s1)
d2<-(d40tot-d1)*(1-s2)
d3<-(d40tot-(d1+d2))*(1-s3)
d4<-(d40tot-(d1+d2+d3))*(1-s4)
d5<-(d40tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d40tot- $(d 1+d 2+d 3+d 4+d 5))^{*}(1-s 6)$
d7<-(d40tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d40tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 40$ tot-(d1 + d2+d3+d4+d5+d6+d7+d8) $) *(1-s 9)$
d10<-(d40tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9))^{*}(1-\mathrm{s} 10)$
$\mathrm{d} 11<-(\mathrm{d} 40 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 40$ tot $-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11)) *(1-\mathrm{s} 12)$
dsilexp40<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt50<-as.matrix(as.integer(mtc*h50))
d50tot<-colSums(dt50)
d1<-d50tot*(1-s1)
d2<-(d50tot-d1)*(1-s2)
d3<-(d50tot-(d1+d2))*(1-s3)
d4<-(d50tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3)) *(1-\mathrm{s} 4)$
d5<-(d50tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d50tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d50tot-(d1+d2+d3+d4+d5+d6))*(1-s7)

```
d8<-(d50tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d50tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d50tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d50tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d50tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp50<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt60<-as.matrix(as.integer(mtc*h60))
d60tot<-colSums(dt60)
d1<-d60tot*(1-s1)
d2<-(d60tot-d1)*(1-s2)
d3<-(d60tot-(d1+d2))*(1-s3)
d4<-(d60tot-(d1+d2+d3))*(1-s4)
d5<-(d60tot- (d1+d2+d3+d4))*(1-s5)
d6<-(d60tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d60tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d60tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 60$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d60tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d60tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d60tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp60<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt70<-as.matrix(as.integer(mtc*h70))
d70tot<-colSums(dt70)
d1<-d70tot* ${ }^{*}(1-\mathrm{s} 1)$
d2<-(d70tot-d1)*(1-s2)
d3<-(d70tot-(d1+d2))*(1-s3)
d4<-(d70tot-(d1+d2+d3))*(1-s4)
d5<-(d70tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d70tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d70tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d70tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d70tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d70tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d70tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 70 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp70<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt80<-as.matrix(as.integer(mtc*h80))
d80tot<-colSums(dt80)
d1<-d80tot*(1-s1)
d2<-(d80tot-d1)*(1-s2)

```
d3<-(d80tot-(d1+d2))*(1-s3)
d4<-(d80tot-(d1+d2+d3))*(1-s4)
d5<-(d80tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d80tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d80tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d80tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d80tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d80tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d80tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d80tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp80<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt90<-as.matrix(as.integer(mtc*h90))
d90tot<-colSums(dt90)
d1<-d90tot*(1-s1)
d2<-(d90tot-d1)*(1-s2)
d3<-(d90tot-(d1+d2))*(1-s3)
d4<-(d90tot-(d1+d2+d3))*(1-s4)
d5<-(d90tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d90tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d90tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d90tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 90$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d90tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d90tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d90tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp90<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt100<-as.matrix(as.integer(mtc*h100))
d100tot<-colSums(dt100)
d1<-d100tot*(1-s1)
d2<-(d100tot-d1)*(1-s2)
d3<-(d100tot-(d1+d2))*(1-s3)
d4<-(d100tot-(d1+d2+d3))*(1-s4)
d5<-(d100tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d100tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d100tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d100tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d100tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d100tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d $11<-(\mathrm{d} 100 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
d12<-(d100tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp100<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
/*compute chi-squared and Fisher's Exact Tests for diffs between remediated differences
and
null expectation under Siler model*/
tbl<-table(dt1,dsilexp1)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt10,dsilexp10)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt20,dsilexp20)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt30,dsilexp30)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt40,dsilexp40)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt50,dsilexp50)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt60,dsilexp60)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt70,dsilexp70)
tbl
chisq.test(tbl)
fisher.test(tbl)
```

tbl<-table(dt80,dsilexp80)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt90,dsilexp90)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt100,dsilexp100)
tbl
chisq.test(tbl)
fisher.test(tbl)
/*plot every 10th iteration of simulation against the null expectations*/

```
plot(t,dsilexp1,type="l",col="red", xlab="Age at Death",ylab="Death Counts",
xlim=c(0,55),ylim=c(0,40))
lines(t,dsilexp10,type="1",col="red")
lines(t,dsilexp20,type="l",col="red")
lines(t,dsilexp30,type="l",col="red")
lines(t,dsilexp40,type="1",col="red")
lines(t,dsilexp50,type="1",col="red")
lines(t,dsilexp60,type="1",col="red")
lines(t,dsilexp70,type="1",col="red")
lines(t,dsilexp80,type="1",col="red")
lines(t,dsilexp90,type="l",col="red")
lines(t,dsilexp100,type="l",col="red")
lines(t,dt1,type="l",col="blue")
lines(t,dt10,type="l",col="blue")
lines(t,dt20,type="l",col="blue")
lines(t,dt30,type="l",col="blue")
lines(t,dt40,type="l",col="blue")
lines(t,dt50,type="l",col="blue")
lines(t,dt60,type="l",col="blue")
lines(t,dt70,type="l",col="blue")
lines(t,dt80,type="l",col="blue")
lines(t,dt90,type="l",col="blue")
lines(t,dt100,type="l",col="blue")
```


## APPENDIX D R CODE FOR MONTE CARLO RESAMPLING

/*Fit Siler Model Life Table Mortality Model Using horticulture Average from Gurven and Kaplan 2007*/
a1<-0.418
b1<-1.657
a3<-0.012
b3<-0.074
t<-matrix(c( $1,5,10,15,20,25,30,35,40,45,50,55))$
St<-exp((-a1/b1*(1-exp(-b1*t)))*exp(a3/b3*(1-exp(b3*t))))
s1<-St[1,]
s2<-St[2,]
s3<-St[3,]
s4<-St[4,]
s5<-St[5,]
s6<-St[6,]
s7<-St[7,]
s8<-St[8,]
s9<-St[9,]
s10<-St[10,]
s11<-St[11,]
s12<-St[12,]
10<-1
11<-10-(1-s1)
12<-10-(1-(s1*s2))
13<-10-(1-(s1*s2*s3))
$14<-10-(1-(\mathrm{s} 1 * \mathrm{~s} 2 * \mathrm{~s} 3 * \mathrm{~s} 4))$
$15<-10-(1-(\mathrm{s} 1 * \mathrm{~s} 2 * \mathrm{~s} 3 * \mathrm{~s} 4 * \mathrm{~s} 5))$
16<-10-(1-(s1*s2*s3*s4*s5*s6))
17<-10-(1-(s1*s2*s3*s4*s5*s6*s7))
18<-10-(1-(s1*s2*s3*s4*s5*s6*s7*s8))
$19<-10-\left(1-\left(\mathrm{s} 1 *_{\mathrm{s}} 2 *_{\mathrm{s}} 3 *_{\mathrm{s}} 4 *_{\mathrm{s} 5} *_{\mathrm{s} 6} 6{ }^{\mathrm{s}} 7{ }^{2} \mathrm{~s} 8 * \mathrm{~s} 9\right)\right)$
$110<-10-(1-(\mathrm{s} 1 * \mathrm{~s} 2 * \mathrm{~s} 3 * \mathrm{~s} 4 * \mathrm{~s} 5 * \mathrm{~s} 6 * \mathrm{~s} 7 * \mathrm{~s} 8 * \mathrm{~s} 9 * \mathrm{~s} 10))$
$111<-10-(1-(\mathrm{s} 1 * \mathrm{~s} 2 * \mathrm{~s} 3 * \mathrm{~s} 4 * \mathrm{~s} 5 * \mathrm{~s} 6 * \mathrm{~s} 7 * \mathrm{~s} 8 * \mathrm{~s} 9 * \mathrm{~s} 10 * \mathrm{~s} 11))$
$112<-10-(1-(\mathrm{s} 1 * \mathrm{~s} 2 * \mathrm{~s} 3 * \mathrm{~s} 4 * \mathrm{~s} 5 * \mathrm{~s} 6 * \mathrm{~s} 7 * \mathrm{~s} 8 * \mathrm{~s} 9 * \mathrm{~s} 10 * \mathrm{~s} 11 * \mathrm{~s} 12))$
Lt<-matrix(c(10,11,12,13,14,15,16,17,18,19,110,111,112))
t2<-matrix $(c(0, \mathrm{t}))$
plot(t2,Lt,type="l",col="red")
/*create "observed" dx function from model LT*/

```
mtcobs<-read.table(file="C:/Users/Kieffer/Documents/MTC.csv",sep=",")
mtc<-as.matrix(mtcobs)
mtctot<-colSums(mtcobs)
d1<-mtctot*(1-s1)
d2<-(mtctot-d1)*(1-s2)
d3<-(mtctot-(d1+d2))*(1-s3)
d4<-(mtctot-(d1+d2+d3))*(1-s4)
d5<-(mtctot-(d1+d2+d3+d4))*(1-s5)
d6<-(mtctot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(mtctot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(mtctot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(mtctot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(mtctot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(mtctot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(mtctot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
Dt<-as.integer(matrix(c(d1,d2,d3,d4,d5,d6,d7,d8,d9,d10,d11,d12)))
plot(t,Dt,type="l",col="red")
lines(t,mtc,col="green")
diff<-(Dt-mtc)
plot(t,diff,type="l",col="red")
tbl<-table(Dt,mtc)
tbl
chisq.test(tbl)
fisher.test(tbl)
/*simulated corrections of death counts based on observability*/
o01m<-. }8
o01s<-.05
o14m<-.55
o14s<-.066
o59m<-. 35
059s<-.033
o1014m<-.15
o1014s<-.033
o1519m<-. 10
o1519s<-.033
o2024m<-. }1
o2024s<-.033
o2529m<-. }1
o2529s<-.033
```

o3034m<-. 10
o3034s<-. 033
o3539m<-. 15
o3539s<-. 033
o $4044 \mathrm{~m}<-.25$
o4044s<-. 033
o4549m<-. 35
o4549s<-. 066
o5054m<-. 45
05054s<-. 066
/*execute calibrated monte-carlo resampling with thinning*/
obs01sim<-replicate(10000,matrix(c(rnorm(10000,o01m,o01s)),nrow=10000,ncol=1)) t01<-obs01sim[seq(100,10000,100),1:1,100]
obs14sim<-replicate(10000,matrix(c(rnorm(10000,o14m,o14s)),nrow=10000,ncol=1)) t14<-obs14sim[seq(100,10000,100),1:1,100]
obs59sim<-replicate(10000,matrix(c(rnorm(10000,o59m,o59s)),nrow=10000,ncol=1))
t59<-obs59sim[seq(100,10000,100),1:1,100]
obs1014sim<-
replicate (10000,matrix(c(rnorm(10000,o1014m,o1014s)),nrow=10000,ncol=1)) t1014<-obs1014sim[seq(100,10000,100),1:1,100]
obs1519sim<-
replicate (10000,matrix(c(rnorm(10000,o1519m,o1519s)),nrow=10000,ncol=1)) t1519<-obs1519sim[seq(100,10000,100),1:1,100]
obs2024sim<-
replicate(10000,matrix(c(rnorm(10000,o2024m,o2024s)),nrow=10000,ncol=1)) t2024<-obs2024sim[seq(100,10000,100),1:1,100]
obs2529sim<-
replicate(10000,matrix(c(rnorm(10000,o2529m,o2529s)),nrow=10000,ncol=1)) t2529<-obs2529sim[seq(100,10000,100),1:1,100]
obs3034sim<-
replicate(10000,matrix(c(rnorm(10000,o3034m,o3034s)),nrow=10000,ncol=1))
t3034<-obs3034sim[seq(100,10000,100),1:1,100]
obs3539sim<-
replicate(10000,matrix(c(rnorm(10000,o3539m,o3539s)),nrow=10000,ncol=1))
t3539<-obs3539sim[seq(100,10000,100),1:1,100]
obs4044sim<-
replicate(10000,matrix(c(rnorm(10000,o4044m,o4044s)),nrow=10000,ncol=1)) t4044<-obs4044sim[seq(100,10000,100),1:1,100]
obs4549sim<-
replicate(10000,matrix(c(rnorm(10000,o4549m,o4549s)),nrow=10000,ncol=1))
t4549<-obs4549sim[seq(100,10000,100),1:1,100]
obs5054sim<-
replicate (10000,matrix(c(rnorm(10000,05054m,o5054s)), nrow=10000,ncol=1))
t5054<-obs5054sim[seq(100,10000,100),1:1,100]
/*Compute Observability Raising Factors*/

```
ht01<-t(1/(1-t01))
ht14<-t(1/(1-t14))
ht59<-t(1/(1-t59))
ht1014<-t(1/(1-t1014))
ht1519<-t(1/(1-t1519))
ht2024<-t(1/(1-t2024))
ht2529<-t(1/(1-t2529))
ht3034<-t(1/(1-t3034))
ht3539<-t(1/(1-t3539))
ht4044<-t(1/(1-t4044))
ht4549<-t(1/(1-t4549))
ht5054<-t(1/(1-t5054))
```

ht<-rbind(ht01,ht14,ht59,ht1014,ht1519,ht2024,ht2529,ht3034,ht3539,ht4044, ht4549,ht5054)
h1<-as.matrix(ht[,1])
h2<-as.matrix (ht[,2])
h3<-as.matrix (ht[,3])
h4<-as.matrix (ht[,4])
h5<-as.matrix(ht[,5])
h6<-as.matrix (ht[,6])
h7<-as.matrix(ht[,7])
h8<-as.matrix(ht[,8])
h9<-as.matrix (ht[,9])
h10<-as.matrix(ht[,10])
h11<-as.matrix(ht[,11])
h12<-as.matrix(ht[,12])
h13<-as.matrix(ht[,13])
h14<-as.matrix(ht[,14])
h15<-as.matrix(ht[,15])
h16<-as.matrix(ht[,16])
h17<-as.matrix(ht[,17])
h18<-as.matrix(ht[,18])
h19<-as.matrix (ht[,19])
h20<-as.matrix (ht[,20])
h21<-as.matrix(ht[,21])
h22<-as.matrix (ht[,22])
h23<-as.matrix(ht[,23])
h24<-as.matrix (ht[,24])
h25<-as.matrix (ht[,25])
h26<-as.matrix(ht[,26])
h27<-as.matrix(ht[,27])
h28<-as.matrix(ht[,28])
h29<-as.matrix(ht[,29])
h30<-as.matrix(ht[,30])
h31<-as.matrix(ht[,31])
h32<-as.matrix(ht[,32])
h33<-as.matrix(ht[,33])
h34<-as.matrix (ht[,34])
h35<-as.matrix(ht[,35])
h36<-as.matrix(ht[,36])
h37<-as.matrix(ht[,37])
h38<-as.matrix (ht[,38])
h39<-as.matrix(ht[,39])
h40<-as.matrix (ht[,40])
h41<-as.matrix(ht[,41])
h42<-as.matrix(ht[,42])
h43<-as.matrix (ht[,43])
h44<-as.matrix(ht[,44])
h45<-as.matrix(ht[,45])
h46<-as.matrix (ht[,46])
h47<-as.matrix (ht[,47])
h48<-as.matrix (ht[,48])
h49<-as.matrix(ht[,49])
h50<-as.matrix(ht[,50])
h51<-as.matrix (ht[,51])
h52<-as.matrix (ht[,52])
h53<-as.matrix(ht[,53])
h54<-as.matrix(ht[,54])
h55<-as.matrix (ht[,55])
h56<-as.matrix (ht[,56])
h57<-as.matrix (ht[,57])
h58<-as.matrix(ht[,58])
h59<-as.matrix (ht[,59])
h60<-as.matrix(ht[,60])
h61<-as.matrix(ht[,61])
h62<-as.matrix(ht[,62])
h63<-as.matrix(ht[,63])
h64<-as.matrix(ht[,64])
h65<-as.matrix(ht[,65])
h66<-as.matrix (ht[,66])
h67<-as.matrix(ht[,67])
h68<-as.matrix(ht[,68])
h69<-as.matrix(ht[,69])
h70<-as.matrix(ht[,70])
h71<-as.matrix (ht[,71])
h72<-as.matrix(ht[,72])
h73<-as.matrix(ht[,73])
h74<-as.matrix(ht[,74])
h75<-as.matrix(ht[,75])
h76<-as.matrix(ht[,76])
h77<-as.matrix(ht[,77])
h78<-as.matrix(ht[,78])
h79<-as.matrix(ht[,79])
h80<-as.matrix(ht[,80])
h81<-as.matrix(ht[,81])
h82<-as.matrix(ht[,82])
h83<-as.matrix(ht[,83])
h84<-as.matrix(ht[,84])
h85<-as.matrix(ht[,85])
h86<-as.matrix(ht[,86])
h87<-as.matrix(ht[,87])
h88<-as.matrix(ht[,88])
h89<-as.matrix(ht[,89])
h90<-as.matrix(ht[,90])
h91<-as.matrix(ht[,91])
h92<-as.matrix(ht[,92])
h93<-as.matrix(ht[,93])
h94<-as.matrix(ht[,94])
h95<-as.matrix(ht[,95])
h96<-as.matrix(ht[,96])
h97<-as.matrix(ht[,97])
h98<-as.matrix(ht[,98])
h99<-as.matrix(ht[,99])
h100<-as.matrix(ht[,100])
/*death count estimates upweighted by observability parameters--100 iterations*/
$\mathrm{dt} 1<-\mathrm{as}$. matrix(as.integer(mtc*h1))
d1tot<-colSums(dt1)
d1<-d1tot*(1-s1)
d2<-(d1tot-d1)*(1-s2)
d3<-(d1tot-(d1+d2))*(1-s3)

```
d4<-(d1tot-(d1+d2+d3))*(1-s4)
d5<-(d1tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d1tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d1 tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d1tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d1tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d1tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d1tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d1tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp1<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt2<-as.matrix(as.integer(mtc*h2))
d2tot<-colSums(dt2)
d1<-d2tot*(1-s1)
d2<-(d2tot-d1)*(1-s2)
d3<-(d2tot-(d1+d2))*(1-s3)
d4<-(d2tot-(d1+d2+d3))*(1-s4)
d5 <-(d2tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d2tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d2tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d2tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 2$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d2tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d2tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d2tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp2<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt3<-as.matrix(as.integer(mtc*h3))
d3tot<-colSums(dt3)
d1<-d3tot*(1-s1)
d2<-(d3tot-d1)*(1-s2)
d3<-(d3tot-(d1+d2))*(1-s3)
d4<-(d3tot-(d1+d2+d3))*(1-s4)
d5<-(d3tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d3tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d3tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d3tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d3tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d3tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d $11<-(\mathrm{d} 3 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
d12<-(d3tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp3<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt4<-as.matrix(as.integer(mtc*h4))
d4tot<-colSums(dt4)
d1<-d4tot*(1-s1)
d2<-(d4tot-d1)*(1-s2)
d3<-(d4tot-(d1+d2))*(1-s3)
d4<-(d4tot-(d1+d2+d3))*(1-s4)
d5<-(d4tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d4tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d4tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d4tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d4tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d4tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d4tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d4tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp4<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt5<-as.matrix(as.integer(mtc*h5))
d5tot<-colSums(dt5)
d1<-d5tot*(1-s1)
d2<-(d5tot-d1)*(1-s2)
d3<-(d5tot-(d1+d2))*(1-s3)
d4<-(d5tot-(d1+d2+d3))*(1-s4)
d5<-(d5tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d5tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d5tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d5tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d5tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d5tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d5tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d5tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp5<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt6<-as.matrix(as.integer(mtc*h6))
d6tot<-colSums(dt6)
d1<-d6tot*(1-s1)
d2<-(d6tot-d1)*(1-s2)
d3<-(d6tot-(d1+d2))*(1-s3)
d4<-(d6tot-(d1+d2+d3))*(1-s4)
d5<-(d6tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d6tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d6tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d6tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d6tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d6tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)

```
d11<-(d6tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d6tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp6<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt7<-as.matrix(as.integer(mtc*h7))
d7tot<-colSums(dt7)
d1<-d7tot*(1-s1)
d2<-(d7tot-d1)*(1-s2)
d3<-(d7tot-(d1+d2))*(1-s3)
d4<-(d7tot-(d1+d2+d3))*(1-s4)
d5<-(d7tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d7tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d7tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d7tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d7tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d7tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d7tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d7tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp7<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt8<-as.matrix(as.integer(mtc*h8))
d8tot<-colSums(dt8)
d1<-d8tot*(1-s1)
d2<-(d8tot-d1)*(1-s2)
d3<-(d8tot-(d1+d2))*(1-s3)
d4<-(d8tot-(d1+d2+d3))*(1-s4)
d5<-(d8tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d8tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d8tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d8tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d8tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d8tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d8tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d8tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dt9<-as.matrix(as.integer(mtc*h9))
d9tot<-colSums(dt9)
d1<-d9tot*(1-s1)
d2<-(d9tot-d1)*(1-s2)
d3<-(d9tot-(d1+d2))*(1-s3)
d4<-(d9tot-(d1+d2+d3))*(1-s4)
d5<-(d9tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d9tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d9tot-(d1+d2+d3+d4+d5+d6))*(1-s7)

```
d8<-(d9tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d9tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d9tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d9tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d9tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp9<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dsilexp8<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt10<-as.matrix(as.integer(mtc*h10))
d10tot<-colSums(dt10)
d1<-d10tot*(1-s1)
d2<-(d10tot-d1)*(1-s2)
d3<-(d10tot-(d1+d2))*(1-s3)
d4<-(d10tot-(d1+d2+d3))*(1-s4)
d5<-(d10tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d10tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d10tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d10tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 10$ tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d10tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d10tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 10 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp10<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt11<-as.matrix(as.integer(mtc*h11))
d11tot<-colSums(dt11)
d1<-d11tot*(1-s1)
d2<-(d11tot-d1)*(1-s2)
d3<-(d11tot-(d1+d2))*(1-s3)
d4<-(d11tot-(d1+d2+d3))*(1-s4)
d5<-(d11 tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d11tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d11 tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
$\mathrm{d} 8<-(\mathrm{d} 11 \text { tot- }(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7))^{*}(1-\mathrm{s} 8)$
d9<-(d11tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d11 tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9)$ )*(1-s10)
d11<-(d11tot- $(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8+d 9+d 10)) *(1-s 11)$
$\mathrm{d} 12<-(\mathrm{d} 11 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp11<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt12<-as.matrix(as.integer(mtc*h12))

```
d12tot<-colSums(dt12)
d1<-d12tot*(1-s1)
d2<-(d12tot-d1)*(1-s2)
d3<-(d12tot-(d1+d2))*(1-s3)
d4<-(d12tot-(d1+d2+d3))*(1-s4)
d5<-(d12tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d12tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d12tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d12tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d12tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d12tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d12tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d12tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp12<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt13<-as.matrix(as.integer(mtc*h13))
d13tot<-colSums(dt13)
d1<-d13tot*(1-s1)
d2<-(d13tot-d1)*(1-s2)
d3<-(d13tot-(d1+d2))*(1-s3)
d4<-(d13tot-(d1+d2+d3))*(1-s4)
d5<-(d13tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d13tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d13tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d13tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d13tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d13tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d13tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d13tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp13<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt14<-as.matrix(as.integer(mtc*h14))
d14tot<-colSums(dt14)
d1<-d14tot*(1-s1)
d2<-(d14tot-d1)*(1-s2)
d3<-(d14tot-(d1+d2))*(1-s3)
d4<-(d14tot-(d1+d2+d3))*(1-s4)
d5<-(d14tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d14tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d14tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d14tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 14$ tot-(d1+d2+d3+d4+d5+d6+d7+d8) $) *(1-s 9)$
d10<-(d14tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d14tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)

```
d12<-(d14tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp14<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt15<-as.matrix(as.integer(mtc*h15))
d15tot<-colSums(dt15)
d1<-d15tot*(1-s1)
d2<-(d15tot-d1)*(1-s2)
d3<-(d15tot-(d1+d2))*(1-s3)
d4<-(d15tot-(d1+d2+d3))*(1-s4)
d5<-(d15tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d15tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d15tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
$\mathrm{d} 8<-(\mathrm{d} 15 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7))^{*}(1-\mathrm{s} 8)$
d9<-(d15tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d15tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d15tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 15 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp15<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt16<-as.matrix(as.integer(mtc*h16))
d16tot<-colSums(dt16)
d1<-d16tot*(1-s1)
d2<-(d16tot-d1)*(1-s2)
d3<-(d16tot-(d1+d2))*(1-s3)
d4<-(d16tot-(d1+d2+d3))*(1-s4)
d5<-(d16tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d16tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d16tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d16tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d16tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d16tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d16tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d16tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp16<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt17<-as.matrix(as.integer(mtc*h17))
d17tot<-colSums(dt17)
d1<-d17tot*(1-s1)
d2<-(d17tot-d1)*(1-s2)
d3<-(d17tot-(d1+d2))*(1-s3)
d4<-(d17tot-(d1+d2+d3))*(1-s4)
d5<-(d17tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d17tot- $(d 1+d 2+d 3+d 4+d 5))^{*}(1-\mathrm{s} 6)$

```
d7<-(d17tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d17tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d17ttot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d17tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d17tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d17tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp17<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt18<-as.matrix(as.integer(mtc*h18))
d18tot<-colSums(dt18)
d1<-d18tot*(1-s1)
d2<-(d18tot-d1)*(1-s2)
d3<-(d18tot-(d1+d2))*(1-s3)
d4<-(d18tot-(d1+d2+d3))*(1-s4)
d5<-(d18tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d18tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d18tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
$\mathrm{d} 8<-(\mathrm{d} 18 \text { tot- }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7))^{*}(1-\mathrm{s} 8)$
d9<-(d18tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d18tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d18tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 18 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp18<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt19<-as.matrix(as.integer(mtc*h19))
d19tot<-colSums(dt19)
d1<-d19tot*(1-s1)
d2<-(d19tot-d1)*(1-s2)
d3<-(d19tot-(d1+d2))*(1-s3)
d4<-(d19tot-(d1+d2+d3))*(1-s4)
d5<-(d19tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d19tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d19tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d19tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d19tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d19tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d19tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d19tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp19<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt20<-as.matrix(as.integer(mtc*h20))
d20tot<-colSums(dt20)
d1<-d20tot*(1-s1)

```
d2<-(d20tot-d1)*(1-s2)
d3<-(d20tot-(d1+d2))*(1-s3)
d4<-(d20tot-(d1+d2+d3))*(1-s4)
d5<-(d20tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d20tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d20tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d20tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d20tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d20tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d20tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d20tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp20<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt21<-as.matrix(as.integer(mtc*h21))
d21tot<-colSums(dt21)
d1<-d21tot*(1-s1)
d2<-(d21tot-d1)*(1-s2)
d3<-(d21tot-(d1+d2))*(1-s3)
d4<-(d21tot-(d1+d2+d3))*(1-s4)
d5<-(d21tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d21tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d21tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d21tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d21tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d21tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d21tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 21 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp21<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt22<-as.matrix(as.integer(mtc*h22))
d22tot<-colSums(dt22)
d1<-d22tot*(1-s1)
d2<-(d22tot-d1)*(1-s2)
d3<-(d22tot-(d1+d2))*(1-s3)
d4<-(d22tot-(d1+d2+d3))*(1-s4)
d5<-(d22tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d22tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d22tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d22tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d22tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d22tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d22tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d22tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp22<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt23<-as.matrix(as.integer(mtc*h23))
d23tot<-colSums(dt23)
d1<-d23tot*(1-s1)
d2<-(d23tot-d1)*(1-s2)
d3<-(d23tot-(d1+d2))*(1-s3)
d4<-(d23tot-(d1+d2+d3))*(1-s4)
d5<-(d23tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d23tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d23tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d23tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d23tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d23tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d23tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d23tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp23<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt24<-as.matrix(as.integer(mtc*h24))
```

d24tot<-colSums(dt24)
d1<-d24tot*(1-s1)
d2<-(d24tot-d1)*(1-s2)
d3<-(d24tot-(d1+d2))*(1-s3)
d4<-(d24tot-(d1+d2+d3))*(1-s4)
d5<-(d24tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d24tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d24tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d24tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d24tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d24tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d24tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 24 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp24<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt25<-as.matrix(as.integer(mtc*h25))
d25tot<-colSums(dt25)
d1<-d25tot*(1-s1)
d2<-(d25tot-d1)*(1-s2)
d3<-(d25tot-(d1+d2))*(1-s3)
d4<-(d25tot-(d1+d2+d3))*(1-s4)
d5<-(d25tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d25tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d25tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d25tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7))^{*}(1-\mathrm{s} 8)$

```
d9<-(d25tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d25tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d25tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d25tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp25<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt26<-as.matrix(as.integer(mtc*h26))
d26tot<-colSums(dt26)
d1<-d26tot*(1-s1)
d2<-(d26tot-d1)*(1-s2)
d3<-(d26tot-(d1+d2))*(1-s3)
d4<-(d26tot-(d1+d2+d3))*(1-s4)
d5<-(d26tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d26tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d26tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d26tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d26tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d26tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d26tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d26tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp26<-as.matrix(as.integer(rbind(d1,d2,d3,d4, d5, d6, d7,d8,d9,10,d11,d12)))
dt27<-as.matrix(as.integer(mtc*h27))
d27tot<-colSums(dt27)
d1<-d27tot*(1-s1)
d2<-(d27tot-d1)*(1-s2)
d3<-(d27tot-(d1+d2))*(1-s3)
d4<-(d27tot-(d1+d2+d3))*(1-s4)
d5<-(d27tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d27tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d27tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d27tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d27tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d27tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d27tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 27 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp27<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt28<-as.matrix(as.integer(mtc*h28))
d28tot<-colSums(dt28)
d1<-d28tot*(1-s1)
d2<-(d28tot-d1)*(1-s2)
d3<-(d28tot-(d1+d2))*(1-s3)

```
d4<-(d28tot-(d1+d2+d3))*(1-s4)
d5<-(d28tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d28tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d28tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d28tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d28tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d28tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d28tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d28tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp28<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt29<-as.matrix(as.integer(mtc*h29))
d29tot<-colSums(dt29)
d1<-d29tot*(1-s1)
d2<-(d29tot-d1)*(1-s2)
d3<-(d29tot-(d1+d2))*(1-s3)
d4<-(d29tot-(d1+d2+d3))*(1-s4)
d5<-(d29tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d29tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d29tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d29tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 29$ tot-(d $1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8))^{*}(1-\mathrm{s} 9)$
d10<-(d29tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d29tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d29tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp29<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt30<-as.matrix(as.integer(mtc*h30))
d30tot<-colSums(dt30)
d1<-d30tot*(1-s1)
d2<-(d30tot-d1)*(1-s2)
d3<-(d30tot-(d1+d2))*(1-s3)
d4<-(d30tot-(d1+d2+d3))*(1-s4)
d5<-(d30tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d30tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d30tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d30tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d30tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d30tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d30tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 30 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp30<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt31<-as.matrix(as.integer(mtc*h31))
d31tot<-colSums(dt31)
d1<-d31tot*(1-s1)
d2<-(d31tot-d1)*(1-s2)
d3<-(d31tot-(d1+d2))*(1-s3)
d4<-(d31tot-(d1+d2+d3))*(1-s4)
d5<-(d31tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d31tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d31tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d31tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d31tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d31tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d31tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d31tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp31<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt32<-as.matrix(as.integer(mtc*h32))
d32tot<-colSums(dt32)
d1<-d32tot*(1-s1)
d2<-(d32tot-d1)*(1-s2)
d3<-(d32tot-(d1+d2))*(1-s3)
d4<-(d32tot-(d1+d2+d3))*(1-s4)
d5<-(d32tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d32tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d32tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d32tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 32$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d32tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d32tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d32tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp32<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt33<-as.matrix(as.integer(mtc*h33))
d33tot<-colSums(dt33)
d1<-d33tot*(1-s1)
d2<-(d33tot-d1)*(1-s2)
d3<-(d33tot-(d1+d2))*(1-s3)
d4<-(d33tot-(d1+d2+d3))*(1-s4)
d5<-(d33tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d33tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d33tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d33tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d33tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d33tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)

```
d11<-(d33tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d33tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp33<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt34<-as.matrix(as.integer(mtc*h34))
d34tot<-colSums(dt34)
d1<-d34tot*(1-s1)
d2<-(d34tot-d1)*(1-s2)
d3<-(d34tot-(d1+d2))*(1-s3)
d4<-(d34tot-(d1+d2+d3))*(1-s4)
d5<-(d34tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d34tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d34tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d34tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d34tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d34tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d34tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d34tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp34<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt35<-as.matrix(as.integer(mtc*h35))
d35tot<-colSums(dt35)
d1<-d35tot*(1-s1)
d2<-(d35tot-d1)*(1-s2)
d3<-(d35tot-(d1+d2) $)^{*}(1-s 3)$
d4<-(d35tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3))^{*}(1-\mathrm{s} 4)$
d5<-(d35tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d35tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d35tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d35tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7))^{*}(1-\mathrm{s} 8)$
d $9<-(d 35 \text { tot- }(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8))^{*}(1-\mathrm{s} 9)$
d10<-(d35tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9)) *(1-\mathrm{s} 10)$
d11<-(d35tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 35 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp35<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5, d6, d7,d8,d9,10,d11,d12)))
dt36<-as.matrix(as.integer(mtc*h36))
d36tot<-colSums(dt36)
d1<-d36tot*(1-s1)
d2<-(d36tot-d1)*(1-s2)
d3<-(d36tot-(d1+d2))*(1-s3)
d4<-(d36tot-(d1+d2+d3))*(1-s4)
d5<-(d36tot-(d1+d2+d3+d4))*(1-s5)

```
d6<-(d36tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d36tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d36tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d36tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d36tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d36tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d36tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp36<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt37<-as.matrix(as.integer(mtc*h37))
d37tot<-colSums(dt37)
d1<-d37tot*(1-s1)
d2<-(d37tot-d1)*(1-s2)
d3<-(d37tot-(d1+d2))*(1-s3)
d4<-(d37tot-(d1+d2+d3))*(1-s4)
d5<-(d37tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d37tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d37tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d37tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d37tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d37tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d37tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 37 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp37<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt38<-as.matrix(as.integer(mtc*h38))
d38tot<-colSums(dt38)
d1<-d38tot*(1-s1)
d2<-(d38tot-d1)*(1-s2)
d3<-(d38tot-(d1+d2))*(1-s3)
d4<-(d38tot-(d1+d2+d3))*(1-s4)
d5<-(d38tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d38tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d38tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d38tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 38$ tot- $(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d38tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9)$ )*(1-s10)
d11<-(d38tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d38tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp38<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt39<-as.matrix(as.integer(mtc*h39))
d39tot<-colSums(dt39)

```
d1<-d39tot*(1-s1)
d2<-(d39tot-d1)*(1-s2)
d3<-(d39tot-(d1+d2))*(1-s3)
d4<-(d39tot-(d1+d2+d3))*(1-s4)
d5<-(d39tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d39tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d39tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d39tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d39tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d39tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d39tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d39tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp39<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt40<-as.matrix(as.integer(mtc*h40))
d40tot<-colSums(dt40)
d1<-d40tot*(1-s1)
d2<-(d40tot-d1)*(1-s2)
d3<-(d40tot-(d1+d2))*(1-s3)
d4<-(d40tot-(d1+d2+d3))*(1-s4)
d5<-(d40tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d40tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d40tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d40tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d40tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d40tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
$\mathrm{d} 11<-(\mathrm{d} 40 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 40 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp40<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt41<-as.matrix(as.integer(mtc*h41))
d41tot<-colSums(dt41)
d1<-d41tot*(1-s1)
d2<-(d41tot-d1)*(1-s2)
d3<-(d41tot-(d1+d2))*(1-s3)
d4<-(d41tot-(d1+d2+d3))*(1-s4)
d5<-(d41tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d41tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d41tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d41 tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 41$ tot- $(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d41tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d41tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 41 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp41<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt42<-as.matrix(as.integer(mtc*h42))
d42tot<-colSums(dt42)
d1<-d42tot*(1-s1)
d2<-(d42tot-d1)*(1-s2)
d3<-(d42tot-(d1+d2))*(1-s3)
d4<-(d42tot-(d1+d2+d3))*(1-s4)
d5<-(d42tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d42tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d42tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d42tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d42tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d42tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d42tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d42tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp42<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt43<-as.matrix(as.integer(mtc*h43))
d43tot<-colSums(dt43)
d1<-d43tot*(1-s1)
d2<-(d43tot-d1)*(1-s2)
d3<-(d43tot-(d1+d2))*(1-s3)
d4<-(d43tot-(d1+d2+d3))*(1-s4)
d5<-(d43tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d43tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d43tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d43tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 43$ tot-(d1 + d2+d3+d4+d5+d6+d7+d8) $) *(1-s 9)$
d10<-(d43tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9))^{*}(1-\mathrm{s} 10)$
$\mathrm{d} 11<-(\mathrm{d} 43 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 43 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp43<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt44<-as.matrix(as.integer(mtc*h44))
d44tot<-colSums(dt44)
d1<-d44tot*(1-s1)
d2<-(d44tot-d1)*(1-s2)
d3<-(d44tot-(d1+d2))*(1-s3)
d4<-(d44tot-(d1+d2+d3))*(1-s4)
d5<-(d44tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d44tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d44tot-(d1+d2+d3+d4+d5+d6))*(1-s7)

```
d8<-(d44tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d44tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d44tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d44tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d44tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp44<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt45<-as.matrix(as.integer(mtc*h45))
d45tot<-colSums(dt45)
d1<-d45tot*(1-s1)
d2<-(d45tot-d1)*(1-s2)
d3<-(d45tot-(d1+d2))*(1-s3)
d4<-(d45tot-(d1+d2+d3))*(1-s4)
d5<-(d45tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d45tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d45tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d45tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 45$ tot- $(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d45tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d45tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 45 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp45<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt46<-as.matrix(as.integer(mtc*h46))
d46tot<-colSums(dt46)
d1<-d46tot*(1-s1)
d2<-(d46tot-d1)*(1-s2)
d3<-(d46tot-(d1+d2))*(1-s3)
d4<-(d46tot-(d1+d2+d3))*(1-s4)
d5<-(d46tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d46tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d46tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d46tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 46$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d46tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
$\mathrm{d} 11<-(\mathrm{d} 46 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 46 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp46<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt47<-as.matrix(as.integer(mtc*h47))
d47tot<-colSums(dt47)
d1<-d47tot*(1-s1)
d2<-(d47tot-d1)*(1-s2)

```
d3<-(d47tot-(d1+d2))*(1-s3)
d4<-(d47tot-(d1+d2+d3))*(1-s4)
d5<-(d47tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d47tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d47tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d47tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d47tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d47tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d47tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d47tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp47<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt48<-as.matrix(as.integer(mtc*h48))
d48tot<-colSums(dt48)
d1<-d48tot*(1-s1)
d2<-(d48tot-d1)*(1-s2)
d3<-(d48tot-(d1+d2))*(1-s3)
d4<-(d48tot-(d1+d2+d3))*(1-s4)
d5<-(d48tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d48tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d48tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d48tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 48$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d48tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d48tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 48 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp48<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt49<-as.matrix(as.integer(mtc*h49))
d49tot<-colSums(dt49)
d1<-d49tot*(1-s1)
d2<-(d49tot-d1)*(1-s2)
d3<-(d49tot-(d1+d2))*(1-s3)
d4<-(d49tot-(d1+d2+d3))*(1-s4)
d5<-(d49tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d49tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d49tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d49tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d49tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d49tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d49tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 49 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp49<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5, d6, d7,d8,d9,10,d11,d12)))

```
dt50<-as.matrix(as.integer(mtc*h50))
d50tot<-colSums(dt50)
d1<-d50tot*(1-s1)
d2<-(d50tot-d1)*(1-s2)
d3<-(d50tot-(d1+d2))*(1-s3)
d4<-(d50tot-(d1+d2+d3))*(1-s4)
d5<-(d50tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d50tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d50tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d50tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d50tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d50tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d50tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d50tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp50<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt51<-as.matrix(as.integer(mtc*h51))
d51tot<-colSums(dt51)
d1<-d51tot*(1-s1)
d2<-(d51tot-d1)*(1-s2)
d3<-(d51tot-(d1+d2))*(1-s3)
d4<-(d51tot-(d1+d2+d3))*(1-s4)
d5<-(d51tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d51tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d51tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d51tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d51tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d51tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d51tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 51 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp51<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt52<-as.matrix(as.integer(mtc*h52))
d52tot<-colSums(dt52)
d1<-d52tot*(1-s1)
d2<-(d52tot-d1)*(1-s2)
d3<-(d52tot-(d1+d2))*(1-s3)
d4<-(d52tot-(d1+d2+d3))*(1-s4)
d5<-(d52tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d52tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d52tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d52tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d52tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
```

```
d10<-(d52tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d52tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d52tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp52<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt53<-as.matrix(as.integer(mtc*h53))
d53tot<-colSums(dt53)
d1<-d53tot*(1-s1)
d2<-(d53tot-d1)*(1-s2)
d3<-(d53tot-(d1+d2))*(1-s3)
d4<-(d53tot-(d1+d2+d3))*(1-s4)
d5<-(d53tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d53tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d53tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d53tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 53$ tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d53tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d53tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 53 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp53<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt54<-as.matrix(as.integer(mtc*h54))
d54tot<-colSums(dt54)
d1<-d54tot*(1-s1)
d2<-(d54tot-d1)*(1-s2)
d3<-(d54tot-(d1+d2))*(1-s3)
d4<-(d54tot-(d1+d2+d3))*(1-s4)
d5<-(d54tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d54tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d54tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d54tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 54$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d54tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d54tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 54 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp54<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt55<-as.matrix(as.integer(mtc*h55))
d55tot<-colSums(dt55)
d1<-d55tot*(1-s1)
d2<-(d55tot-d1)*(1-s2)
d3<-(d55tot-(d1+d2))*(1-s3)
d4<-(d55tot-(d1+d2+d3))*(1-s4)

```
d5<-(d55tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d55tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d55tot-(d1+d2+d3+d4+d5+d6)**(1-s7)
d8<-(d55tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d55tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d55tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d55tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d55tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp55<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt56<-as.matrix(as.integer(mtc*h56))
d56tot<-colSums(dt56)
d1<-d56tot*(1-s1)
d2<-(d56tot-d1)*(1-s2)
d3<-(d56tot-(d1+d2))*(1-s3)
d4<-(d56tot-(d1+d2+d3))*(1-s4)
d5<-(d56tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d56tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d56tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d56tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d56tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d56tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d56tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 56 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp56<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt57<-as.matrix(as.integer(mtc*h57))
d57tot<-colSums(dt57)
d1<-d57tot*(1-s1)
d2<-(d57tot-d1)*(1-s2)
d3<-(d57tot-(d1+d2))*(1-s3)
d4<-(d57tot-(d1+d2+d3))*(1-s4)
d5<-(d57tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d57tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d57tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d57tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 57$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d57tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d57tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 57 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp57<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5, d6, d7,d8, d9,10,d11,d12)))
dt58<-as.matrix(as.integer(mtc*h58))

```
d58tot<-colSums(dt58)
d1<-d58tot*(1-s1)
d2<-(d58tot-d1)*(1-s2)
d3<-(d58tot-(d1+d2))*(1-s3)
d4<-(d58tot-(d1+d2+d3))*(1-s4)
d5<-(d58tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d58tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d58tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d58tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d58tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d58tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d58tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d58tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp58<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5, d6, d7,d8,d9,10,d11,d12)))

```
dt59<-as.matrix(as.integer(mtc*h59))
d59tot<-colSums(dt59)
d1<-d59tot*(1-s1)
d2<-(d59tot-d1)*(1-s2)
d3<-(d59tot-(d1+d2))*(1-s3)
d4<-(d59tot-(d1+d2+d3))*(1-s4)
d5<-(d59tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d59tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d59tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d59tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d59tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d59tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d59tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d59tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp59<-as.matrix(as.integer(rbind(d1,d2,d3,d4, d5, d6, d7,d8, d9,10,d11,d12)))
dt60<-as.matrix(as.integer(mtc*h60))
d60tot<-colSums(dt60)
d1<-d60tot*(1-s1)
d2<-(d60tot-d1)*(1-s2)
d3<-(d60tot-(d1+d2))*(1-s3)
d4<-(d60tot-(d1+d2+d3))*(1-s4)
d5<-(d60tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d60tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d60tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d60tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d60tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d60tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
$\mathrm{d} 11<-(\mathrm{d} 60 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$

```
d12<-(d60tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp60<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt61<-as.matrix(as.integer(mtc*h61))
d61tot<-colSums(dt61)
d1<-d61tot*(1-s1)
d2<-(d61tot-d1)*(1-s2)
d3<-(d61tot-(d1+d2))*(1-s3)
d4<-(d61tot-(d1+d2+d3))*(1-s4)
d5<-(d61tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d61tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d61tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d61 tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d61tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d61tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d61tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d61tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp61<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt62<-as.matrix(as.integer(mtc*h62))
d62tot<-colSums(dt62)
d1<-d62tot*(1-s1)
d2<-(d62tot-d1)*(1-s2)
d3<-(d62tot-(d1+d2))*(1-s3)
d4<-(d62tot-(d1+d2+d3))*(1-s4)
d5<-(d62tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d62tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d62tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d62tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d62tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d62tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d62tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d62tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp62<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt63<-as.matrix(as.integer(mtc*h63))
d63tot<-colSums(dt63)
d1<-d63tot*(1-s1)
d2<-(d63tot-d1)*(1-s2)
d3<-(d63tot-(d1+d2))*(1-s3)
d4<-(d63tot-(d1+d2+d3))*(1-s4)
d5<-(d63tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d63tot-(d1+d2+d3+d4+d5))*(1-s6)

```
d7<-(d63tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d63tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d63tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d63tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d63tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d63tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp63<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt64<-as.matrix(as.integer(mtc*h64))
d64tot<-colSums(dt64)
d1<-d64tot*(1-s1)
d2<-(d64tot-d1)*(1-s2)
d3<-(d64tot-(d1+d2))*(1-s3)
d4<-(d64tot-(d1+d2+d3))*(1-s4)
d5<-(d64tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d64tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d64tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d64tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d64tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d64tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d64tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 64 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp64<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt65<-as.matrix(as.integer(mtc*h65))
d65tot<-colSums(dt65)
d1<-d65tot*(1-s1)
d2<-(d65tot-d1)*(1-s2)
d3<-(d65tot-(d1+d2))*(1-s3)
d4<-(d65tot-(d1+d2+d3))*(1-s4)
d5<-(d65tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d65tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d65tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d65tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d65tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d65tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d65tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d65tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp65<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt66<-as.matrix(as.integer(mtc*h66))
d66tot<-colSums(dt66)
d1<-d66tot*(1-s1)

```
d2<-(d66tot-d1)*(1-s2)
d3<-(d66tot-(d1+d2))*(1-s3)
d4<-(d66tot-(d1+d2+d3))*(1-s4)
d5<-(d66tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d66tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d66tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d66tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d66tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d66tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d66tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d66tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp66<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt67<-as.matrix(as.integer(mtc*h67))
d67tot<-colSums(dt67)
d1<-d67tot*(1-s1)
d2<-(d67tot-d1)*(1-s2)
d3<-(d67tot-(d1+d2))*(1-s3)
d4<-(d67tot-(d1+d2+d3))*(1-s4)
d5<-(d67tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d67tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d67tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
$\mathrm{d} 8<-(\mathrm{d} 67 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7))^{*}(1-\mathrm{s} 8)$
d9<-(d67tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d67tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d67tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 67 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp67<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt68<-as.matrix(as.integer(mtc*h68))
d68tot<-colSums(dt68)
d1<-d68tot*(1-s1)
d2<-(d68tot-d1)*(1-s2)
d3<-(d68tot-(d1+d2))*(1-s3)
d4<-(d68tot-(d1+d2+d3))*(1-s4)
d5<-(d68tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d68tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d68tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d68tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 68 \text { tot- }(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8))^{*}(1-\mathrm{s} 9)$
$\mathrm{d} 10<-(\mathrm{d} 68 \text { tot- }(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9))^{*}(1-\mathrm{s} 10)$
d11<-(d68tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d68tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp68<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt69<-as.matrix(as.integer(mtc*h69))
d69tot<-colSums(dt69)
d1<-d69tot*(1-s1)
d2<-(d69tot-d1)*(1-s2)
d3<-(d69tot-(d1+d2))*(1-s3)
d4<-(d69tot-(d1+d2+d3))*(1-s4)
d5<-(d69tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d69tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d69tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d69tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d69tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d69tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d69tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d69tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp69<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt70<-as.matrix(as.integer(mtc*h70))
d70tot<-colSums(dt70)
d1<-d70tot*(1-s1)
d2<-(d70tot-d1)*(1-s2)
d3<-(d70tot-(d1+d2))*(1-s3)
d4<-(d70tot-(d1+d2+d3))*(1-s4)
d5<-(d70tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d70tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d70tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d70tot- $(d 1+d 2+d 3+d 4+d 5+d 6+d 7)) *(1-s 8)$
d $9<-(d 70$ tot-(d1 + d2 $2+d 3+d 4+d 5+d 6+d 7+d 8))^{*}(1-s 9)$
d10<-(d70tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d70tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 70 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp70<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt71<-as.matrix(as.integer(mtc*h71))
d71tot<-colSums(dt71)
d1<-d71tot*(1-s1)
d2<-(d71tot-d1)*(1-s2)
d3<-(d71tot-(d1+d2))*(1-s3)
d4<-(d71tot-(d1+d2+d3))*(1-s4)
d5<-(d71tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d71tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d71tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d71 tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
```

```
d9<-(d71tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d71tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d71tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d71 tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp71<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt72<-as.matrix(as.integer(mtc*h72))
d72tot<-colSums(dt72)
d1<-d72tot*(1-s1)
d2<-(d72tot-d1)*(1-s2)
d3<-(d72tot-(d1+d2))*(1-s3)
d4<-(d72tot-(d1+d2+d3))*(1-s4)
d5<-(d72tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d72tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d72tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d72tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d72tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d72tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d72tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d72tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp72<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt73<-as.matrix(as.integer(mtc*h73))
d73tot<-colSums(dt73)
d1<-d73tot*(1-s1)
d2<-(d73tot-d1)*(1-s2)
d3<-(d73tot-(d1+d2))*(1-s3)
d4<-(d73tot-(d1+d2+d3))*(1-s4)
d5<-(d73tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d73tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d73tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d73tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 73$ tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d73tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d73tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 73 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp73<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt74<-as.matrix(as.integer(mtc*h74))
d74tot<-colSums(dt74)
d1<-d74tot*(1-s1)
d2<-(d74tot-d1)*(1-s2)
d3<-(d74tot-(d1+d2))*(1-s3)

```
d4<-(d74tot-(d1+d2+d3))*(1-s4)
d5<-(d74tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d74tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d74tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d74tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d74tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d74tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d74tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d74tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp74<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt75<-as.matrix(as.integer(mtc*h75))
d75tot<-colSums(dt75)
d1<-d75tot*(1-s1)
d2<-(d75tot-d1)*(1-s2)
d3<-(d75tot-(d1+d2))*(1-s3)
d4<-(d75tot-(d1+d2+d3))*(1-s4)
d5<-(d75tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d75tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d75tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d75tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 75 \text { tot- }(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8))^{*}(1-\mathrm{s} 9)$
d10<-(d75tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d75tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d75tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp75<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt76<-as.matrix(as.integer(mtc*h76))
d76tot<-colSums(dt76)
d1<-d76tot*(1-s1)
d2<-(d76tot-d1)*(1-s2)
d3<-(d76tot-(d1+d2))*(1-s3)
d4<-(d76tot-(d1+d2+d3))*(1-s4)
d5<-(d76tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d76tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d76tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d76tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d76tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d76tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d76tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 76 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp76<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt77<-as.matrix(as.integer(mtc*h77))
d77tot<-colSums(dt77)
d1<-d77tot*(1-s1)
d2<-(d77tot-d1)*(1-s2)
d3<-(d77tot-(d1+d2))*(1-s3)
d4<-(d77tot-(d1+d2+d3))*(1-s4)
d5<-(d77tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d77tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d77tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d77tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d77tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d77tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d77tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d77tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp77<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt78<-as.matrix(as.integer(mtc*h78))
d78tot<-colSums(dt78)
d1<-d78tot*(1-s1)
d2<-(d78tot-d1)*(1-s2)
d3<-(d78tot-(d1+d2))*(1-s3)
d4<-(d78tot-(d1+d2+d3))*(1-s4)
d5<-(d78tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d78tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d78tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d78tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d78tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d78tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d78tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d78tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp78<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt79<-as.matrix(as.integer(mtc*h79))
d79tot<-colSums(dt79)
d1<-d79tot*(1-s1)
d2<-(d79tot-d1)*(1-s2)
d3<-(d79tot-(d1+d2))*(1-s3)
d4<-(d79tot-(d1+d2+d3))*(1-s4)
d5<-(d79tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d79tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d79tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d79tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d79tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d79tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)

```
d11<-(d79tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d79tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp79<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt80<-as.matrix(as.integer(mtc*h80))
```

d80tot<-colSums(dt80)
d1<-d80tot*(1-s1)
d2<-(d80tot-d1)*(1-s2)
d3<-(d80tot-(d1+d2))*(1-s3)
d4<-(d80tot-(d1+d2+d3))*(1-s4)
d5<-(d80tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d80tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d80tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d80tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7))^{*}(1-\mathrm{s} 8)$
d $9<-(d 80$ tot-(d1+d2+d3+d4+d5+d6+d7+d8) $) *(1-s 9)$
d10<-(d80tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d80tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10)) *(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 80 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp80<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt81<-as.matrix(as.integer(mtc*h81))
d81tot<-colSums(dt81)
d1<-d81tot*(1-s1)
d2<-(d81tot-d1)*(1-s2)
d3<-(d81tot-(d1+d2))*(1-s3)
d4<-(d81tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3))^{*}(1-\mathrm{s} 4)$
d5<-(d81tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d81tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d81tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d81tot- $(d 1+d 2+d 3+d 4+d 5+d 6+d 7)) *(1-s 8)$
d $9<-(\mathrm{d} 81 \text { tot- }(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8))^{*}(1-\mathrm{s} 9)$
$\mathrm{d} 10<-(\mathrm{d} 81$ tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9)) *(1-\mathrm{s} 10)$
d11<-(d81tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10)$ )*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 81 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp81<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt82<-as.matrix(as.integer(mtc*h82))
d82tot<-colSums(dt82)
d1<-d82tot*(1-s1)
d2<-(d82tot-d1)*(1-s2)
d3<-(d82tot-(d1+d2))*(1-s3)
d4<-(d82tot-(d1+d2+d3))*(1-s4)
d5<-(d82tot-(d1+d2+d3+d4))*(1-s5)

```
d6<-(d82tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d82tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d82tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d82tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d82tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d82tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d82tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp82<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt83<-as.matrix(as.integer(mtc*h83))
```

d83tot<-colSums(dt83)
d1<-d83tot*(1-s1)
d2<-(d83tot-d1)*(1-s2)
d3<-(d83tot-(d1+d2))*(1-s3)
d4<-(d83tot-(d1+d2+d3))*(1-s4)
d5<-(d83tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d83tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d83tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d83tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d83tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d83tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d83tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 83 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp83<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt84<-as.matrix(as.integer(mtc*h84))
d84tot<-colSums(dt84)
d1<-d84tot*(1-s1)
d2<-(d84tot-d1)*(1-s2)
d3<-(d84tot-(d1+d2))*(1-s3)
d4<-(d84tot-(d1+d2+d3))*(1-s4)
d5<-(d84tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d84tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d84tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d84tot- $(d 1+d 2+d 3+d 4+d 5+d 6+d 7)) *(1-s 8)$
d $9<-(d 84$ tot- $(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d84tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d84tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10)$ )*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 84 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp84<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt85<-as.matrix(as.integer(mtc*h85))
d85tot<-colSums(dt85)

```
d1<-d85tot*(1-s1)
d2<-(d85tot-d1)*(1-s2)
d3<-(d85tot-(d1+d2))*(1-s3)
d4<-(d85tot-(d1+d2+d3))*(1-s4)
d5<-(d85tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d85tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d85tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d85tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d85tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d85tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d85tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d85tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp85<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt86<-as.matrix(as.integer(mtc*h86))
d86tot<-colSums(dt86)
d1<-d86tot*(1-s1)
d2<-(d86tot-d1)*(1-s2)
d3<-(d86tot-(d1+d2))*(1-s3)
d4<-(d86tot-(d1+d2+d3))*(1-s4)
d5<-(d86tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d86tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d86tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d86tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d86tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d86tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
$\mathrm{d} 11<-(\mathrm{d} 86 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 86 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp86<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt87<-as.matrix(as.integer(mtc*h87))
d87tot<-colSums(dt87)
d1<-d87tot*(1-s1)
d2<-(d87tot-d1)*(1-s2)
d3<-(d87tot-(d1+d2))*(1-s3)
d4<-(d87tot-(d1+d2+d3))*(1-s4)
d5<-(d87tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d87tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d87tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d87tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 87$ tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8)$ )*(1-s9)
d10<-(d87tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d87tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 87 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp87<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt88<-as.matrix(as.integer(mtc*h88))
d88tot<-colSums(dt88)
d1<-d88tot*(1-s1)
d2<-(d88tot-d1)*(1-s2)
d3<-(d88tot-(d1+d2))*(1-s3)
d4<-(d88tot-(d1+d2+d3))*(1-s4)
d5<-(d88tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d88tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d88tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d88tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d88tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d88tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d88tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d88tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp88<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt89<-as.matrix(as.integer(mtc*h89))
d89tot<-colSums(dt89)
d1<-d89tot*(1-s1)
d2<-(d89tot-d1)*(1-s2)
d3<-(d89tot-(d1+d2))*(1-s3)
d4<-(d89tot-(d1+d2+d3))*(1-s4)
d5<-(d89tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d89tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d89tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d89tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 89$ tot-(d1 + d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d89tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9)$ )*(1-s10)
$\mathrm{d} 11<-(\mathrm{d} 89 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10))^{*}(1-\mathrm{s} 11)$
$\mathrm{d} 12<-(\mathrm{d} 89 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp89<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt90<-as.matrix(as.integer(mtc*h90))
d90tot<-colSums(dt90)
d1<-d90tot*(1-s1)
d2<-(d90tot-d1)*(1-s2)
d3<-(d90tot-(d1+d2))*(1-s3)
d4<-(d90tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3)) *(1-\mathrm{s} 4)$
d5<-(d90tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d90tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d90tot-(d1+d2+d3+d4+d5+d6))*(1-s7)

```
d8<-(d90tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d90tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d90tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d90tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d90tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp90<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt91<-as.matrix(as.integer(mtc*h91))
d91tot<-colSums(dt91)
d1<-d91tot*(1-s1)
d2<-(d91tot-d1)*(1-s2)
d3<-(d91tot-(d1+d2))*(1-s3)
d4<-(d91tot-(d1+d2+d3))*(1-s4)
d5<-(d91tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d91tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d91tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d91tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d91tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d91tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d91tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d91tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp91<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt92<-as.matrix(as.integer(mtc*h92))
d92tot<-colSums(dt92)
d1<-d92tot*(1-s1)
d2<-(d92tot-d1)*(1-s2)
d3<-(d92tot-(d1+d2))*(1-s3)
d4<-(d92tot-(d1+d2+d3))*(1-s4)
d5<-(d92tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d92tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d92tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d92tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 92$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d92tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d92tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
$\mathrm{d} 12<-(\mathrm{d} 92 \text { tot }-(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp92<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt93<-as.matrix(as.integer(mtc*h93))
d93tot<-colSums(dt93)
d1<-d93tot*(1-s1)
d2<-(d93tot-d1)*(1-s2)

```
d3<-(d93tot-(d1+d2))*(1-s3)
d4<-(d93tot-(d1+d2+d3))*(1-s4)
d5<-(d93tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d93tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d93tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d93tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d93tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d93tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d93tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d93tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp93<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt94<-as.matrix(as.integer(mtc*h94))
d94tot<-colSums(dt94)
d1<-d94tot*(1-s1)
d2<-(d94tot-d1)*(1-s2)
d3<-(d94tot-(d1+d2))*(1-s3)
d4<-(d94tot-(d1+d2+d3))*(1-s4)
d5<-(d94tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d94tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d94tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d94tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d $9<-(d 94$ tot $-(d 1+d 2+d 3+d 4+d 5+d 6+d 7+d 8)) *(1-s 9)$
d10<-(d94tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d94tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d94tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp94<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt95<-as.matrix(as.integer(mtc*h95))
d95tot<-colSums(dt95)
d1<-d95tot*(1-s1)
d2<-(d95tot-d1)*(1-s2)
d3<-(d95tot-(d1+d2))*(1-s3)
d4<-(d95tot-(d1+d2+d3))*(1-s4)
d5<-(d95tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d95tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d95tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d95tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d95tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d95tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d95tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d95tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp95<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt96<-as.matrix(as.integer(mtc*h96))
d96tot<-colSums(dt96)
d1<-d96tot*(1-s1)
d2<-(d96tot-d1)*(1-s2)
d3<-(d96tot-(d1+d2))*(1-s3)
d4<-(d96tot-(d1+d2+d3))*(1-s4)
d5<-(d96tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d96tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d96tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d96tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d96tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d96tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d96tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d96tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp96<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt97<-as.matrix(as.integer(mtc*h97))
d97tot<-colSums(dt97)
d1<-d97tot*(1-s1)
d2<-(d97tot-d1)*(1-s2)
d3<-(d97tot-(d1+d2))*(1-s3)
d4<-(d97tot-(d1+d2+d3))*(1-s4)
d5<-(d97tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d97tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d97tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d97tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d97tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d97tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d97tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d97tot- $(\mathrm{d} 1+\mathrm{d} 2+\mathrm{d} 3+\mathrm{d} 4+\mathrm{d} 5+\mathrm{d} 6+\mathrm{d} 7+\mathrm{d} 8+\mathrm{d} 9+\mathrm{d} 10+\mathrm{d} 11))^{*}(1-\mathrm{s} 12)$
dsilexp97<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt98<-as.matrix(as.integer(mtc*h98))
d98tot<-colSums(dt98)
d1<-d98tot*(1-s1)
d2<-(d98tot-d1)*(1-s2)
d3<-(d98tot-(d1+d2))*(1-s3)
d4<-(d98tot-(d1+d2+d3))*(1-s4)
d5<-(d98tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d98tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d98tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d98tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d98tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
```

```
d10<-(d98tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d98tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d98tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp98<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))

```
dt99<-as.matrix(as.integer(mtc*h99))
d99tot<-colSums(dt99)
d1<-d99tot*(1-s1)
d2<-(d99tot-d1)*(1-s2)
d3<-(d99tot-(d1+d2))*(1-s3)
d4<-(d99tot-(d1+d2+d3))*(1-s4)
d5<-(d99tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d99tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d99tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d99tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d99tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d99tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d99tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d99tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
```

dsilexp99<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
dt100<-as.matrix(as.integer(mtc*h100))
d100tot<-colSums(dt100)
d1<-d100tot*(1-s1)
d2<-(d100tot-d1)*(1-s2)
d3<-(d100tot-(d1+d2))*(1-s3)
d4<-(d100tot-(d1+d2+d3))*(1-s4)
d5<-(d100tot-(d1+d2+d3+d4))*(1-s5)
d6<-(d100tot-(d1+d2+d3+d4+d5))*(1-s6)
d7<-(d100tot-(d1+d2+d3+d4+d5+d6))*(1-s7)
d8<-(d100tot-(d1+d2+d3+d4+d5+d6+d7))*(1-s8)
d9<-(d100tot-(d1+d2+d3+d4+d5+d6+d7+d8))*(1-s9)
d10<-(d100tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9))*(1-s10)
d11<-(d100tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10))*(1-s11)
d12<-(d100tot-(d1+d2+d3+d4+d5+d6+d7+d8+d9+d10+d11))*(1-s12)
dsilexp100<-as.matrix(as.integer(rbind(d1,d2,d3,d4,d5,d6,d7,d8,d9,10,d11,d12)))
/*compute chi-squared and Fisher's Exact Tests for diffs between remediated differences and
null expectation under Siler model*/

```
tbl<-table(dt1,dsilexp1)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt2,dsilexp2)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt3,dsilexp3)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt4,dsilexp4)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt5,dsilexp5)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt6,dsilexp6)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt7,dsilexp7)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt8,dsilexp8)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt9,dsilexp9)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt10,dsilexp10)
tbl
```

```
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt11,dsilexp11)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt12,dsilexp12)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt13,dsilexp13)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt14,dsilexp14)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt15,dsilexp15)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt16,dsilexp16)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt17,dsilexp17)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt18,dsilexp18)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt19,dsilexp19)
tbl
chisq.test(tbl)
```

fisher.test(tbl)

```
tbl<-table(dt20,dsilexp20)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt21,dsilexp21)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt22,dsilexp22)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt23,dsilexp23)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt24,dsilexp24)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt25,dsilexp25)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt26,dsilexp26)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt27,dsilexp27)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt28,dsilexp28)
tbl
chisq.test(tbl)
fisher.test(tbl)
```

```
tbl<-table(dt29,dsilexp29)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt30,dsilexp30)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt31,dsilexp31)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt32,dsilexp32)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt33,dsilexp33)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt34,dsilexp34)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt35,dsilexp35)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt36,dsilexp36)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt37,dsilexp37)
tbl
chisq.test(tbl)
fisher.test(tbl)
```

```
tbl<-table(dt38,dsilexp38)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt39,dsilexp39)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt40,dsilexp40)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt41,dsilexp41)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt42,dsilexp42)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt43,dsilexp43)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt44,dsilexp44)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt45,dsilexp45)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt46,dsilexp46)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt47,dsilexp47)
```

tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt48,dsilexp48)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt49,dsilexp49)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt50,dsilexp50)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt51,dsilexp51)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt52,dsilexp52)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt53,dsilexp53)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt54,dsilexp54)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt55,dsilexp55)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt56,dsilexp56)
tbl

```
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt57,dsilexp57)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt58,dsilexp58)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt59,dsilexp59)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt60,dsilexp60)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt61,dsilexp61)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt62,dsilexp62)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt63,dsilexp63)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt64,dsilexp64)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt65,dsilexp65)
tbl
chisq.test(tbl)
```

```
fisher.test(tbl)
```

```
tbl<-table(dt66,dsilexp66)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt67,dsilexp67)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt68,dsilexp68)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt69,dsilexp69)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt70,dsilexp70)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt71,dsilexp71)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt72,dsilexp72)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt73,dsilexp73)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt74,dsilexp74)
tbl
chisq.test(tbl)
fisher.test(tbl)
```

```
tbl<-table(dt75,dsilexp75)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt76,dsilexp76)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt77,dsilexp77)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt78,dsilexp78)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt79,dsilexp79)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt80,dsilexp80)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt81,dsilexp81)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt82,dsilexp82)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt83,dsilexp83)
tbl
chisq.test(tbl)
fisher.test(tbl)
```

```
tbl<-table(dt84,dsilexp84)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt85,dsilexp85)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt86,dsilexp86)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt87,dsilexp87)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt88,dsilexp88)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt89,dsilexp89)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt90,dsilexp90)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt91,dsilexp91)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt92,dsilexp92)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt93,dsilexp93)
```

```
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt94,dsilexp94)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt95,dsilexp95)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt96,dsilexp96)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt97,dsilexp97)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt98,dsilexp98)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt99,dsilexp99)
tbl
chisq.test(tbl)
fisher.test(tbl)
tbl<-table(dt100,dsilexp100)
tbl
chisq.test(tbl)
fisher.test(tbl)
```

/*plot every 10th iteration of simulation against the null expectations*/
plot(t,dsilexp1,type="l",col="red", xlab="Age at Death",ylab="Death Counts",
xlim=c( 0,55 ), ylim=c( 0,40$)$ )
lines(t,dsilexp10,type="l",col="red")
lines(t,dsilexp20,type="l",col="red")

```
lines(t,dsilexp30,type="l",col="red")
lines(t,dsilexp40,type="l",col="red")
lines(t,dsilexp50,type="l",col="red")
lines(t,dsilexp60,type="1",col="red")
lines(t,dsilexp70,type="l",col="red")
lines(t,dsilexp80,type="l",col="red")
lines(t,dsilexp90,type="l",col="red")
lines(t,dsilexp100,type="l",col="red")
lines(t,dt1,type="l",col="blue")
lines(t,dt10,type="l",col="blue")
lines(t,dt20,type="l",col="blue")
lines(t,dt30,type="l",col="blue")
lines(t,dt40,type="l",col="blue")
lines(t,dt50,type="l",col="blue")
lines(t,dt60,type="l",col="blue")
lines(t,dt70,type="l",col="blue")
lines(t,dt80,type="l",col="blue")
lines(t,dt90,type="l",col="blue")
lines(t,dt100,type="l",col="blue")
```


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[^0]:    ${ }^{1}$ This radiocarbon date was processed by Beta Analytic and paid for GRB Entertainment for an episode of a telievision show titled Bone Detectives (Season 1, Episode 3 "Cave of the Headless Corpse"), which aired on the Discovery Channel on January 21, 2008. Attempts were made to retrieve detailed assay information, but neither the production company or Beta Analytic would release the information.

