A BIOCULTURAL ANALYSIS OF NUBIAN FETAL POT BURIALS FROM ASKUT, SUDAN

by

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ABSTRACT

The skeletal remains in this study were excavated from the Nubian archaeological island fortress site of Askut (ca. 1850 BC - 1070 BC, New Kingdom/Third Intermediate period), located at the 2nd Cataract of the Nile river in Sudan. These remains were recovered as part of an archaeological expedition from 1962-1964, which was an effort to learn as much as possible about this site before the building of the High Dam in Aswan. Seven fetal skeletons (dated ca. 1260-770 BC) were examined for their biocultural significance. Biological analysis of these individuals indicates a range in developmental age from 36 to 40 weeks gestation. Three of the seven individuals show signs of pathology, including vertebral lesions, a deformed sphenoid, and cranial infectious bone reaction. These individuals, all interred in ceramic pots, were excavated from the pomoerium (the religious/sacred boundary or symbolic wall) of Askut's fortress. The interment style and burial location indicate that these individuals were treated differently in comparison to the children and adults of Askut, who were most likely buried in the cemeteries along the banks of the Nile. As Nubia was an Egyptian colony at this point in history, Egyptian influences and ideology would have had a large impact on Nubian culture, and this is reflected in the burial treatment of these individuals. Biocultural analyses of these individuals are used to interpret the particular burial patterns of these individuals.

“Life’s like a movie, write your own ending
Keep believing, keep pretending
We’ve done just what we set out to do
Thanks to the lovers, the dreamers, and you”

(Henson et al., 2005: 171).

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And ultimately I would like to give a personal heartfelt thank you to the following: mom and dad, my sisters, the dogs, the rest of my family, the friends who always listened and never complained (you know who you are), and God.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

The ancient region of Nubia, present day Sudan, has a fascinating history partly because of its distinct location that allowed Egypt access to resources in Africa, which would then be traded with the Mediterranean. It is also important to note that although the cultures of the lower end of the Egyptian Nile have the world's longest recorded history, the land of its headwaters in inner Africa have some of the shortest and least complete recorded histories (Adams, 1977). However, despite this absence from recorded history, the Nile was of pivotal importance to trade routes in antiquity. Though the cataracts of the Nile in Lower Nubia caused difficulty in navigation of the river, the Nile provided a route for the trade of products from Sub-Saharan Africa, including ivory, ebony, and gold to Egypt, the Mediterranean, and the rest of the world (Burstein 1998; Grzymski, 2004).

Even though the region had an important role in history, Nubia's geographic boundaries are not clearly defined. Referred to as Ethiopia by classical writers, it has been described as the land south of the first cataract of the Nile and the surrounding desert areas (Dixon, 1964; Shinnie, 1996); while other authors describe it as the Kingdom of the Kush, Kush being the term ancient Egyptians used to designate the upper Nile Valley south of Egypt from the second millennium BC to the end of antiquity (Burstein, 1998). Typically Nubia is considered to range from Wadi Halfa in the north to Khartoum in the south. Lower Nubia, the area of focus in this study, is the area south of Aswan near the first and second cataracts (Figure 1). Today, most of this region is under the waters of Lake Nasser due to the construction of the Aswan High Dam (Greener, 1962). Because of the loss of these archaeological sites, much of what is know about this area is the result of

the excavations that took place just prior to the dam's construction as part of the UNESCO/High Aswan Dam project (Irish, 2005; Bianchi, 2004). The area designated as Upper Nubia extends from Batn el-Hagar to the fourth cataract of the Nile. Kerma, a major Nubian city, was located in upper Nubia.

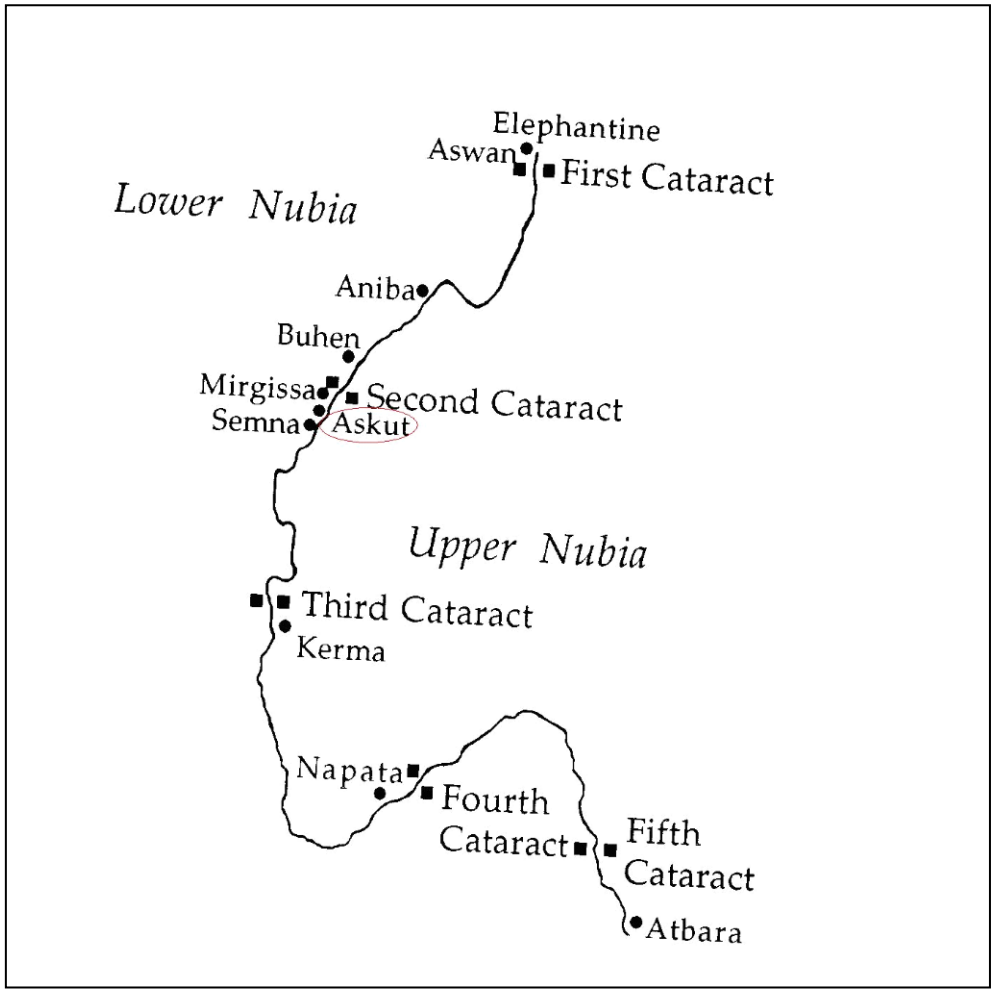

Figure 1: Map showing Egypt and Nubia along the Nile, including many of the second cataract forts, such as Askut (circle). Note the location of Upper and Lower Nubia (adapted from Smith, 1995).

There are varying accounts in antiquity of the Nubians. Burstein (1998) mentions that the Greeks viewed Nubia as an appendage of Egypt, stemming from the trade along the Nile, while van Sertima (1989) describes the Nubians being viewed as, "poor

neighbors of the Egyptians" by other ancient historians (1989: 85). Both of these views of the Nubians relate them to Egypt. This seems to suggest that there was a distinct relationship between the two cultures resulting from their proximity to one another and trade along the Nile. Although the main purpose of this research is the bioarchaeological examination of six pot burials from Lower Nubia, the relationship and influence of Egypt during the New Kingdom period is important to consider. These factors should be considered when examining Askut's pot burials to help determine whether they reflect more typical Egyptian or Nubian burial patterns, and therefore help to add insight into the effects of Egypt's colonization in Nubia, as well as cultural views of children and neonates from those times. Comparing styles of both cultures will help determine the role of the pot burials in the larger picture of Egyptian and Nubian burials.

The pot burials were excavated by Alexander Badawy from 1962-1964 at the site of Askut, Sudan during the Aswan High Dam Salvage Campaign. Pot burials are also referred to as urn burials and jar burials, however they should not be confused with the practice of placing cremated remains within urns or other ceramic vessels as seen in the American Southwest (Moore, 1904). This site is now completely covered by the waters of Lake Nasser, created by the Aswan High Dam. A radiocarbon date from one of the individuals dates the remains at 1260 BC -770 BC, which falls at the end of the New Kingdom and beginning of the Third Intermediate periods (Smith, 2007, pers. comm.). Since the individuals were not buried in a cemetery but rather in the pomoerium of Askut's fortress and the fact that they were buried in pots indicates differential treatment. The research questions that will be addressed in this project include:

- What was Egypt's influence at Askut? Is this reflected in the burials?
- Why were these individuals buried in pots?
- What are the ages and conditions of these individuals?
- What does this imply about burial practices and social treatment?

The remains were assessed for their biological age by using aging standards set by Fazekas and Kósa (1978) to help understand how developmental age is related to this style of burial, and a bioarchaeological approach will be used in this analysis to examine the influence of both Egypt and Nubia in this burial style. Larsen (2002) describes how human skeletal remains, when applied to the study of past populations, may aid in examining the interaction of biology and behavior. Such an approach will examine how ancient Nubians at Askut treated children, or fetuses in this case. Interpretations are based on data gathered from the skeletons themselves and from relevant literature. Lewis notes that child studies have been hindered, "…by poor preservation, lack of recovery and small sample sizes, despite […] many researchers becoming aware of their importance in determining the overall success of a population" (2007:11). The skeletons from Askut can provide additional information as to what is known about how Nubian and Egyptian populations viewed their deceased children.

Burial style of these fetal remains implies that there were certain social considerations involved in their being treated in this way. The reason these individuals came to be buried in pots may be inferred by examining and comparing burial practices (particularly those of children), interactions between Nubia and Egypt, and social treatment of different individuals. Egypt's influence in Nubia may be seen in several

cultural factors, such as burial style (Smith, 2003; Haycock, 1965) and children being buried separately with fewer grave goods than adults (Buzon, 2006). By analyzing these factors, social treatment may be inferred for the individuals involved in these pot burials. It is also of interest to note how these specific burials relate to a larger scale understanding of how cultures treat their dead, particularly their children as pre-industrial societies had infant mortality rates around 200/1000 lives births (Lewis, 2007). Lewis (2007) notes that infant mortality studies can infer information regarding a population's ability to adapt to the environment, cultural practices, maternal health, cultural bonding and attitudes towards children. Treatment of children is interesting in regards to how it reflects on high levels of infant mortality in antiquity, and also as childhood is a developmental period where individuals learn about their culture and language (Kamp, 2001). Childhood and youth are social constructs therefore examining how a society treats their dead children is a reflection of these social constructs.

Even though Badawy indicates such pot burials have been found at other fortresses, and authors have mentioned children being buried in jars, scant information has been published on Nubian pot burials (Buzon, 2006). Therefore it is necessary to examine other methods of Nubian burial. It is important to note that both Nubian and Mediterranean cultures have buried their children separately from their adult counterparts during many time periods (Murail et al., 2004; Soren, 2003). This is also seen at Tombos (located near the third cataract) with an enclosed area of child burials around the tomb of an adult (Smith, 2003). Though not described often in the literature, pot burials have been found in Egypt. Most Egyptian pot burials are of children and infants, while adults are

buried alongside pots; however one pot burial included a fifteen year old male (Baker, 2008, pers. comm.).

This thesis consists of five chapters, including the introduction found here. Chapter Two provides a discussion of the relationship between Egypt and Nubia in order to understand the establishment of the forts and the associated cultures and burial practices, as well as a general overview of Askut, Nubian burial practices, and fetal osteology and bioarchaeology; this is necessary to help understand Egypt's influence at Askut and to establish the basic anthropological background essential to this analysis. Chapter Three presents the materials and methods used in this thesis, such as the metric analysis used to help determine the age at death and condition of the individuals which will be discussed later. Chapter Four includes the results, such as age of the individuals and pathological analyses; and Chapter Five and Six includes a discussion of the data and conclusions reached in regards to the reason these fetal remains were buried in pots as well as implications for social treatment and burial practices.

CHAPTER 2: LITERATURE REVIEW

Unfortunately, there has been little published on the site of Askut, or on pot burials. In order to fully analyze the burials the following topics will be reviewed: the fortress of Askut, the relationship between Egyptians and Nubians particularly in regards to the fort system, Nubian and Egyptian burials, the bioarchaeology of children, and fetal osteology.

Nubia: The Fortress of Askut

The history of Askut is beneficial to establishing the context of the pot burials and may add understanding as to why they were buried in the isolated location. Why Askut was colonized as well as to understanding life there and who inhabited the island prior to Egyptian colonization will be beneficial in understanding who these people were.

Even before Egyptian material culture was common in Nubia, Egypt's presence was felt through the establishment of military forts in Lower Nubia around 2000 BC (Middle Kingdom). These forts, located around the second cataract of the Nile, were made out of mud brick and timber. Semna has been considered to be the major defensive fort with six others downstream - Shelfak, Askut, Dabernarti, Migrissa, Kor, and Buhen (Figure 2). While their origin and primary function is debatable, some of these fortresses provided supply, storage, and manufacture of weapons, while others served to provide safe passage of trading vessels along the navigable parts of the Nile between the cataracts. Control of trade goods from Nubia, as well as Egypt, was maintained through a sealing system (Smith, 1995). There were both large and small seals used in the fortress

system. Seals were a stamp impressed on an item or used in documentation that were commonly an Egyptian motif such as those associated with scarabs (Smith, 2003; Smith, 1995). The fortresses with more seals are inferred to have had a stronger role in economics than those with less seals. This is due to the sealing system being used to control goods. For example, the fort of Uronarti had a large quantity of seals present, however only two different economic institutions are represented, as opposed to the five types found at Askut (Smith, 1995). This has been attributed to Uronarti's "rearward" position (Smith, 1995:43) suggesting it was less involved with economics and trade than other forts, as opposed to other sites, such as Bigeh which was located along the Egyptian frontier and shows evidence of interaction with Egypt as well as the other forts (Smith, 1995). These seals helped to serve as an archive (Smith, 2003). For example, the seals at Askut represent granaries, storehouses, a treasury, a labor prison, upper fort, and more (Gratien, 1998; Smith, 1995). The presence of seals is also a strong indicator of Egypt's presence at these sites (Žabkar, 1972) since they kept records of interactions, indicating what the forts would supply or obtain from Egypt and other sites. Seals are found in Egypt as early as the Predynastic Period (5300-3000BC); since Nubia was an Egyptian colony this suggests that seals originated in Egypt (Podzorski, 1988) and then spread to other sites such as those at the second cataract. As previously mentioned, many of these forts also display Egyptian material culture (Smith, 2003).

Figure 2: Map indicating location of Askut (circled) and other fortresses along the Nile in Sudan (adapted from Nibbi, 1992).

Askut not only served as a fortress but was also settled by people from Kerma and Group-C. Group-C commonly refers to a native Nubian population around 2400 BC (see Table 1) (O'Connor, 1993). Smith describes the two main building phases at Askut as, "…one from the original construction of the fortress in the Middle Kingdom, and a second reflecting the abandonment and rebuilding that accompanied the transition to the New Kingdom settlement" (2003:98) (Figure 3). The fort's architecture resembles an Egyptian style of mud brick construction and its design pattern is similar to other Egyptian fortresses in the Syro-Palestine region, and eventually like that of Kerma (Smith, 2003). Tools and items of personal adornment recovered from this fort also bear more similarities to Egyptian material culture than to Nubian ones. At Askut, these include clay weights for fishing nets, metal hooks, bone tools, and flint cores that are later

replaced by metal tools. Despite the overwhelming Egyptian influenced artifacts present at Askut, some Nubian jewelry has been found, such as ivory pendants and cowry beads.

Table 1: Nubian time periods, adapted from Bianchi (2004) and Hrdy (1978), all dates are BC unless noted otherwise.

Date	Name of Time Period
300, 000	Paleolithic Period/Old Stone Age
40, 000	Neolithic Period
5500	Neolithic Agricultural Revolution
3700-2800	A-Group Culture
3700-3250	Ancient Phase
3250-3150	Classic Phase
3150-2800	Final Phase
2300-1600	C-Group Culture
2300-1900	Ancient Phase
1900-1600	Second Phase
2500-1500	The Kingdom of Kerma
2500-2050	Ancient Kerma Period
2050-1750	Middle Kerma Period
1750-1500	Classic Kerma Period
1550-1069	Nubian Cultures Contemporary with New Kingdom Egypt
1550-1292	Dynasty XVII
1292-1185	Dynasty XIX
1186-1069	Dynasty XX
1000-275	The Rise of the Kingdom of Napata
746-653	Egypt's Nubian Dynasty
275-350 AD	The Kingdom of Meroe
100-300 AD	Merotic
300-600 AD	X-Group Culture
600-1000 AD	Christian Period

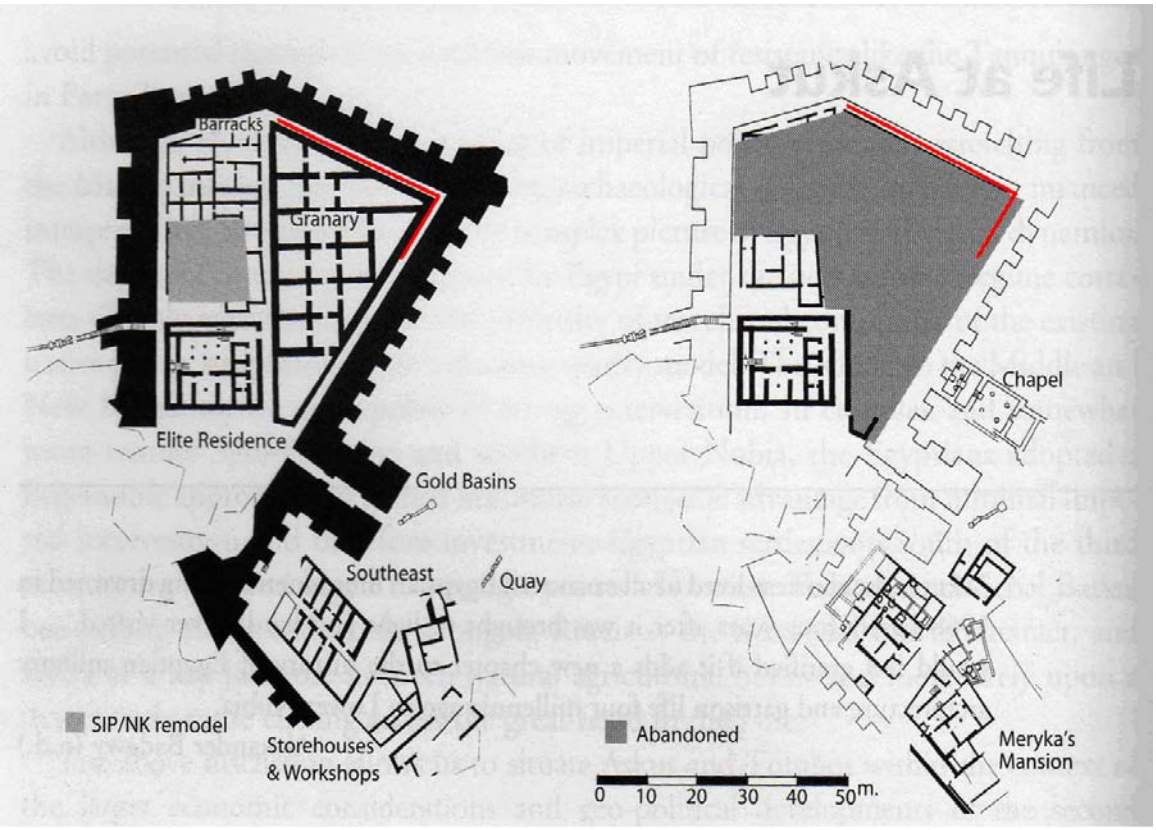

Figure 3: Askut in the Middle Kingdom (left) and Second Intermediate Period/New Kingdom (right) showing the rebuilding phase at the site with the pomerium indicated in red (adapted from Smith, 2003). The New Kingdom shows the abandonment of the main fortress (granary and barracks) including the pomerium where the skeletons were found. The New Kingdom plan of Askut also shows expansion to include the chapel.

Previous excavations at Askut have shown ceramics used for storage, service, and for the preparation of food. Smith (2003) uses ceramics to link Nubian and Egyptian identity, with Nubian pottery representing a minor component of the assemblage. From the Middle to New Kingdom periods (2050-1070BC) there is an over 200 percent increase in the presence of Egyptian pottery. Smith (2003) attributes this and other factors to a cultural and demographic transformation. This is significant in that it may indicate a change of the population inhabiting Askut, or a change in cultural affiliation. Social status also plays a role in distribution of Egyptian cookware, which is most prevalent in

elite residencies and work areas, with Nubian ceramics being most prevalent in the barracks, which were likely abandoned during the Second Intermediate period. Smith (2003) notes that circa 1800 BC (Middle Kingdom) soldiers were no longer a strong presence at Askut, but instead Nubian, or possibly Egyptian colonists appear to be significantly more represented. This, however, seems to contradict the fact that Nubian material culture is being replaced by Egyptian during this time as well (Smith, 2003); a small proportion of Kerma and Pan Grave culture ceramics make up a small portion of the assemblage present at Askut (Smith, 1991),

Evidence of religion has also been suggested at Askut, primarily indicated by the building that Smith (2003) describes as a chapel, believed to be the first public religious architecture at the site. Its eastward orientation suggests an Egyptian origin (Smith, 2003), though it is uncertain what deity was worshipped there. The artifacts from inside the chapel's temple (incense burners, dishes, baboon figures, and storage jars) are also suggestive of Egyptian influenced rituals. The chapel was built in several stages with the final plan (Figure 4) being similar to the design of other Egyptian temples such as the one at Deir el-Medineh near Thebes.

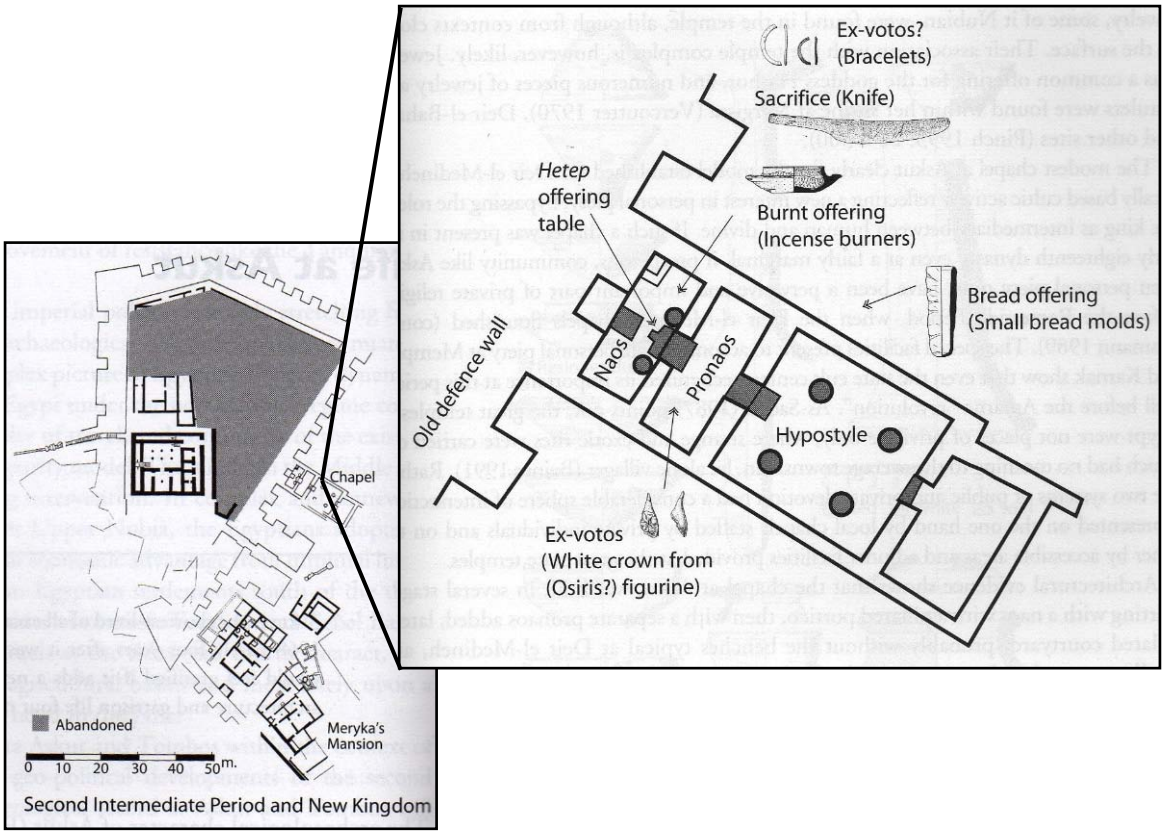

Figure 4: Final plan of the chapel at Askut (adapted from Smith, 2003).

The first phase of the chapel is thought to have been built during the Second Intermediate Period (13th Dynasty). Smith (2003) also notes that Askut's chapel is modest compared to those of other forts as it is a mud brick structure compared to the stone walled and ornately decorated ones present at Semna, Buhen, Kumma, and Uronarti. There is also evidence of household shrines at Askut which contain fragmented pottery offering trays. Such offering trays and funerary stele are also associated with settlements in Kahun and Buhen (Smith, 2003).

Though no cemeteries have been documented on the island of Askut there are some nearby on opposite sides of the Nile, there are cemeteries located at the second cataract fortresses of Buhen and Mirgissa, with three major cemeteries documented at

both sites. Distribution of diagnostic artifacts from the Second Intermediate Period, Middle Kingdom, and New Kingdom, aided in the chronological dating of the three main cemeteries at Buhen (Smith, 1995). Mirgissa has multiple cemeteries (referred to as Cemetery MX-Tc, Cemetery MX-Td, and Cemetery MX, Cemetery Mx-Fe, M-I, and M-III) as well, and evidence shows that the cemetery documented as MX-Tc was used during the Middle Kingdom, MX-Td during the New Kingdom, and MX in the Middle Kingdom and Second Intermediate Period. Gratien (1975) notes that cemetery Mx-Fe, which was excavated in 1969 was a child cemetery with the following age distribution of the burials: 42.5% children, 5% fetuses, 22.5% babies/infants, 7.5% adolescents, and 22.5% adults. These include pot burials of fetal remains and newborns, which were also found buried in shrouds. Some of the subadult graves contained grave goods. Cemetery MIII at Mirgissa showed evidence of Kerma culture (Vila, 1970). Verlinden (2008) mentions that two out of 138 total subadult burials from all cemeteries addressed in her studies were found buried in pots, these include both Nubian and Egyptian cemeteries from the Middle Kingdom. The artifacts associated with the Mirgissa cemeteries show close contact with Upper Egypt from the Thirteenth through the Seventeenth Dynasties (Smith, 1995), and this was deduced through the absence of scarabs indicating the Twelfth Dynasty kings.

Though a cemetery was located on the opposite bank of Askut, Badawy's excavation notes from Askut state that, "…two levels [of] broken jars along the east and west walls, seven of which contained burials of babies, a feature known at Semna, Mirgissa and Buhen. Carbon dating showed, however, that these burials were made after

the fortress had been ultimately abandoned toward the end of the New Kingdom, in the ninth century [BC] or before" (Smith, 2007, pers. comm.). Figure 3 indicates which portions of the island were being used after the abandonment of the fort itself; though other portions of the island were inhabited at that time, the fortress itself was not. In order to make sense out of the pot burials it is necessary to examine other Nubian and Egyptian burials, as well as the presence of pot burials at other locations. Unfortunately this specific cemetery is not named or further described by Smith (1995) or Badawy (1965).

The Relationship between Ancient Egypt and Nubia

Seeing as Askut was established as an Egyptian fortress in Nubia, it is beneficial to examine the relationship between the two cultures. This, as well as comparing burial styles between the two cultures, will help to determine whether pot burials are the result of Egyptian or Nubian cultural influence, or perhaps both.

There are six distinct cataracts of the Nile within what was considered Nubia, with Askut and other fortresses being located around the second cataract. This cataract marked the southern border of Egypt between the Second Intermediate Period and the Middle Kingdom (Bunson, 1996). Bunson (1996) also mentions other forts along the Nile between the island of Elephantine (near modern Aswan) and lower Nubia. With each one having between 2500-3000 soldiers present, the forts of Mirgissa, Askut, and Buhen, are thought to have had both Egyptian and Nubian occupation until the end of the 2nd Intermediate Period, circa 1650-1550BC (Bourriau, 2000). Smith (2003) remarks that the granary and barracks of Askut were no longer in use after the second building phase, reflecting the increasing Nubian influence at Kerma during the Middle Kingdom (1680

BC), replacing the Egyptian colonization. Smith (1991) notes that over 25 C – Group sites are located around Askut, as well as some having A-Group deposits underneath them. Throughout the Middle and New Kingdom time periods several cultures could have interacted at Askut, these include Egyptian, Kerma, C-Group, and the Pan Grave culture. At the fort of Semna South A-Group and Kerma culture are noted through ceramics (Žabkar and Žabkar, 1982) as well as a Meroitic cemetery with some X-Group and Christian graves present. The meroitic graves had two common patterns; one with a ramp leading to a chamber with a blocked entrance, and another with a later chamber. The bodies were often wrapped in shrouds.

Many colonial sites in Nubia, such as Tombos and Askut, show a great deal of Egyptian influence. During the New Kingdom period (1550-1050 BC) Egypt began to expand into lower Nubia, with Kerma, the most well known and some say most important Nubian archaeological site, being overthrown by Thutmose I around 1550 BC (Smith, 2003; Shinnie, 1996). During this time Egyptian culture quickly replaces indigenous Nubian culture, including everything from architecture to burial practices. A chronology of the Nubian time periods are shown in Table 1, and those of Egypt in Table 2, but only those periods that pertain to the material in this thesis will be discussed. The burials which will be analyzed in this research should also be viewed in light of Egyptian history, particularly the New Kingdom and the Third Intermediate period, which generally refers to the period following the 20th Dynasty (James, 2005). Pot burials have also been found in Egypt, though not often published (Figure 5).

Table 2: Table identifying time periods in Egyptian history (adapted from Stalcup, 2001; Shaw, 2000).

Date	Time Period
5300-3000 BC	Predynastic Period
4000-3200 BC	Naqada Period
3000-2686 BC	Archaic/Early Dynastic Period (First and Second Dynasties)
2826-2125 BC	Old Kingdom (Third-Seventh Dynasties)
2160-2055 BC	First Intermediate Period (Seventh-Tenth Dynasties)
2050-1650 BC	Middle Kingdom (Eleventh- Fourteenth Dynasties)
1650-1550 BC	Second Intermediate Period (Fifteen-Seventeenth Dynasties)
1550-1070 BC	New Kingdom (Eighteenth-Twentieth Dynasties)
1070- 663 BC	Third Intermediate Period (Twenty first-Twenty fifth)
663- 525 BC	Saite Period
525-332 BC	Persian Period
332-30 BC	Ptolemaic Period
30 BC- 395 AD	Roman Period

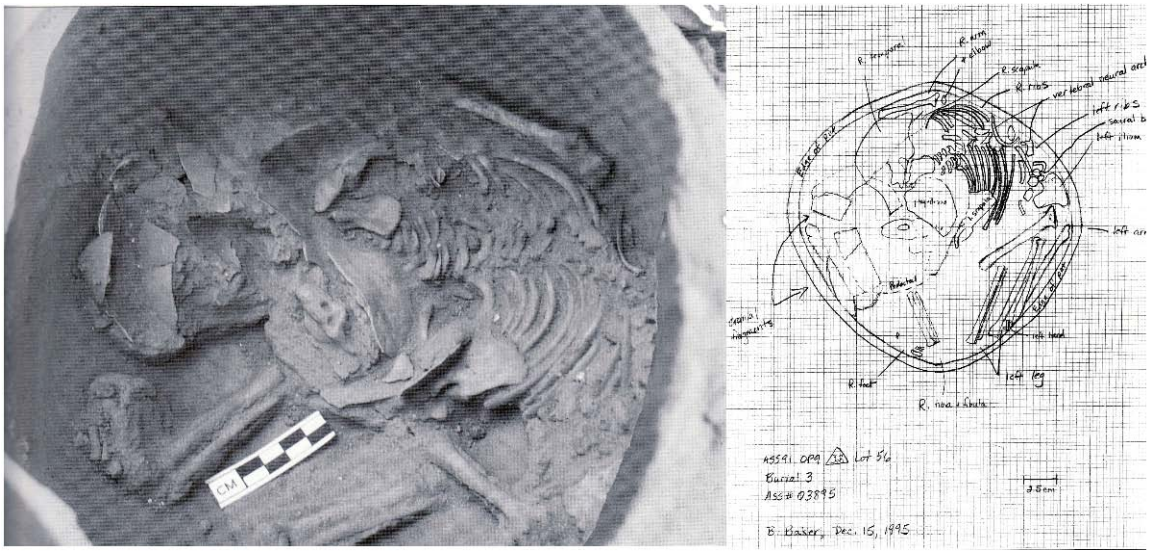

Figure 5: Pot burial from Egypt (adapted from Baker et al., 2005), suggesting that such burial practices are not exclusively a Nubian practice.

It will also be beneficial to examine the Middle Kingdom period of Egyptian history to understand patterns of Egyptian conquest, burial, and how these may relate to Askut. The Middle Kingdom Period (2040-1650 BC) in Egypt was characterized by political continuity and the beginning of imperialism spreading into the forts of Nubia (Richards, 2005). Due to these activities there was increased Nubian migration to Egypt and with this came the Nubian traditions being incorporated into Egyptian society. During this time period Egypt had, "… a standing professional army, practice of rotating garrisons in the Nubian forts and the impact of both the organization of both the organization of Egyptian society especially with regard to opportunities for social and political mobility" (Richards, 2005:6). During the Middle Kingdom period a variety of social classes appear to have emerged as evidenced by mortuary practices. In fact, though not published, neonate pot burials were found in Egypt around this time, however it is uncertain if these represent the earliest pot burials in Egypt (Baker, 2008, pers. comm.).

Lower Nubia was of importance to Egypt due to its resources, primarily the quarries that provided diorite, granite, amethyst, and access to gold and copper from other parts of Africa (Bourriau, 2000). Bourriau (2000) even notes that one burial associated with Cemetery K in Buhen, located about 30 kilometers north of Askut, had a large gold necklace present, implying that Buhen had a direct association with the gold industry. Large forts such as Buhen and Askut were built both to guard and protect trade along the Nile, and as cities with established forts were less likely to fall under attack by other establishments (Brier and Hobbs, 1999). Some authors (e.g., Smith, 1995; Williams, 1995), however, feel these forts were established more for military usage and that any

potential trading benefits from their locations were merely an afterthought as the cost of building and manning the forts was not necessary for trade as Egypt had other means of acquiring goods. Smith summarizes:

> If the Egyptians could eliminate the cost imposed by C-Group middle men by establishing an imperial presence, then the fort system could have been 'profitable' from an economic point of view as long as it did not exceed these payments in resources expended on the forts (1995:3).

Badawy had a similar view on Askut's dual role as both a military outpost and having an important role in trade and craft work due to the presence of, "numerous grinding stones and pounding balls similar to those found at the Duweishat mines, could only be used for pounding gold-bearing quartz or gold itself" (1965: 131).

Adams, however, interprets the lack of surviving records as indicating that the forts were not used simply for intimidation or for ,"…the outermost defenses of Egypt" (1977: 184). Since their location along the Nile made them more susceptible to attacks. Adams (1977) argues against Williams' (1995) claim stating that:

> The Second Cataract Forts are functionally intelligible only in relation to the Nile, and more specifically to the Nile cataracts. All of them are situated at or close to the largest (Batn el Hajar) rapids: places where riverain cargoes would have to be transferred from larger to smaller vessels […] From these circumstances it seems logical to infer that the fortresses were designed chiefly to provide assistance to riverain commerce and at the same time to protect it at those points where it was most vulnerable to attack from the bank (184).

Adams (1977) also notes that Mirgissa and Buhen had well developed ports and warehouses; reiterating that trade was an important function.

The A and C Group Cultures: Their Burials

Despite the strong Egyptian influence found in the second cataract, there were many distinct Nubian cultures; some of which were even found at Askut before it

become an Egyptian fortress (Smith, 1991). The major cultures include: A-Group, C-Group, Kerma Culture, and Pan grave, though others will be mentioned.

The A-Group cultural group, which inhabited Lower Nubia around 3700-2800 BC, is divided into three phases: ancient, classic, and final. The A-Group's primary trading partner was Egypt, which may have resulted in the numerous Egyptian ceramics appearing in the A-Group horizons (O'Connor, 1993). Most of these ceramics have been ascribed to the Nakada I (also known as Naqadah) and Nakada II (3500-3300BC) phases in Upper Egypt, and most include containers for beer, wine, oil, or other products. A-Group Nubians also obtained copper weapons and tools from Egypt, as well as wine, oils, beer, and other foodstuffs; which is supported by the Egyptian-style storage vessels that have been found in A-Group excavations (Bianchi, 2004). It has been suggested that the A-Group traded goods from farther south, like gold and ivory, with the Egyptians.

Most A-Group settlements have been assumed to consist of small huts or other small shelters. However, the elites appeared to have similar shelter architecture to those found at Kerma (Bianchi, 2004). Such stone structures with rectangular rooms were surrounded by the circular huts and have been found at both the site of Afyeh and Kerma. Adams (1977) writes of a "B-Group" culture, which is also believed to have been the lower end of the social hierarchy in the A-Group culture.

Typically the A-Group buried their dead in cemeteries using one of two common burial styles (Figure 6). In one style, resembling those of the Neolithic period, a circular pit served as the grave with the body lying on a mat (Bianchi, 2004; Adams, 1977). The second burial style included a rectangular chamber that was cut in the "pit's floor, deeper

on one side to accommodate a contracted position and accompanied by grave goods. Often a stone slab resting diagonally from the wall to the floor of the pit covered the opening into the rectangular chamber" (Bianchi, 2004:34). Grave goods show evidence of social hierarchy among the A-Group, and most objects include objects of daily life and some jewelry. However, even comparably poorer graves contained some material culture, helping to support the claim that the so called B-Group is a lower economic class compared to the A-Group as the same kinds of items are found, just of less quantity or poorer quality. Adams (1977) made note that over 100 A-Group cemeteries have been excavated with the largest number of individual graves found in one cemetery being 117, but they generally only contain 30-80 graves.

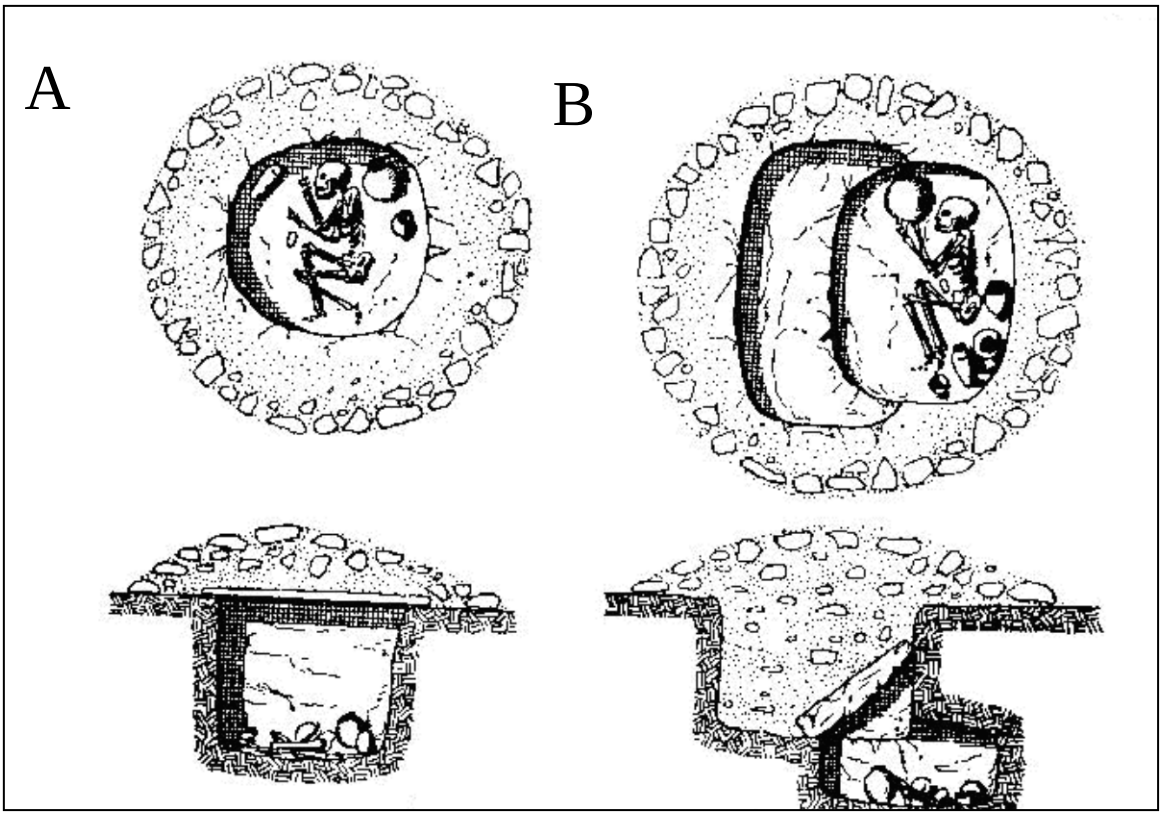

Figure 6: Illustrations of A-Group Burial patterns (adapted from Adams, 1977). The images in column A represent the burial style utilizing a circular pit, and the images in column B depict the rectangular chamber used in other burial styles.

Nubian C-Group culture inhabited Nubia shortly after the final phase of the A-Group horizon. Some pottery assemblages suggest a connection with the A-Group culture; however this has not yet been confirmed (Bianchi, 2004). Smith (1995) feels that the A-Group culture faded out in part due to a strong systematic integration of the Egyptian presence in Nubia; the A-Group could not cope with Egyptian aggression. The C-Group is associated with Buhen and other second cataract forts (Smith, 2003). Other C-Group sites include Sayala, Aniba, and Areika. These sites are often characterized by round houses framed with poles on foundations of vertically set large slabs. Despite their association with fortresses, Smith (1995) notes that the C-Group was not viewed as a

threat by Egypt, though he also notes that they coped with Egyptian invasion in a different manner than the A-Group, eventually becoming fully integrated.

The C-Group burial practices are set apart by their funerary architecture, which some have suggested shows an increased awareness of ritual or of the afterlife (Adams, 1977; Bianchi, 2004). The most elaborate C-Group burials were associated with circular chapels with diameters of up to 16 meters. These chapels were erected to the east of the tombs themselves. This suggests a hierarchical social system (Bianchi, 2004). Common C-group burial features (Figure 7) include burial mounds covered with a stone slab, and evidence of marking graves with stelae or tumulus with a stone circle built up around the top of the grave (Adams, 1977; Bianchi, 2004). On occasion some tombs have diameters of 16 meters and are lined with painted oxen skulls. The origin of this tradition is unknown but it bears similarities to the pan-grave culture. Pan-graves are a distinct burial pattern named after the shallow circular shapes of the burial pits, and these burials have been associated with painted skulls of gazelles, paralleling the painted oxen skulls of the C-Group burials. Pan-graves are generally dated to the Second Intermediate and New Kingdom periods, and they are often associated with fortresses (Shinnie, 1996). The origin of pan-graves is unknown; they have been attributed to both Egyptian soldiers (Shinnie, 1996) and the C-Group (Smith, 1995). Despite the uncertainties, there does appear to be a connection between the C-group culture and the pan-grave culture, both are associated with fortresses, and painted faunal remains are present in both burial styles.

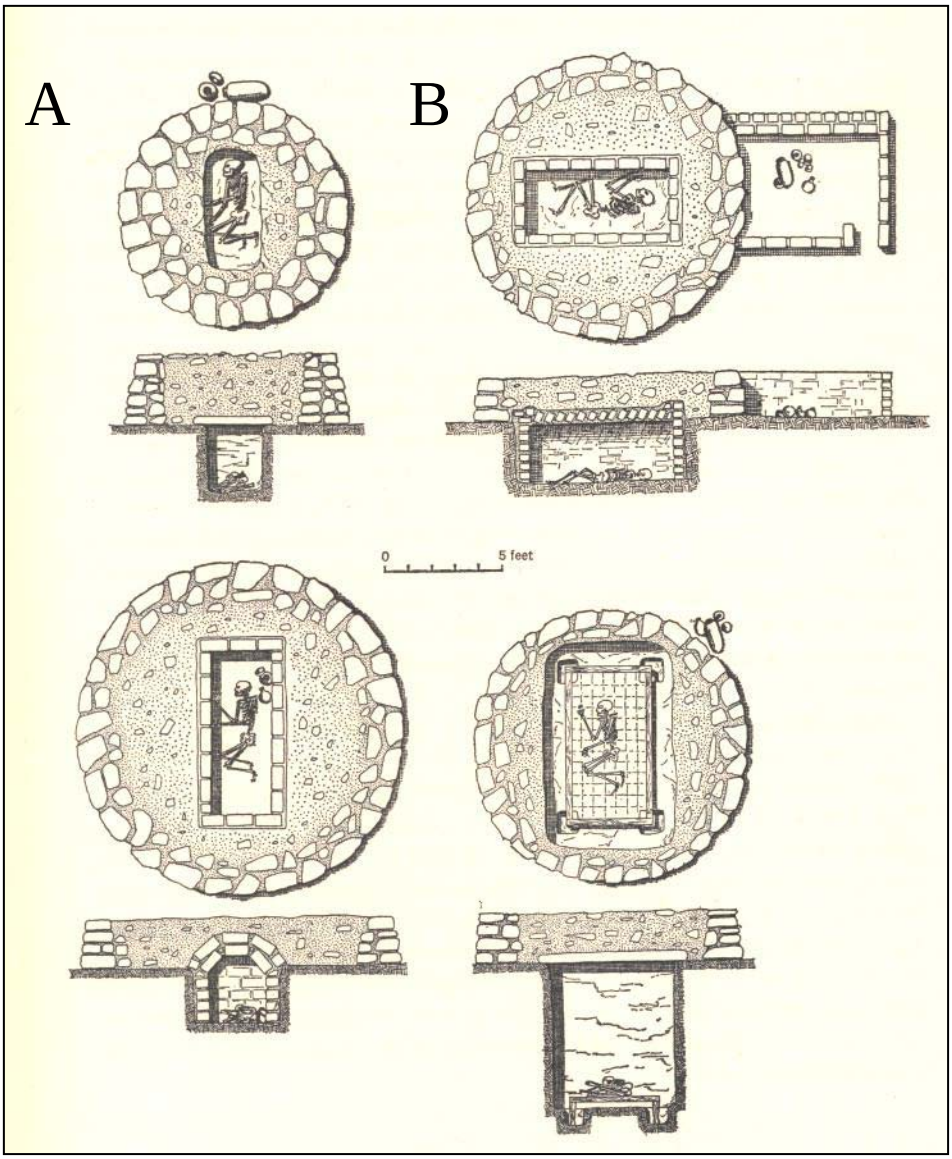

Figure 7: C-Group burial patterns (adapted from Adams, 1977) depicting the various burial styles. Graves found earlier in the C Group horizon are depicted in column A, those in column B are later style burials. The circular masonry outside of the grave is considered to be the unique aspect of C Group burials, particularly when compared to the A Group.

Kerma Culture and Graves

The Kingdom of Kerma, first recognized by archaeologists in the early twentieth century (Reisner, 1923) existed from 2500-1500 BC between the Nile's third and fourth cataracts. The environment of Kerma and Upper Nubia is different compared to Lower

Nubia and Egypt, in part due to the narrow floodplains of the Nile, affecting the agriculture of this desert area (Trigger, 1976). However, despite this agricultural shortcoming, Kerma had a large and densely settled population. Nubians had developed agricultural practices to help them survive in this area; this has been supported by the findings of food storage jars and the remains of animal herds (Bianchi, 2004). The pottery assemblages found at Kerma have been dominated by black topped red ware, which is not associated with the A or C Groups (Adams, 1977). The most typical of the black-topped red ware, called "Kerma Beaker Ware" is a round bottomed wide mouthed beaker that is commonly found in graves (Adams, 1977). These are nearly universal in Kerma graves and appear in clusters.

The inhabitants of Kerma also developed a distinctive pattern of funerary architecture, particularly notable with the elite rulers of the Classic Kerma Period who were buried in large tombs of up to 90 meters in diameter (Bianchi, 2004), with the tomb owner's body placed in a flexed position. Evidence of human and animal sacrifice is present, but it is unknown if the sacrificial victims had any relationship to the tomb owner. Adams (1977), however, describes the typical Kerma graves to be similar to those of the C-Group: shallow rectangular graves with rounded corners, bodies laid on right side in flexed position, facing north (Figure 8). Grave goods are common in Kerma burials with personal belongings, often toiletries being laid close to the body, and pottery vessels containing foodstuffs being laid close to the walls. Adams (1977) describes five features common and unique to Kerma graves: bed burial, Kerma pottery, domed tumuli, ram sacrifices, and human sacrifices. Although the intact graves generally have the body

lying on a reclined bed, this is occasionally found in other parts of Nubia but never as common as it is in Kerma graves. The black topped pottery previously mentioned are also a universal trait among Kerma burials, though occasionally found in Lower Nubia and Egypt. The Kerma tumulus is dome-shaped sloping downwards towards the ground, and this primarily serves a decorative purpose. Though an uncommon feature in other parts of Nubia, sacrifice of animals is a common aspect in Kerma burials, being including within the grave itself as opposed to separate sacrificial pits as was the practice in the C-Group. Human sacrifices are also fairly common, most individuals believed to be either buried alive or died previously from suffocation (Adams, 1977; Reisner, 1923). These five characteristics are also described by Trigger (1976).

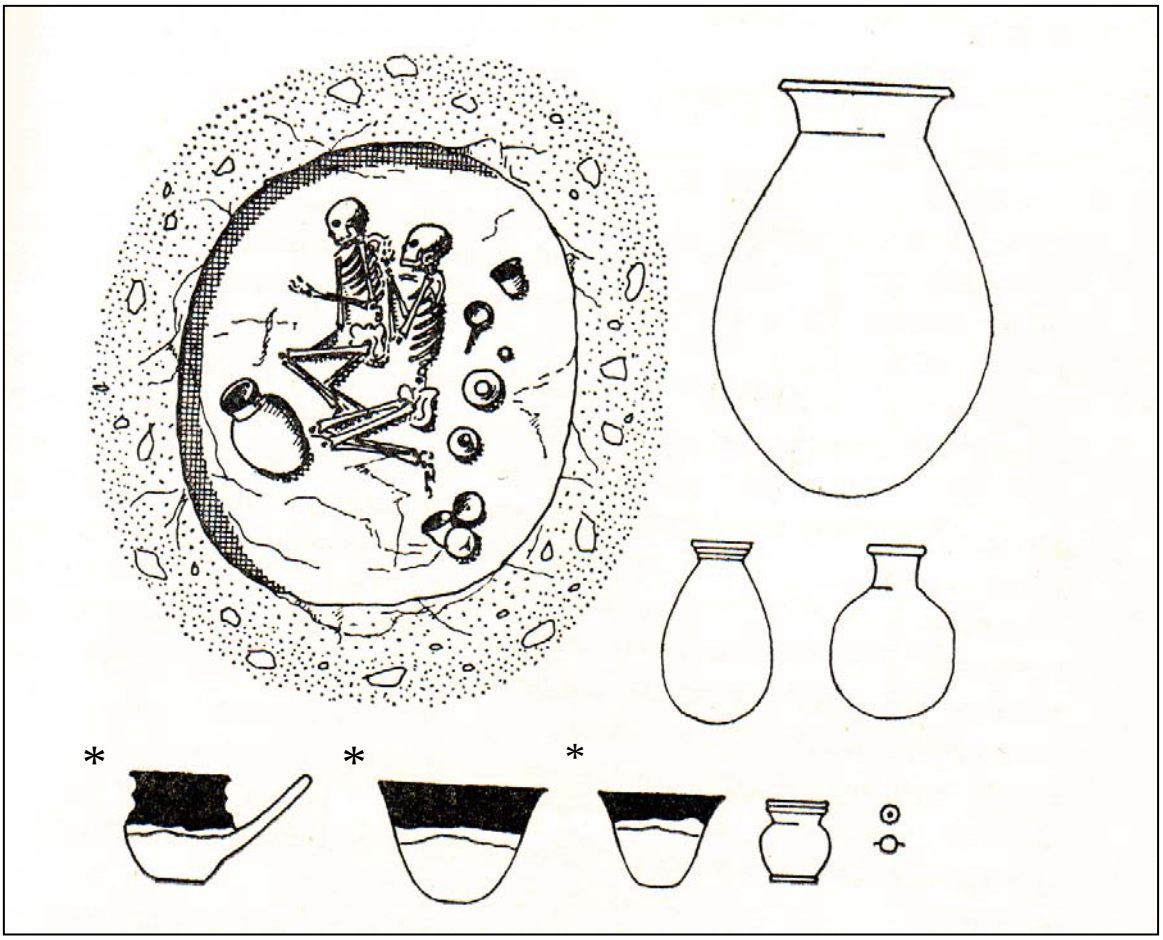

Figure 8: Kerma style burial (adapted from Adams, 1977). This image depicts two individuals (Adams does not state whether one individual is supposed to represent a sacrificial victim) and commonly associated grave goods, (*) indicates examples of Kerma Beaker Ware.

The Ancient (4450–4000BC), Middle (4000-3700 BC), and Classic Kerma (3700-3450 BC) periods all had their own style of burial, as has been documented through the excavation of their cemeteries. Tombs of the Ancient Kerma Period are round structures with an average of a one meter diameter with slabs of sandstone forming concentric circles with another stone mixture (Bianchi, 2004). There are many cases of bowls and other ceramic vessels being buried upside down, and Bianchi (2004) attributes this to some sort of funerary rite of passage. Bodies were buried in a flexed position on the right side with the head oriented east, which was also seen in the C-Group. Published literature

generally does not specify whether these general burial patterns apply to both males and females, however children are usually not mentioned.

The Middle Kerma period shows signs of more complex ritual. More bowls and jars for the storage of food are associated with the burials. Associated architecture also becomes more complex and chapels begin appearing on the western sides of the superstructures. It is thought that this is where organized worship took place, and this has been inferred by the seal impressions found next to some of their entrances. There is also evidence of large scale animal sacrifice; sometimes almost an entire herd, though generally one to six animals are found with one individual. Many of the animals show evidence of decoration such as beads or head adornment, and such scenes have also been depicted in Nubian rock art, suggesting there was a ritual involved with the animals before sacrifice. Human sacrifices are also found, always placed face down. Males, females, and children were used as sacrificial victims, indicating that age and sex did not play a role in the selection of human sacrifices (Bianchi, 2004). This trend increased throughout the Middle Period, while animal sacrifice decreased.

It is the Kerma Classic period that is characterized by complex religious and political systems, as is depicted in their burials. Burial mounds of the elite at this time have reached diameters of up to 90 meters. One of these large burial mounds revealed hundreds of skeletons buried in the corridor leading to the central burial chamber. These individuals were in flexed positions on mats that are presumed to accompany the elite member in the afterlife; however the literature does not specify whether these victims were male or female (Bianchi, 2004; Adams, 1977). The body of the elite was placed on

a bed, which was decorated with ivory and copper. Religious structures at this time get larger and more prominent than those seen in the Middle Period.

It is also important to note that during the Classic Kerma Period (1750-500 BC), children were buried separately from adults. This act, however, was not specific to the Nubian culture, as it has also been reported in parts of Italy during the fifth century AD (Soren, 2003), and in Grecian sites in Italy like Paestum (450 BC). A Nubian infant cemetery from the Island of Sai (located near the third cataract) showed nearly 80% of interred individuals were stillborn or died shortly after birth, but none of the burials were described as fetuses (Murail et al., 2004). These individuals were still given proper burials, and the typical black pottery is found with most graves, which may be attributed to the increased religious awareness during the Classic Period. All graves were individual burials and the cemetery appeared to be organized by age group. Interpretation of social stratification of these juvenile individuals was impossible due to the limitations of aging and sexing juvenile skeletons. The fact that a specific cemetery existed, however, is important because it helps to explain cultural attitudes, which dictate where and how adults and children are buried (Lewis, 2007). However, it is also important to remember that the children who die may not be a typical representation of children who survived in the society because they are dead, and the “normal children” grew up into adults (Wood et al, 1992). Therefore, it is important to keep aspects of the infant mortality rate in mind during the examination of such data, and to remember that archaeological populations would have very different experiences in such regards than do modern western cultures (Goodman and Armelagos, 1989).

Other Nubian Burials

Though the A- and C-Groups, and Kerma cultures are commonly described as some of the major aspects of Nubian prehistory, there were other groups in Nubia who had their own distinct burial customs to suit their needs. These groups have included nomadic individuals represented by Neolithic burials in Upper Nubia. These graves were circular mounds that were 15-20 centimeters high and contained a maximum of six burials. Other excavations have documented similar findings (Reinold, 2001). Some burials included adults and children, while others were exclusively adults or children (Peressinotto et al., 2004). No matter the individual interred, or the age of the individual, the same manner of burial is used. The nomadic way of life required simple burials, and they did not have elaborate grave markers or grave goods as seen in other parts of Nubia.

While nomads had simple burials, later Nubians had more elaborate burials and even sought to imitate Egyptian Burial style. On the other hand, sites such as Tombos, located at the third cataract, show that burial architecture and its associated rituals mimic the Egyptian style with the presence of pit tombs and underground chamber tombs circa 750-300 BC (Smith, 2003). Since objects of daily life and amulets at Tombos reflect an Egyptian style, Smith (2003) argues that the deceased must have lived with Egyptian ideals and beliefs rather than those associated with indigenous Nubian burials; this is reinforced by elite burials constructed in orientation with the sun, showing another Egyptian practice. However, it is important to note that some child burials in Nubia also reflect Egyptian ideals, suggesting more effort was put into the burial of upper class

children (O'Connor, 1993). Such studies play a role in biological and ethnic identity in antiquity (Buzon, 2006).

Egyptian Burials

Due to the obvious Egyptian influence at the site of Askut it is also important to look at Egyptian burial style during these time periods. Randall-Maciver (1902) describes the tombs of El Amrah, Egypt, which was inhabited during the Naqada Period (4000-3200 BC), as falling into nine categories, these include: round shallow graves, oval graves, graves with a rock recess, and pot burials.

The round shallow graves average 3-4 feet deep with the body being wrapped in leather-like material then in a reed mat. In general these are single burials, though double and triple burials have been recorded. The oval graves are deeper, averaging 5-6 feet in depth. This style has been described as one of the most typical predynastic graves (Randall-Maciver, 1902). Like the round graves, these bodies were wrapped in leather and reed mats with the occasional occurrence of multiple burials. There are multiple versions of burials with rock recesses described by Randall-Maciver, the main factor being the accommodation for the amount of grave goods found with the burials.

Pot burials at El Amrah were used in the late predynastic and protodynastic period. These burials were described as being sunk into the soil without a tomb (Randall-Maciver, 1902); of the pot burials found none contained grave goods. The ages of those interred ranged from juveniles to adults. Ikram (2003) also notes the use of pots and even baskets for burials during predynastic Egypt. The use of pots has been attributed to a desire for cheap ready made receptacles instead of more elaborate labor intensive coffins.

Brief Overview of the Bioarchaeology of Children

Studying the skeletons of children allow researchers to learn how societies treat children through their burials and other factors, such as indicators of maternal health. This can also help to broaden the general scope of bioarchaeology to be summarized in the following definition that, "A person's skeleton is remarkably informative about their health and wellbeing, dietary history, lifestyle (activity), ancestry, and key biological attributes (i.e., age and sex) that are used to construct demographic profiles of the population from which they originate" (Larsen, 2002: 119). By focusing on juvenile skeletons insight is provided into a particular part of a population. It is important to study children as it can provide inferences about childhood which Halcrow and Tayles (2008; 190) describe as both a, "…biological and social phenomenon" as it is a unique state of extended immaturity and learning period to humans. It may provide information regarding the human condition by examining views on children and childhood. Comparative analysis may be made between the changing views on children and childhood over time and the role they play in society. However, Lewis (2007) also notes the additional importance of children's skeletal remains in the archaeological record as they provide insight into growth and development, age at death, as well as the effects of social and economic factors on their lives resulting in trauma or death. Lewis also mentions the lack of resources available on children in bioarchaeology due to the poor preservation of fragile bones. Deservenski (summarized in Halcrow and Tayles, 2008: 200) attributes the previous lack of attention to juvenile remains as a result of archaeologists having, "…ignor[ed] children's important place in past societies and

reduce[d] them to passive beings not participating in social or economic life". By not acknowledging the presence of children within the archaeological record they are being portrayed as passive members of society. Despite this shortcoming much can be learned about their biology as previously mentioned (growth and development, aging, etc.), and it should also be noted that the bioarchaeological approach is different from specifically skeletal biology (Wright and Yoder, 2003) as it additional examines culture and history of a population, and the influence of culture on biology. Variables such as age and sex must be assessed in bioarchaeology; though techniques for determining some variables often are not as specific as in adult remains, such as sexing the skeleton, research has been conducted on aging, sexing, and even determining ancestry in subadult remains (Kósa, 2002; Kósa and Castellana, 2005; Hoffman, 1979; Black and Scheuer, 1996).

Fetal and Juvenile Osteology

Since the six burials from Askut are subadult remains, it is important to understand what information may be gained from their skeletons, what methods are used, and what is applicable to this study. Although Scheuer and Black note that, "fetal and juvenile osteology receives little attention in modern-day anatomical, medical, anthropological and forensic teaching" (2000 b:IX), there has been research conducted on aging, sexing, and determining ancestry in fetal and other subadult skeletons, though effective methods have not yet resulted from research in terms of determining sex or biological affinity (Kósa, 2002; Kósa and Castellana, 2005; Hoffman, 1979; Black and Scheuer, 1996).

Methodology concerning the determination of age in subadult remains is focused on both skeletal and dental development. Age estimates based on skeletal indicators may be obtained by long bone length, the appearance and development of ossification centers, epiphyseal fusion, and suture closure.

Though not used in this study because of the lack of dentition, dental aging techniques, specifically dental development, will be briefly discussed. Discussion of eruption patterns are not considered here because they are not applicable to fetal remains as they have not reached that point in development. There has been much work published on the formation of the deciduous and permanent dentition in physical anthropology, which is useful in aging juvenile remains. The timing and formation of deciduous and permanent has been reported by Ubelaker (1999) whose standards illustrate both the age of fetal dental mineralization as well as eruption patterns which may be used as a means of comparison when determining age. Mineralization refers to the tooth's stage of its growth and development, and since the tooth has not erupted yet, such data can only be studied with radiographs. Moorrees et al. (1963) examined stages of formation which include initial cusp formation, coalescence of cusps, crown half complete, crown complete, initial root formation, root length, root length closure, and completion of apical closure (not all stages are included). This technique is applicable in both fetuses and infants.

Long bone length is commonly used for aging fetuses and young infants, as any differences that may appear due to sex or biological affinity appear later in childhood (Byers, 2005; Facchini and Veschi, 2004), though environmental factors such as

smoking, pollution, and maternal health may effect fetal measurements (Lewis, 2007). Fazekas and Kósa's (1978) measurements of fetal remains have been considered the standard for long bone length age estimates; however some authors have questioned the validity of this research (Lewis, 2007; Lewis and Rutty, 2003) since the Hungarian sample used as the basis of that research was of unknown age and verification of age assessments was not possible. However, Fazekas and Kósa's (1978) measurements for individuals in later periods of fetal development, near birth, are similar to those of Facchini and Veschi (2004), which was based off an Italian sample of known age. Hoffman's (1979) results were also similar.

Unlike adult remains, where methods based on skeletal degeneration are employed, growth and development patterns are often employed when aging juvenile skeletons. The appearance of ossification centers is useful as primary ossification centers begin to form during fetal development (Scheuer and Black, 2000 a) with ossification beginning by the sixth week, including the temporal ring and the fusion of the suture mendosa (Weaver, 1986; Francis et al, 1939; Lewis, 2007). Secondary centers more often appear after birth, including the femoral head which is present around six months after birth and visible by age one (Scheuer and Black, 2000b).Though this provides information on aging, it is more often beneficial in clinical radiographic studies than in skeletal samples because, "…an element might be missing because it had not ossified or was too small and undifferentiated in form to be recognized" (Klepinger, 2006, 43-44). Age may be estimated by studying patterns that occur in the appearance of ossification centers. For example, the lesser wing of the sphenoid is generally recognizable around

the 20th week of fetal development with the lesser wings fusing to the body around birth; therefore fetal remains in which the lesser wings are fused to the body is older than an individual in which these three bones exist as separate entities (Scheuer and Black, 2000b). Kósa and Castellana (2005) examined ossification centers of fetal and newborn vertebrae with considerable accuracy from four to ten months.

On a similar note, the epiphyseal fusion of long bones may also aid in determining age at death of a juvenile skeleton. Epiphyseal union is divided into four morphological phases: no fusion, early fusion, advanced fusion, and complete fusion (Scheuer and Black, 2000a; Byers, 2005). Fusion occurs with the cessation of longitudinal growth of the diaphysis, during that time the epiphyseal cartilage becomes replaced by bone. Fusion of most long bones begins by the age of eleven, and therefore no fusion would indicate an individual of a younger age (Lewis, 2007). Fusion of sutures may also be used in estimating age of fetal remains. Primarily in younger individuals the sutures that are indicative of age are the metopic suture of the frontal bone, the two halves of the mandible, and those found in the occipital bone (Byers, 2005; Scheuer and Black, 2000a).

Though many techniques have been shown to have be fairly accurate in estimating fetal and juvenile age in skeletal samples, biological affinity and sexing of subadult skeletons have much less success in related research, though some patterns have been noted (Harris et al., 2001; Weinberg et al., 2005). Scheuer states that, "…the determination of race or ethnic origin is the most difficult and unreliable tribute" (2002:307) to be established by an osteologist. The difficulty in determining ancestry in

adult skeletons is due to the variability in individual morphology, as many specimens do not fit neatly into one of the three categories (European, Asian, and African). Determining ancestry is even more difficult with juvenile remains because it is often assumed that common morphological indicators of ancestry do not appear until later in life (Lewis and Rutty, 2003). Though such skeletal indicators are not developed, many morphological dental traits that are more highly prevalent in adult populations are also reflected in juvenile remains, such as shovel shaped incisors in Asians and Carabelli's cusp in Europeans. However since the dentition is still forming during fetal development morphological traits such as these would not be detectable (Lewis, 2007). However, some fetal cranial morphological differences have been found between European and African fetal populations (Weinberg et al., 2005; Lewis, 2007), unfortunately Asian remains are not addressed in these studies. Weinberg and colleagues (2005) note patterns of more pronounced anterior nasal spines and elongated vomers in European populations, while Lewis (2007) notes that nasal height is shorter and breadth is wider in African fetuses, which is comparable to the results found in African adults.

Similarly to indicators of biological affinity, indicators in sex in the skeleton generally do not become apparent until after puberty, resulting in a greater range of error in such studies, and with few methods yield results over 70% accuracy (Lewis, 2007). Scheuer (2002) notes that sex, as along with ancestry, is one of the most difficult biological indicators to assess in juvenile skeletons. For example, using measurements of the greater sciatic notch in juveniles, Fazekas and Kósa (1978) report 80% accuracy; while using the same techniques, Schutkowski's (1987) study yielded less than 70% in

accuracy. Lewis (2007) and Scheuer (2002) both discuss the benefits of genetic testing in accurately determining sex in fetal and infant remains, however this is costly and not realistic for many researchers in bioarchaeology.

Methods that are useful in determining sex from adult skeletons are not applicable in fetal remains. For example, Rissech and Malgosa (2005) found no significant differences in metric analysis of the ilium from birth until age 15, confirming that puberty and sex hormones play a major role in determining sex from skeletons. Several authors mention males having larger dental dimensions than females in both adults and juveniles (Lewis, 2007; Lewis and Rutty, 2003; Scheuer, 2002). However, Harris and colleagues (2001) found that dimensional differences were more significant between European and African descended individuals than between male and female children when examining dental tissue contributions to overall tooth size.

CHAPTER 3: MATERIALS AND METHODS

This research involves the analysis of seven individuals found in pot burials in the Nubian site of Askut, which is located near the modern Egypt-Sudan border at the second cataract of the Nile (Figure 9). The collection is regularly housed in the Fowler Museum at the University of California, Los Angeles, and is on temporary loan to the University of Central Florida for purposes of this research. The skeletons (see examples *in situ*, Figures 10 and 11) are from the 1962-1963 excavations performed by Professor Alexander Badawy, during the Aswan High Dam Salvage Campaign. These remains have not previously been analyzed, and there are very little published on these excavations, so little is known of their origins. Unfortunately there is no published information of the taphonomy of these individuals when they were found in situ. An inventory of all remains provided is presented in Appendix A. These burials had been excavated from their pots prior to their arrival at UCF. The burials analyzed were given the following identification numbers based on their provenance: 151, 765 400-406 Box 153, 2186, 765, 2189, and 400-291 Box 152 (Figures 12-17).

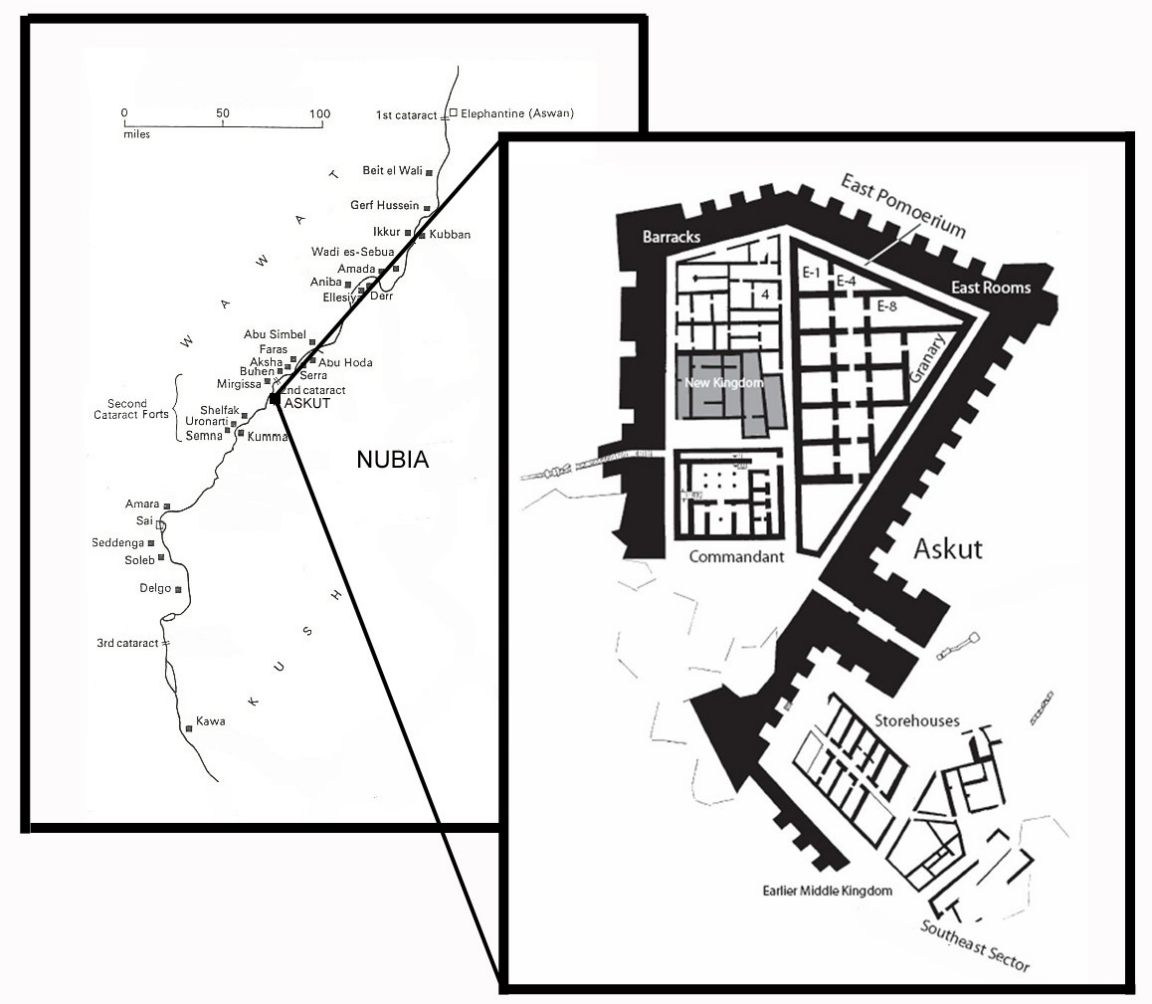

Figure 9: Map of Nubia and Askut indicating the East Pomoerium, where the individuals were recovered during the excavation (inset map courtesy of S. Smith).

Figure 10: An example of one of the fetal pot burials found *in situ* (courtesy of S. Smith).

Figure 11: A second example of one of the fetal pot burials as found *in situ* (courtesy of S. Smith).

Figure 12: Photo of burial from Pomerium East Box 151 (not all bones present included in photo).

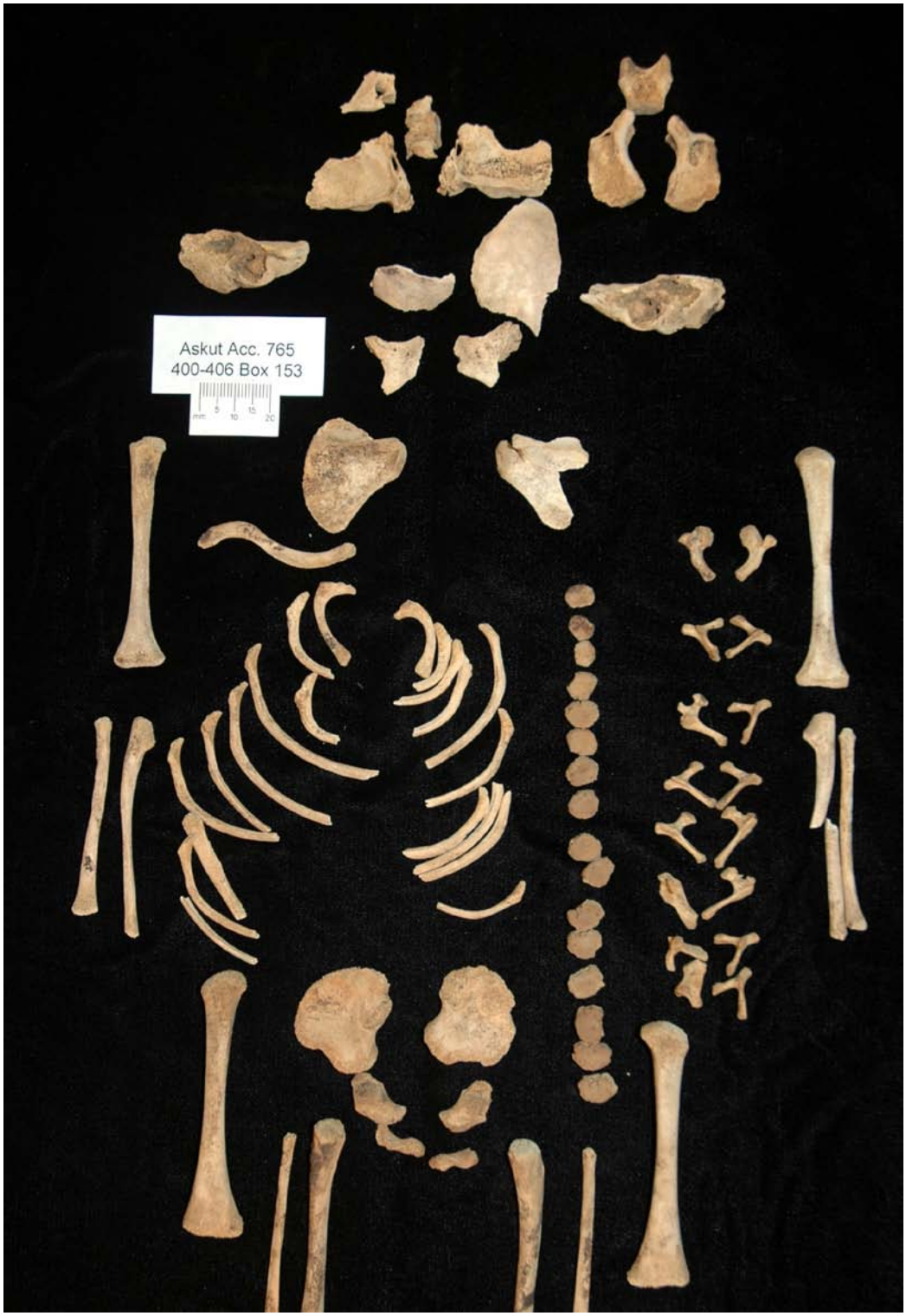

Figure 13: photo of burial identification number 765 400-406 Box 153 (not all bones present included in picture).

Figure 14: Photo of burials identification number 2186 (not all bones present included in picture).

Figure 15: Photo of burial identification number 765 which only contained cranial remains, a deformed sphenoid was also present in this individual.

Figure 16: Photo of burial identification number 2189 (not all bones present included in photo).

Figure 17: Photo of burial identification number 400-291 Box 152. This burial contained two individuals.

As previously mentioned, there were two construction periods that took place at Askut, the first during the Middle Kingdom and the second after its rebuilding and the transition to a New Kingdom settlement rather than a fortress (Smith, 2003). It is interesting to note that Smith (2003) describes the granary and barracks surrounding the pomoerium as being part of the abandoned area during the second building phase that would have occurred prior to the radiocarbon date provided for one of the individuals. Although Badaway, who excavated the burials (Smith, 2007), referred to the area as a pomoerium due to architectural similarities with walls that bore sacred significance, it should not be inferred that the pomoerium of Askut (Figures 18-19) served a similar purpose to the inhabitants. Unfortunately any additional notes and maps are not published, what is available is presented.

Figure 18: Overview image of the fort of Askut (courtesy of S. Smith).

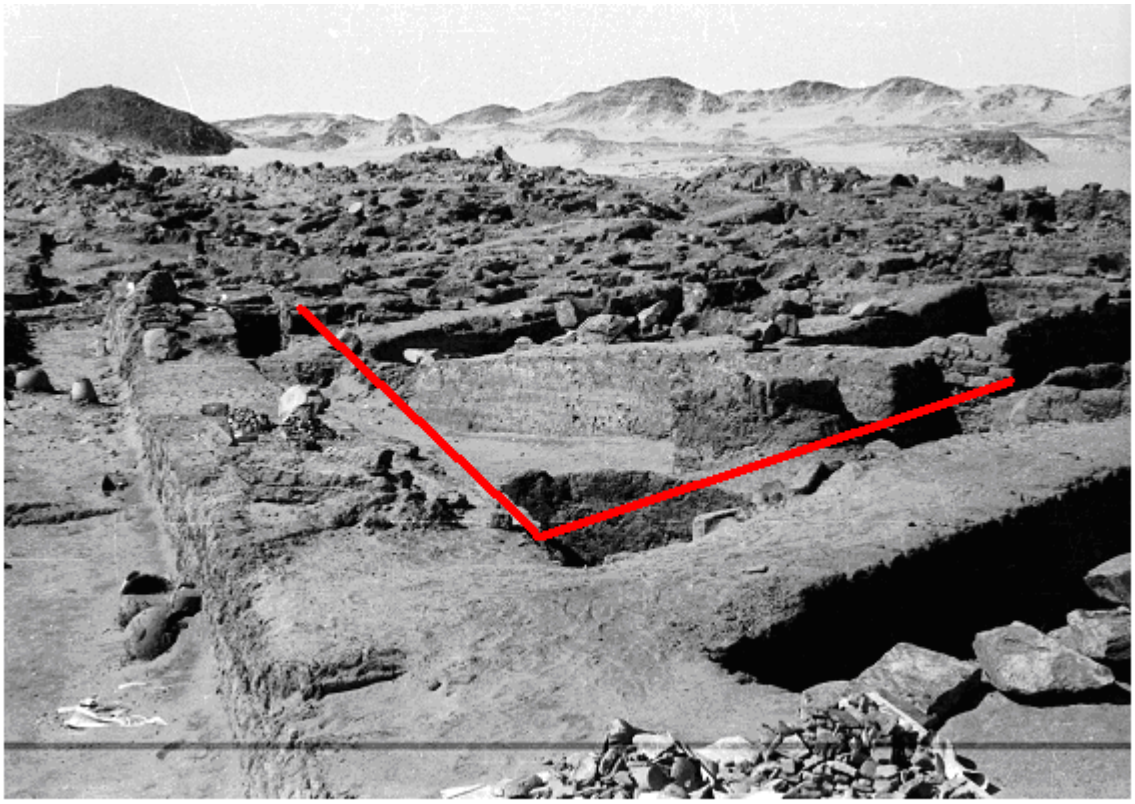

Figure 19: Overview shot of the street (pomoerium) where the pot burials were excavated. The red lines indicate the general vicinity of the burial locations (photo courtesy of S. Smith).

To estimate age at death of the individuals, sliding calipers were used to measure all bones that were not damaged or fragmented to the nearest hundredth of a millimeter based on standards of Fazekas and Kósa. The measurements for all applicable bones were each taken four times to determine intraobserver error. The measurements collected are presented in Chapter 4. Though it cannot be said specifically what caused the death of these individuals or what role their pathologies held in their death, it is important to note the presence of developmental abnormalities as these individuals have a significantly lower survival rate than do healthy individuals (Roberts and Manchester, 2007).

CHAPTER 4: RESULTS

Measurements were compared with those of Fazekas and Kósa as described in Scheuer and Black (2000 b) suggesting an average age at death between 35-40 weeks. Despite critiques of these standards (Lewis and Rutty, 2003; Lewis, 2007) similar measurements of long bone length at birth have been found when compared to other methods. Age estimates of the Askut burials were then compared to other studies in determining age through long bone measurements, which helped to confirm these results (Sherwood et al., 2000; Facchini and Veschi, 2004; van Gerven et al., 1985). Total measurements for each individual are found in Tables 3-8. The measurements of the other methods used to compare to Fazekas and Kósa (1978) are summarized in Table 9.

Table 3: Total and mean average measurements for burial number 151 from Askut. Fields marked with a 0 indicate the bone was not present, those marked with an X indicates a broken or fractured bone whose measurements were not included. All lengths are in millimeters. Each measurement was taken four times with the average being used for age estimation.

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
LW Sphenoid	8.80	8.90	n/a	11.20	11.60	n/a	n/a	n/a
	9.12	8.17	n/a	10.25	10.74	n/a	n/a	n/a
	8.85	9.41	n/a	9.53	10.10	n/a	n/a	n/a
	9.04	9.27	n/a	9.72	10.42	n/a	n/a	n/a
Mean	***8.95***	***8.93***	***n/a***	***10.17***	***10.71***	***n/a***	***n/a***	***n/a***
GW Sphenoid	28.30	29.10	n/a	21.40	19.30	n/a	n/a	n/a
	26.96	29.08	n/a	20.57	19.24	n/a	n/a	n/a
	27.06	28.48	n/a	21.00	19.44	n/a	n/a	n/a
	26.76	28.90	n/a	20.58	19.02	n/a	n/a	n/a
Mean	***27.27***	***28.89***	***n/a***	***20.88***	***19.25***	***n/a***	***n/a***	***n/a***
Sphenoid Body	n/a	n/a	9.10	n/a	n/a	20.30	n/a	n/a

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
	n/a	n/a	10.73	n/a	n/a	19.68	n/a	n/a
	n/a	n/a	11.97	n/a	n/a	18.87	n/a	n/a
	n/a	n/a	12.01	n/a	n/a	19.79	n/a	n/a
Mean	***n/a***	***n/a***	***10.95***	***n/a***	***n/a***	***19.66***	***n/a***	***n/a***
Petrous &	41.20	40.80	n/a	16.70	18.20	n/a	n/a	n/a
Mastoid	41.98	40.71	n/a	16.80	16.62	n/a	n/a	n/a
	41.21	40.46	n/a	14.46	15.57	n/a	n/a	n/a
	41.42	40.65	n/a	15.40	13.93	n/a	n/a	n/a
Mean	***41.45***	***40.65***	***n/a***	***15.84***	***16.08***	***n/a***	***n/a***	***n/a***
Pars Basilaris	n/a	n/a	11.90	n/a	n/a	15.10	n/a	n/a
	n/a	n/a	11.59	n/a	n/a	15.92	n/a	n/a
	n/a	n/a	12.20	n/a	n/a	15.77	n/a	n/a
	n/a	n/a	11.75	n/a	n/a	16.62	n/a	n/a
Mean	***n/a***	***n/a***	***11.86***	***n/a***	***n/a***	***15.85***	***n/a***	***n/a***
Zygomatic	X	X	n/a	X	X	n/a	n/a	n/a
Maxilla Alveolar	0	0	n/a	0	0	n/a	0	0
Mandible (1/2)	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Mandible Arc	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Mandible Body	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Clavicle	0	0	n/a	n/a	n/a	n/a	0	0
Scapula	n/a	n/a	n/a	0	28.70	n/a	0	29.30
	n/a	n/a	n/a		28.84	n/a		37.15
	n/a	n/a	n/a		28.82	n/a		29.46
	n/a	n/a	n/a		28.87	n/a		36.85
Mean	n/a	n/a	***n/a***	***0***	***28.80***	***n/a***	***0***	***33.20***
Humerus	0	66.50	n/a	0	17.30	n/a	0	5.40
		67.51	n/a		17.11	n/a		5.11

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
		67.18	n/a		17.84	n/a		5.43
		67.41	n/a		17.81	n/a		6.21
Mean	***0***	***67.15***	***n/a***	***0***	***17.42***	***n/a***	***0***	***5.54***
Ulna	X	62.60	n/a	n/a	n/a	n/a	X	4.50
		62.18	n/a	n/a	n/a	n/a		4.14
		61.23	n/a	n/a	n/a	n/a		4.49
		62.64	n/a	n/a	n/a	n/a		4.39
Mean	***X***	***62.12***	***n/a***	***n/a***	***n/a***	***n/a***	***X***	***4.38***
Radius	X	X	n/a	n/a	n/a	n/a	X	X
Femur	0	78.80	n/a	0	19.90	n/a	0	6.80
		80.02	n/a		19.95	n/a		6.40
		80.14	n/a		19.65	n/a		6.66
		80.03	n/a		20.04	n/a		6.88
Mean	***0***	***79.75***	***n/a***	***0***	***19.88***	***n/a***	***0***	***6.68***
Tibia	70.60	71.20	n/a	n/a	n/a	n/a	7.60	6.90
	70.73	71.41	n/a	n/a	n/a	n/a	6.67	7.39
	70.88	71.36	n/a	n/a	n/a	n/a	6.71	6.83
		71.54	n/a	n/a	n/a	n/a		6.86
Mean	***70.74***	***71.38***	***n/a***	***n/a***	***n/a***	***n/a***	***6.99***	***6.99***
Fibula	68.80	68.90	n/a	n/a	n/a	n/a	3.30	3.90
	68.71	68.94	n/a	n/a	n/a	n/a	2.60	2.57
	68.35	68.54	n/a	n/a	n/a	n/a	2.65	2.56
		68.40	n/a	n/a	n/a	n/a		2.76
Mean	***68.62***	***68.70***	***n/a***	***n/a***	***n/a***	***n/a***	***2.85***	***2.95***
Ilium	0	0	n/a	0	0	n/a	n/a	n/a
Ischium	0	0	n/a	0	0	n/a	n/a	n/a
Pubis	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Calcaneous	0	0	n/a	0	0	n/a	n/a	n/a

Table 4: Measurements of individual burial number 400-406 Box 153 from Askut. Fields marked with a 0 indicate the bone was not present, those marked with an X indicates a broken or fractured bone whose measurements were not included. All lengths are in millimeters. Each measurement was taken four times with the average being used for age estimation.

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
LW								
Sphenoid	18.36	0.00	n/a	12.37	0.00	n/a	n/a	n/a
	2.50		n/a	10.40		n/a	n/a	n/a
	11.71		n/a	10.17		n/a	n/a	n/a
	1.52		n/a	9.43		n/a	n/a	n/a
Mean	***8.52***	***0***	***n/a***	***10.59***	***0***	***n/a***	***n/a***	***n/a***
GW								
Sphenoid	28.90	27.70	n/a	20.60	18.00	n/a	n/a	n/a
	28.91	28.94	n/a	21.84	21.72	n/a	n/a	n/a
	29.78	28.95	n/a	21.78	21.61	n/a	n/a	n/a
	28.22	28.98	n/a	21.97	21.68	n/a	n/a	n/a
Mean	***28.68***	***28.54***	***n/a***	***21.41***	***20.46***	***n/a***	***n/a***	***n/a***
Sphenoid								
Body	n/a	n/a	10.30	n/a	n/a	17.10	n/a	n/a
	n/a	n/a	9.12	n/a	n/a	16.70	n/a	n/a
	n/a	n/a	8.77	n/a	n/a	16.49	n/a	n/a
	n/a	n/a	9.78	n/a	n/a	17.17	n/a	n/a
Mean	***n/a***	***n/a***	***9.47***	***n/a***	***n/a***	***16.86***	***n/a***	***n/a***
Petrous &	40.60	37.10	n/a	15.90	16.50	n/a	n/a	n/a
Mastoid	40.00	36.77	n/a	16.50	17.07	n/a	n/a	n/a
	37.09	39.99	n/a	14.39	15.25	n/a	n/a	n/a
	39.77	35.76	n/a	14.48	13.35	n/a	n/a	n/a
Mean	***40.13***	***37.38***	***n/a***	***15.31***	***15.54***	***n/a***	***n/a***	***n/a***
Pars								
Basilaris	n/a	n/a	12.30	n/a	n/a	16.30	n/a	n/a
	n/a	n/a	11.90	n/a	n/a	14.06	n/a	n/a
	n/a	n/a	12.05	n/a	n/a	14.56	n/a	n/a
	n/a	n/a	11.95	n/a	n/a	14.89	n/a	n/a
Mean	***n/a***	***n/a***	***12.05***	***n/a***	***n/a***	***14.95***	***n/a***	***n/a***
Zygomatic	17.60	18.90	n/a	19.10	16.40	n/a	n/a	n/a
	17.44	18.19	n/a	16.00	14.70	n/a	n/a	n/a
	17.08	18.12	n/a	17.53	15.27	n/a	n/a	n/a
			n/a	16.86	15.46	n/a	n/a	n/a
Mean	***17.37***	***18.40***	***n/a***	***17.37***	***15.45***	***n/a***	***n/a***	***n/a***
Maxilla								
Alveolar	0	0	n/a	0	0	n/a	0	0

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
Mandible (1/2)	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Mandible Arc	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Mandible Body	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Clavicle	0	44.10	n/a	n/a	n/a	n/a	0	6.10
		43.14	n/a	n/a	n/a	n/a		3.03
		42.55	n/a	n/a	n/a	n/a		3.14
Mean	***0***	***43.26***	***n/a***	***n/a***	***n/a***	***n/a***	***0***	***3.06***
Scapula	n/a	n/a	n/a	26.1	27.90	n/a	28.10	32.00
	n/a	n/a	n/a	25.42	26.99	n/a	24.95	29.29
	n/a	n/a	n/a	25.67	26.75	n/a	25.12	28.99
	n/a	n/a	n/a	25.26	31.96	n/a	27.71	27.66
Mean	***n/a***	***n/a***	***n/a***	***25.61***	***28.40***	***n/a***	***26.47***	***29.48***
Humerus	65.90	63.20	n/a	16.80	15.90	n/a	6.40	6.30
	65.40	64.95	n/a	14.30	14.32	n/a	4.50	4.77
	65.54	64.83	n/a	14.64	14.41	n/a	4.25	4.32
	65.52	64.84	n/a	14.62	14.38	n/a	4.78	4.45
Mean	***65.59***	***64.45***	***n/a***	***15.10***	***14.75***	***n/a***	***4.98***	***4.96***
Ulna	61.30	61.70	n/a	n/a	n/a	n/a	4.40	4.90
	61.02	60.42	n/a	n/a	n/a	n/a	3.68	3.57
	61.14	61.31	n/a	n/a	n/a	n/a	3.19	4.04
	60.85	60.72	n/a	n/a	n/a	n/a	3.73	3.42
Mean	***61.08***	***61.04***	***n/a***	***n/a***	***n/a***	***n/a***	***3.75***	***3.98***
Radius	55.50	54.60	n/a	n/a	n/a	n/a	4.80	4.90
	54.83	54.72	n/a	n/a	n/a	n/a	3.03	3.12
	54.94	55.02	n/a	n/a	n/a	n/a	2.97	3.09
Mean	***55.09***	***54.78***	***n/a***	***n/a***	***n/a***	***n/a***	***3.60***	***3.70***
Femur	75.20	75.30	n/a	18.70	16.70	n/a	7.50	5.70
	74.99	74.67	n/a	17.20	16.45	n/a	4.92	5.37
	74.78	75.43	n/a	17.02	16.87	n/a	4.98	5.13
	74.80	75.39	n/a	16.94	16.85	n/a	5.10	5.21
Mean	***74.94***	***75.19***	***n/a***	***17.46***	***16.71***	***n/a***	***5.62***	***5.35***
Tibia	64.10	65.00	n/a	n/a	n/a	n/a	5.60	5.80
	63.74	64.54	n/a	n/a	n/a	n/a	5.87	5.68
	63.93	64.69	n/a	n/a	n/a	n/a	5.81	5.99
	63.83	64.61	n/a	n/a	n/a	n/a	5.65	5.44

	Length			Width			Diameter/Height	
	Left	Right	Midline	Left	Right	Midline	Left	Right
Mean	***63.90***	***64.66***	***n/a***	***n/a***	***n/a***	***n/a***	***5.73***	***5.72***
Fibula	61.80	62.40	n/a	n/a	n/a	n/a	3.50	3.30
	61.98	61.92	n/a	n/a	n/a	n/a	4.70	2.75
	62.22	61.90	n/a	n/a	n/a	n/a	2.48	2.98
Mean	***62.00***	***62.07***	***n/a***	***n/a***	***n/a***	***n/a***	***3.56***	***3.01***
Ilium	27.70	29.60	n/a	27.60	28.40	n/a	n/a	n/a
	27.49	28.36	n/a	28.12	28.36	n/a	n/a	n/a
	29.39	28.94	n/a	28.80	26.78	n/a	n/a	n/a
	28.83	27.58	n/a	29.04	27.35	n/a	n/a	n/a
Mean	***28.35***	***28.62***	***n/a***	***28.40***	***27.72***	***n/a***	***n/a***	***n/a***
Ischium	X	X	n/a	X	X	n/a	n/a	n/a
Pubis	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Calcaneous	0	0	n/a	0	0	n/a	n/a	n/a

Table 5: Measurements for burial number 2186 from Askut. Fields marked with a 0 indicate the bone was not present, those marked with an X indicates a broken or fractured bone whose measurements were not included. All lengths are in millimeters. Each measurement was taken four times with the average being used for age estimation.

	Length			Width			Diameter/Height	
	Left	Right	Midline	Left	Right	Midline	Left	Right
LW Sphenoid	12.10	13.50	n/a	10.70	11.10	n/a	n/a	n/a
	12.07	13.46	n/a	11.15	11.52	n/a	n/a	n/a
	12.07	13.97	n/a	10.28	11.92	n/a	n/a	n/a
	12.04	13.13	n/a	9.92	10.53	n/a	n/a	n/a
Mean	***12.07***	***13.26***	***n/a***	***10.51***	***11.26***	***n/a***	***n/a***	***n/a***
GW Sphenoid	29.30	29.20	n/a	20.30	19.80	n/a	n/a	n/a
	28.20	27.10	n/a	20.20	20.00	n/a	n/a	n/a
	29.28	29.38	n/a	20.16	19.99	n/a	n/a	n/a
	28.53	29.43	n/a	20.27	18.82	n/a	n/a	n/a
Mean	***28.82***	***28.77***	***n/a***	***20.23***	***19.65***	***n/a***	***n/a***	***n/a***
Sphenoid Body	n/a	n/a	10.70	n/a	n/a	19.30	n/a	n/a
	n/a	n/a	10.93	n/a	n/a	18.92	n/a	n/a
	n/a	n/a	10.15	n/a	n/a	19.29	n/a	n/a
	n/a	n/a	9.87	n/a	n/a	19.52	n/a	n/a
Mean	***n/a***	***n/a***	***10.41***	***n/a***	***n/a***	***19.40***	***n/a***	***n/a***
Petrous & Mastoid	41.30	40.00	n/a	20.10	17.50	n/a	n/a	n/a
	41.90	39.14	n/a	16.50	15.60	n/a	n/a	n/a

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
	41.74	39.25	n/a	16.96	17.66	n/a	n/a	n/a
	40.46	39.25	n/a	14.69	16.00	n/a	n/a	n/a
Mean	***41.35***	***39.41***	***n/a***	***17.06***	***16.70***	***n/a***	***n/a***	***n/a***
Pars Basilaris	n/a	n/a	11.80	n/a	n/a	16.00	n/a	n/a
	n/a	n/a	11.80	n/a	n/a	16.20	n/a	n/a
	n/a	n/a	12.01	n/a	n/a	15.95	n/a	n/a
	n/a	n/a	11.69	n/a	n/a	16.07	n/a	n/a
Mean	***n/a***	***n/a***	***11.82***	***n/a***	***n/a***	***16.05***	***n/a***	***n/a***
Zygomatic	22.00	19.30	n/a	18.30	21.60	n/a	n/a	n/a
	24.90	24.00	n/a	20.70	18.00	n/a	n/a	n/a
	21.60	24.52	n/a	17.58	17.87	n/a	n/a	n/a
	21.66	24.64	n/a	21.70	19.30	n/a	n/a	n/a
Mean	***22.54***	***23.11***	***n/a***	***19.57***	***19.19***	***n/a***	***n/a***	***n/a***
Maxilla Alveolar	24.30	24.40	n/a	27.00	X	n/a	24.20	X
	24.91	24.30	n/a	20.70		n/a	24.50	
	24.60	25.74	n/a	19.01		n/a	25.31	
	24.98	25.33	n/a	25.43		n/a	25.15	
Mean	***24.74***	***24.94***	***n/a***	***23.03***	***X***	***n/a***	***24.79***	***X***
Mandible (1/2)	47.70	X	n/a	n/a	n/a	n/a	n/a	n/a
	46.05		n/a	n/a	n/a	n/a	n/a	n/a
	46.03		n/a	n/a	n/a	n/a	n/a	n/a
	42.00		n/a	n/a	n/a	n/a	n/a	n/a
Mean	***46.55***	***X***	***n/a***	***n/a***	***n/a***	***n/a***	***n/a***	***n/a***
Mandible Arc	n/a	n/a	n/a	16.40	X	n/a	n/a	n/a
	n/a	n/a	n/a	18.54		n/a	n/a	n/a
	n/a	n/a	n/a	19.01		n/a	n/a	n/a
	n/a	n/a	n/a	17.66		n/a	n/a	n/a
Mean	***n/a***	***n/a***	***n/a***	***17.90***	***X***	***n/a***	***n/a***	***n/a***
Mandible Body	37.40	X	n/a	n/a	n/a	n/a	n/a	n/a
	38.30		n/a	n/a	n/a	n/a	n/a	n/a
	34.54		n/a	n/a	n/a	n/a	n/a	n/a
	37.38		n/a	n/a	n/a	n/a	n/a	n/a
	36.90	X	n/a	n/a	n/a	n/a	n/a	n/a
Clavicle	43.60	0	n/a	n/a	n/a	n/a	2.80	0
	41.72		n/a	n/a	n/a	n/a	2.33	
	40.99		n/a	n/a	n/a	n/a	3.10	

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
	43.43		n/a	n/a	n/a	n/a	3.18	
Mean	***42.43***	***0***	***n/a***	***n/a***	***n/a***	***n/a***	***2.85***	***0***
Scapula	n/a	n/a	n/a	27.30	29.90	n/a	30.70	33.00
	n/a	n/a	n/a	27.77	25.64	n/a	28.61	29.21
	n/a	n/a	n/a	27.20	26.55	n/a	29.73	29.26
	n/a	n/a	n/a	26.88	26.65	n/a	33.20	27.99
Mean	***n/a***	***n/a***	***n/a***	***27.28***	***27.18***	***n/a***	***30.56***	***29.86***
Humerus	64.70	0	n/a	16.60	0	n/a	4.80	0
	63.20		n/a	16.59		n/a	5.76	
	64.26		n/a	16.37		n/a	5.12	
	64.21		n/a	16.57		n/a	5.47	
Mean	***64.09***	***0***	***n/a***	***16.53***	***0***	***n/a***	***5.28***	***0***
Ulna	X	61.60	n/a	n/a	n/a	n/a	4.90	5.00
		61.70	n/a	n/a	n/a	n/a	5.36	4.73
		61.58	n/a	n/a	n/a	n/a	5.11	4.75
		61.25	n/a	n/a	n/a	n/a	4.68	4.67
Mean	***X***	***62.12***	***n/a***	***n/a***	***n/a***	***n/a***	***5.01***	***4.78***
Radius	0	0	n/a	n/a	n/a	n/a	0	0
Femur	77.90	77.50	n/a	19.50	28.20	n/a	5.90	5.70
	77.38	77.04	n/a	19.59	18.28	n/a	6.22	6.05
	77.23	76.97	n/a	19.36	18.91	n/a	6.05	5.96
	77.07	77.60	n/a	19.13	18.50	n/a	6.18	6.50
Mean	***77.39***	***77.27***	***n/a***	***19.35***	***20.97***	***n/a***	***6.09***	***6.05***
Tibia	66.40	68.50	n/a	n/a	n/a	n/a	5.70	5.70
	66.79	67.17	n/a	n/a	n/a	n/a	6.64	6.05
	66.98	68.34	n/a	n/a	n/a	n/a	6.99	6.38
	66.60	68.13	n/a	n/a	n/a	n/a	6.82	7.38
Mean	***66.69***	***68.04***	***n/a***	***n/a***	***n/a***	***n/a***	***6.53***	***6.38***
Fibula	64.70	62.40	n/a	n/a	n/a	n/a	3.30	2.60
	64.31	62.14	n/a	n/a	n/a	n/a	4.03	3.40
	62.72	64.38	n/a	n/a	n/a	n/a	2.64	3.32
	64.01	62.85	n/a	n/a	n/a	n/a	2.52	3.29
Mean	***63.93***	***62.94***	***n/a***	***n/a***	***n/a***	***n/a***	***3.12***	***3.15***
Ilium	30.90	0	n/a	30.10	0	n/a	n/a	n/a
	30.79		n/a	29.89		n/a	n/a	n/a
	30.80		n/a	30.20		n/a	n/a	n/a
	28.48		n/a	31.39		n/a	n/a	n/a
Mean	***30.05***	***0***	***n/a***	***30.46***	***0***	***n/a***	***n/a***	***n/a***

	Length			Width			Diameter/Height	
	Left	Right	Midline	Left	Right	Midline	Left	Right
Ischium	19.90	19.30	n/a	12.40	12.80	n/a	n/a	n/a
	19.15	19.34	n/a	10.35	9.94	n/a	n/a	n/a
Mean	***19.48***	***19.32***	***n/a***	***11.38***	***11.37***	***n/a***	***n/a***	***n/a***
Pubis	17.20	0	n/a	n/a	n/a	n/a	n/a	n/a
	16.98		n/a	n/a	n/a	n/a	n/a	n/a
	16.95		n/a	n/a	n/a	n/a	n/a	n/a
Mean	***17.04***	***0***	***n/a***	***n/a***	***n/a***	***n/a***	***n/a***	***n/a***
Calcaneous	0	0	n/a	0	0	n/a	n/a	n/a

Table 6: Measurements for burial number 765 from Askut. Fields marked with a 0 indicate the bone was not present, those marked with an X indicates a broken or fractured bone whose measurements were not included. All lengths are in millimeters. Each measurement was taken four times with the average being used for age estimation.

	Length			Width			Diameter/Height	
	Left	Right	Midline	Left	Right	Midline	Left	Right
LW Sphenoid	8.10	8.10	n/a	12.25	10.30	n/a	n/a	n/a
	8.40	9.20	n/a	11.08	8.25	n/a	n/a	n/a
	9.84	6.89	n/a	11.77	10.25	n/a	n/a	n/a
	9.84	8.16	n/a	12.39	8.97	n/a	n/a	n/a
Mean	***9.04***	***8.08***	***n/a***	***11.87***	***9.44***	***n/a***	***n/a***	***n/a***
GW Sphenoid	X	0	n/a	X	0	n/a	n/a	n/a
Sphenoid Body	n/a	n/a	10.40	n/a	n/a	X	n/a	n/a
	n/a	n/a	9.26	n/a	n/a		n/a	n/a
	n/a	n/a	10.51	n/a	n/a		n/a	n/a
	n/a	n/a	9.35	n/a	n/a		n/a	n/a
Mean	***n/a***	***n/a***	***9.88***	***n/a***	***n/a***	***X***	***n/a***	***n/a***
Petrous &	36.40	37.70	n/a	18.20	16.22	n/a	n/a	n/a
Mastoid	37.26	37.56	n/a	16.71	15.51	n/a	n/a	n/a
	37.51	35.96	n/a	14.43	12.87	n/a	n/a	n/a
	37.48	35.40	n/a	13.75		n/a	n/a	n/a
Mean	***37.16***	***36.74***	***n/a***	***15.77***	***14.86***	***n/a***	***n/a***	***n/a***
Pars Basilaris	n/a	n/a	0	n/a	n/a	0	n/a	n/a
Zygomatic	17.80	0	n/a	18.30	0	n/a	n/a	n/a
	17.95		n/a	17.81		n/a	n/a	n/a

	Length			**Width**			**Diameter/height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
	18.18		n/a	17.81		n/a	n/a	n/a
	17.88		n/a	16.87		n/a	n/a	n/a
Mean	***17.95***	***0.00***	***n/a***	***17.70***	***0.00***	***n/a***	***n/a***	***n/a***
Maxilla Alveolar	0	0	n/a	0	0	n/a	0	0
Mandible (1/2)	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Mandible Arc	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Mandible Body	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Clavicle	0	0	n/a	n/a	n/a	n/a	0	0
Scapula	n/a	n/a	n/a	0	0	n/a	0	0
Humerus	0	0	n/a	0	0	n/a	0	0
Ulna	0	0	n/a	n/a	n/a	n/a	0	0
Radius	0	0	n/a	n/a	n/a	n/a	0	0
Femur	0	0	n/a	0	0	n/a	0	0
Tibia	0	0	n/a	n/a	n/a	n/a	0	0
Fibula	0	0	n/a	n/a	n/a	n/a	0	0
Ilium	0	0	n/a	0	0	n/a	n/a	n/a
Ischium	0	0	n/a	0	0	n/a	n/a	n/a
Pubis	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Calcaneous	0	0	n/a	0	0	n/a	n/a	n/a

Table 7: Measurements for burial number 2189 from Askut. Fields marked with a 0 indicate the bone was not present, those marked with an X indicates a broken or fractured bone whose measurements were not included. All lengths are in millimeters. Each measurement was taken four times with the average being used for age estimation.

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
LW								
Sphenoid	9.40	9.60	n/a	10.80	10.80	n/a	n/a	n/a
	9.80	9.46	n/a	8.84	8.64	n/a	n/a	n/a
	9.85	9.58	n/a	9.81	11.06	n/a	n/a	n/a
	10.23	10.34	n/a	9.96	8.51	n/a	n/a	n/a
Mean	***9.82***	***9.75***	***n/a***	***9.80***	***9.75***	***n/a***	***n/a***	***n/a***
GW								
Sphenoid	27.10	27.70	n/a	19.50	18.00	n/a	n/a	n/a
	27.08	27.31	n/a	18.71	18.08	n/a	n/a	n/a
	26.81	27.20	n/a	18.74	17.85	n/a	n/a	n/a
	26.76	26.88	n/a	18.93	18.19	n/a	n/a	n/a
Mean	***26.93***	***27.27***	***n/a***	***18.97***	***18.03***	***n/a***	***n/a***	***n/a***
Sphenoid								
Body	n/a	n/a	11.90	n/a	n/a	17.40	n/a	n/a
	n/a	n/a	8.86	n/a	n/a	17.40	n/a	n/a
	n/a	n/a	10.27	n/a	n/a	17.45	n/a	n/a
	n/a	n/a	9.99	n/a	n/a	17.57	n/a	n/a
Mean	***n/a***	***n/a***	***10.25***	***n/a***	***n/a***	***17.45***	***n/a***	***n/a***
Petrous &	37.40	37.70	n/a	17.50	16.40	n/a	n/a	n/a
Mastoid	38.03	35.22	n/a	14.69	16.01	n/a	n/a	n/a
	37.65	36.55	n/a	17.48	19.56	n/a	n/a	n/a
	38.10	35.88	n/a	14.30	14.55	n/a	n/a	n/a
Mean	***37.79***	***36.33***	***n/a***	***15.99***	***16.63***	***n/a***	***n/a***	***n/a***
Pars								
Basilaris	n/a	n/a	13.50	n/a	n/a	14.50	n/a	n/a
	n/a	n/a	11.80	n/a	n/a	15.06	n/a	n/a
	n/a	n/a	11.93	n/a	n/a	15.20	n/a	n/a
	n/a	n/a	11.78	n/a	n/a	15.23	n/a	n/a
Mean	***n/a***	***n/a***	***12.25***	***n/a***	***n/a***	***15.00***	***n/a***	***n/a***
Zygomatic	22.70	23.00	n/a	18.10	17.70	n/a	n/a	n/a
	22.52	22.57	n/a	17.64	17.53	n/a	n/a	n/a
	22.74	23.05	n/a	17.80	17.01	n/a	n/a	n/a
	22.80	23.13	n/a	18.08	17.05	n/a	n/a	n/a

	Length			**Width**			**Diameter/height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
Mean	***22.69***	***22.93***	***n/a***	***17.90***	***17.32***	***n/a***	***n/a***	***n/a***
Maxilla Alveolar	19.00	X	n/a	19.30	X	n/a	23.00	X
	30.06		n/a	26.82		n/a	39.59	
	30.45		n/a	28.06		n/a	24.13	
	30.22		n/a	21.43		n/a	23.79	
Mean	***27.43***	***X***	***n/a***	***23.00***	***X***	***n/a***	***27.63***	***X***
Mandible (1/2)	48.90	46.80	n/a	n/a	n/a	n/a	n/a	n/a
	48.76	45.74	n/a	n/a	n/a	n/a	n/a	n/a
	48.04	46.24	n/a	n/a	n/a	n/a	n/a	n/a
	48.34	46.19	n/a	n/a	n/a	n/a	n/a	n/a
Mean	***48.51***	***46.24***	***n/a***	***n/a***	***n/a***	***n/a***	***n/a***	***n/a***
Mandible Arc	n/a	n/a	n/a	16.50	X	n/a	n/a	n/a
	n/a	n/a	n/a	16.43		n/a	n/a	n/a
	n/a	n/a	n/a	28.06		n/a	n/a	n/a
	n/a	n/a	n/a	15.69		n/a	n/a	n/a
Mean	***n/a***	***n/a***	***n/a***	***19.17***	***X***	***n/a***	***n/a***	***n/a***
Mandible Body	38.90	38.60	n/a	n/a	n/a	n/a	n/a	n/a
	39.59	37.28	n/a	n/a	n/a	n/a	n/a	n/a
	35.20	37.28	n/a	n/a	n/a	n/a	n/a	n/a
	41.18	42.96	n/a	n/a	n/a	n/a	n/a	n/a
	38.72	38.84	n/a	n/a	n/a	n/a	n/a	n/a
Clavicle	42.80	42.40	n/a	n/a	n/a	n/a	3.90	3.00
	38.89	38.70	n/a	n/a	n/a	n/a	3.43	2.35
	42.46	42.43	n/a	n/a	n/a	n/a	3.38	3.48
	41.80	40.76	n/a	n/a	n/a	n/a	2.27	2.18
Mean	***41.49***	***41.07***	***n/a***	***n/a***	***n/a***	***n/a***	***3.24***	***2.75***
Scapula	n/a	n/a	n/a	27.80	28.60	n/a	25.70	26.80
	n/a	n/a	n/a	26.60	28.36	n/a	26.14	26.89
	n/a	n/a	n/a	25.96	28.47	n/a	25.35	27.07
	n/a	n/a	n/a	26.27	25.17	n/a	25.92	30.47
Mean	***n/a***	***n/a***	***n/a***	***26.66***	***27.65***	***n/a***	***25.78***	***27.81***
Humerus	62.00	59.50	n/a	14.30	14.10	n/a	5.10	5.10
	60.96	60.01	n/a	14.49	14.21	n/a	5.03	4.93

	Length			**Width**			**Diameter/height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
	61.15	59.59	n/a	14.16	13.66	n/a	5.04	4.90
	61.82	59.72	n/a	14.57	14.47	n/a	5.20	5.01
Mean	***61.48***	***59.70***	***n/a***	***14.38***	***14.11***	***n/a***	***5.09***	***4.98***
Ulna	0	X	n/a	n/a	n/a	n/a	0	X
Radius	48.77	X	n/a	n/a	n/a	n/a	2.98	X
	48.40		n/a	n/a	n/a	n/a	3.41	
	48.55		n/a	n/a	n/a	n/a	3.91	
Mean	48.57	X	n/a	n/a	n/a	n/a	3.43	X
Femur	72.70	72.26	n/a	16.70	15.79	n/a	6.50	5.90
	72.48	72.50	n/a	16.52	15.57	n/a	5.79	5.94
	72.41	72.48	n/a	16.38	15.68	n/a	5.71	5.77
	72.54		n/a	16.62		n/a	6.73	6.37
Mean	***72.53***	***72.41***	***n/a***	***16.55***	***15.68***	***n/a***	***6.20***	***53.99***
Tibia	63.50	63.90	n/a	n/a	n/a	n/a	5.90	6.20
	62.36	62.68	n/a	n/a	n/a	n/a	6.09	6.07
	63.64	63.01	n/a	n/a	n/a	n/a	6.11	5.81
	63.63	62.70	n/a	n/a	n/a	n/a	6.03	6.14
Mean	***63.28***	***63.00***	***n/a***	***n/a***	***n/a***	***n/a***	***6.03***	***6.05***
Fibula	X	X	n/a	n/a	n/a	n/a	X	X
Ilium	X	X	n/a	X	X	n/a	n/a	n/a
Ischium	0	0	n/a	0	0	n/a	n/a	n/a
Pubis	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Calcaneous	0	0	n/a	0	0	n/a	n/a	n/a

Table 8: Measurements for burial number 400-291 Box 152 from Askut. Fields marked with a 0 indicate the bone was not present, those marked with an X indicates a broken or fractured bone whose measurements were not included. All lengths are in millimeters. Each measurement was taken four times with the average being used for age estimation.

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
LW Sphenoid	0	0	n/a	0	0	n/a	n/a	n/a
GW Sphenoid	0	29.10	n/a	0	19.10	n/a	n/a	n/a
		28.95	n/a		19.66	n/a	n/a	n/a
		29.03	n/a		19.03	n/a	n/a	n/a
		28.73	n/a		19.11	n/a	n/a	n/a
	0	28.95	n/a	0	19.22	n/a	n/a	n/a
Sphenoid Body	n/a	n/a	0	n/a	n/a	0	n/a	n/a
Petrous &	36.60	36.30	n/a	15.20	17.70	n/a	n/a	n/a
Mastoid	36.50	37.13	n/a	19.00	18.00	n/a	n/a	n/a
	35.88	36.18	n/a	17.40	16.00	n/a	n/a	n/a
	36.75	35.72	n/a	14.43	14.69	n/a	n/a	n/a
Mean	***36.43***	***36.33***	***n/a***	***16.50***	***16.60***	***n/a***	***n/a***	***n/a***
Pars Basilaris	n/a	n/a	0	n/a	n/a	0	n/a	n/a
	24.60			19.90				
Zygomatic	24.80	23.40	n/a	19.70	18.60	n/a	n/a	n/a
	24.30			18.60				
	24.45	23.40	n/a	19.94	18.60	n/a	n/a	n/a
	24.43			19.80				
	24.46	22.81	n/a	19.94	18.70	n/a	n/a	n/a
	24.50			20.03				
	24.64	23.80	n/a	18.52	19.08	n/a	n/a	n/a
	24.45			***19.58***				
Mean	***24.58***	***23.35***	***n/a***	***19.20***	***18.75***	***n/a***	***n/a***	***n/a***
Maxilla Alveolar	0	0	n/a	0	0	n/a	0	0
Mandible (1/2)	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Mandible Arc	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Mandible Body	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Clavicle	0	0	n/a	n/a	n/a	n/a	0	0

	Length			**Width**			**Diameter/Height**	
	Left	Right	Midline	Left	Right	Midline	Left	Right
Scapula	n/a	n/a	n/a	0	28.20	n/a	0	28.40
					27.15			28.12
					26.74			28.93
					26.80			30.42
Mean				***0***	***27.22***		***0***	***28.97***
Humerus	0	0	n/a	0	0	n/a	0	0
Ulna	0	0	n/a	n/a	n/a	n/a	0	0
Radius	0	0	n/a	n/a	n/a	n/a	0	0
Femur	0	0	n/a	0	0	n/a	0	0
Tibia	0	0	n/a	n/a	n/a	n/a	0	0
Fibula	0	0	n/a	n/a	n/a	n/a	0	0
Ilium	X	0	n/a	X	0	n/a	n/a	n/a
Ischium	X	X	n/a	X	X	n/a	n/a	n/a
Pubis	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Calcaneous	0	0	n/a	0	0	n/a	n/a	n/a

Table 9: Summary of long bone lengths from, all lengths provided in mm. averages have been taken from ranges and rounded up to the next whole number, and age estimates compared from Fazekas and Kósa (1978) with other methods.

Burial Number	151	400-406 Box 153	2186	765	2189	400-291 Box 152
Measurements Bone						
Femur	80	75	77	n/a	72	n/a
Tibia	71	64	67	n/a	63	n/a
Fibula	69	62	63	n/a	n/a	n/a
Humerus	67	65	64	n/a	61	n/a
Ulna	62	61	62	n/a	n/a	n/a
Radius	n/a	55	n/a	n/a	49	n/a
	Age Estimate					
Source						
Fazekas and Kósa	40 + weeks	40 weeks	40 weeks	n/a	39 weeks	n/a
Facchini and Veschi (2004)	40+ weeks	40 weeks	40 weeks	n/a	40 weeks	n/a
Sherwood et al (2000)	42 weeks	39 weeks	39 weeks	n/a	37 weeks	n/a

Age estimates along with pathological descriptions are presented in Table 10; these are younger than the ages suggested by long by lengths as presented in Table 9. It should be kept in mind that the ages in Table 10 also consider cranial measurements which are not included in estimating age based on long bone length resulting in the slightly younger age estimates than those presented in Table 9. In modern populations prior to 37 weeks the fetus is not developed enough to survive outside the womb without medical assistance (Armigo, 2008). This indicates that there is a chance these individuals could could have been live births based on their age ranges, however a still born birth cannot be entirely ruled out. Individuals 409-219 Box 152 (this box contained two individuals, which though not the norm has been documented at other sites and has been attributed to a relationship between the individuals (Mishina, 2008; Verlinden, 2008)), 765, and 2186 had pathologies present while the other four individuals did not appear to have any

skeletal indicators of pathology. The pathologies noted in the three individuals include vertebral lesions (one of the two individuals in 400-219 Box 152), a deformed sphenoid (765), and cranial infectious bone reaction (2186).

Table 10: Age at death and pathological assessment. Age based on Fazekas and Kósa (1978).

Identification number	Age Estimate	Additional Comments
2186	36-40 weeks	Cranial infectious bone reaction present on frontals
400-219 Box 152	38-40 weeks	Contains minimum of two individuals with one showing signs of vertebral pathology
151	36-40 weeks	
765	36-38 weeks	Deformed sphenoid
2189	36-38 weeks	
765 400-416 Box 153	36-40 weeks	

The presence of a deformed sphenoid in Individual 765 (Figure 20) shows a deviation from normal growth and development which may be indicative of congenital disease (Roberts and Manchester, 2007). Such defects may be caused by genetic or developmental factors. Unfortunately a definitive diagnosis cannot be made due to the fragmentary and missing remains of this individual. The lesser wings of this individual are unusually thick and the greater wings are deformed. However the presence of a deformed sphenoid may suggest the presence of a neural tube defect, such as anencephaly, a condition in which the sphenoid is the most deformed bone (Mathews, S, 2008; Dambaska, M and Wisniewski, KE, 1999). However other signs of anencephaly, such as premature fusion of the lesser wings to the body, are not seen in this individual and some of the fragmentary cranial vault bones that would not develop in this pathology are also present (though not included in Figures 15 and 20 due to their fragmentary nature). Since the sphenoid articulates with other bones of the skull, it is likely this individual's appearance may have been affected by such a malformation. Deformity may have contributed to its being buried in a pot in the isolated location.

Figure 20: Deformed sphenoid from Burial 765 displaying malformation of greater wings.

Cranial infectious bone reaction, as seen in burial 2186 (Figures 21 and 22) may be representative of an inflammation of the meninges (Roberts and Manchester, 2007; Lewis , 2004); however a variety of other causes have been suggested as potential causes including anemia, neoplasia, scurvy, rickets, venous drainage disorders, and tuberculosis (Lewis, 2004). Malgosa et al. (1996) attribute periosteal lesions to infectious aetiology. Such a reaction of bone formation in fetal remains suggests a maternal illness causing inflammation and subsequent bone reaction in the fetus. Since age estimates for this individual average at 38 weeks this infection was likely contracted in utero from maternal transfer.

Figure 21: Frontal bones of Burial 2186 from Askut, this individual displayed cranial infectious bone.

Figure 22: Close up of cranial infectious bone on 2186 frontals.

Malformed vertebral bodies (Figure 23), such as those found in one of the individuals in burial 400-219 Box 152, could be attributed to neural tube defects, aneuploidy conditions, tuberculosis, or dwarfism. Neural tube defects, such as anencephaly which was previously discussed, occur from the neural tube failing to close properly (Pulikkunnel and Thomas, 2005). The most common neural tube defect is spina bifida, which occurs in about 400,000 live births each year in modern populations. However, some manifestations of spina bifida cannot be determined in this individual, such as incomplete fusion of the posterior neural arches of the vertebrae since they fuse in later childhood (Roberts and Manchester, 2007; Scheuer and Black, 2004); but it would be more likely that a neural tube defect in this individual is related to

chromosomal anomalies (Trisomy 13 or 18), which are one of the genetic factors that can cause neural tube defects (Pulikkunnel and Thomas, 2005). Kjær and colleagues (1997) examined trisomy 13 in fetuses via ultrasound; all were free of neural tube defects as far as could be detected. This suggested malformed vertebrae (as in this example from Askut) may be independent from neural tube closure; unfortunately due to the incompleteness of this individual is is hard to be certain. All individuals in their study showed malformation of the lumbar vertebrae, with the thoracic vertebrae only being malformed when associated with more severely deformed lumbar vertebrae. As one of the two individuals from burial 400-219 Box 152 exhibits malformations along the majority of its vertebral column and not limited to one section, it may indicate a more extreme malformation due to trisomy 13, or perhaps a combination of a neural tube defect and an aneuploidy condition.

Though uncommon, congenital tuberculosis may be spread from an infected mother to the fetus with these individuals generally being stillborn (Lewis, 2007). There have been cases of tuberculosis in older children from Egypt from 3200BC (Dabernat and Crubézy, 2009) noting that it was highly prevalent in the area until 500 BC. While this individual did not display pathology comparable to the one from Askut, it showed malformation in atlas and axis, as well as the 12th thoracic and first lumbar vertebrae. In adults 25-50% of skeletal tuberculosis involved the vertebral column (Steinbock, 1976), while in children, though still affected, it is not considered an area of high involvement (Lewis, 2007). With this in mind, it is unlikely this is a case of congenital tuberculosis seen at Askut.

Several forms of dwarfism also effect the development of the vertebral bodies in fetal skeletons, including achondrogenesis, achondroplasia, and dyssegmental dwarfism. Multiple forms of skeletal dysplasia have been documented in ancient Egypt (Kozma, 2008). These three conditions are all rare and have an effect on the development and ossification of the vertebral bodies (Jaffe and Bui, 1999). Achondrogenesis is a lethal condition occurring in 0.23 out of 10,000 births; this condition is associated with a delay in ossification which affects the vertebral bodies as well as other bones. Unfortunately long bones are not present in the affected individual from Askut. Though shorter limbs are usually found in fetuses affected with dwarfism, in rare cases ones with achondrogenesis exhibit average long bone length with a complete absence of vertebral bodies (Kucakok and Kiris, 2002). Achondroplasia is the most common form of dwarfism (Roberts and Manchester, 2007), and in this variety the spinal canal is often narrowed in the anterior posterior and transverse planes, resulting in the vertebral body having a concave posterior border. Dyssegmental dwarfism (lethal anisospondylic campotomicromelic dwarfism, dyssegmental dwarfism) results in severe abnormalities of the vertebrae, such as absent, over sized, or clefted vertebral bodies. These abnormalities are shown in the entire spine and are not limited to one region (Jaffe and Bui, 1999).The individual from Askut shows some signs comparable to the poorly formed vertebrae found in multiple forms of dwarfism but it seems more likely to have resulted from an aneuploidy such as trisomy 13.

Figure 23: Malformed verterbral bodies, photo indicating the lesions in the border of the vertebral bodies.

CHAPTER 5: DISCUSSION

Age and Socioeconomic Implications

As has been demonstrated from the comparison of ages estimated from long bone length based on methods from Fazekas and Kósa (1978) and others (Sherwood et al., 2000; Facchini and Veschi, 2004; van Gerven et al., 1985) all of these individuals fall between the ages of 30 and 40 gestational weeks indicating that they were in fact fetal remains and not infants. The term 'infant' implies an age between birth and one year old (Scheuer and Black, 2000a). Smith (2007) referred to these individuals as children and juveniles, again implying an older age than they actually were. Badawy (1965) refers to these as the burials of babies which suggest they were alive for a time after birth. However, age estimates suggest that these individuals were most likely born early and died at or shortly after birth. Despite any cultural indicators that could suggest different views of fetuses, infants, and other juveniles, it is generally fetal and infant remains that are buried in pots in Egyptian and Nubian sites (Verlinden, 2008; Redfern, 2008,pers. comm.), though there are a few examples of older children being buried in such a manner (Baker, pers. comm., 2008). Based on data collected from Tell el-Dabaa, Sedment, Abydos, and Mirgissa, Verlinden (2008) comments that the use of pots in burial practices suggests that the first year of life was considered to be a transitional phase in how children are viewed in society. This is drawn from the research indicating only fetuses, neonates, and infants up to one year old were buried in pot burials. Of the infants Verlinden analyzed there was roughly an even distribution of those buried in pots and those in buried in coffins. This may suggest a culturally significant transition in burial

style based on the age of the individual. This implies a cultural implication that pot burials were exclusively attributed to fetuses over other age groups. Age relation to pot burials indicates a different view of infants and fetuses in that culture; perhaps due to the higher rates of infant mortality and time invested with the individual. However, this does not necessarily mean this is the only manner in which fetuses were buried.

Bacvarov (2008) notes that the majority of pot burials found in South Eastern Europe are believed to have been still births, though some have been found to contain individuals up to six years old. Similarily, in the Southern Levant pot burials have been documented with age ranges from fetal to ten years old (Orrelle, 2008). However, a Lebanese burial site from the Chalcolithic period (4000-3150 BC) revealed that of 2097 burials, 2059 were pot burials that did not show any age based selection for the use of pot burials since nearly half of those found were adults (Artin, 2008). The higher occurrence is likely attributed to the fact that a smaller body is easier to fit into the vessel, indicating that perhaps pot burials hold practical and symbolic meaning.

Orrelle (2008) examined pot burials in the southern Levant with the aid of ethnographic data from modern populations. Pot burials are used by some modern communities in Northern Sudan for stillborn births and in Zimbabwe for stillborn and aborted fetuses. In both of these communities Orrelle (2008) makes the observation that pot burials symbolize the womb; however these two examples view it in different context. The Sudanese population views the pot as a metaphor for the ideal womb, protective and watertight, which would not have resulted in a stillborn fetus; while in Zimbabwe the pot is not intended to represent idealized protection, but rather a womb

that has not yet given birth. The Zimbabwians place the pot burial in a dry riverbed, resulting in the body being washed out of the pot during rain, symbolizing birth (Orrelle, 2008). Archaeological populations from Bulgaria are also thought to have used pot burials to represent the womb and rebirth, suggesting a relationship between age, the life cycle, and pot burials (Mishina, 2008). This data strengthens Verlinden's (2008) argument that pot burials are viewed as a transitional vessel between fetuses and infants by suggesting that the pot is intended to represent the womb, which would have a closer connection to fetal and young infant remains. Those at Askut are of the right age to suggest that there is a relationship between their stage of life and the pot burials.

The womb metaphor may be indicative of a reason for the pot burials, and motivations for burying the individuals within the pomoerium should also be addressed. There are multiple factors that could have motivated such a location for burials. There is a pattern of burying children separately from their adult counterparts, and this practice is not only limited to Egypt and Nubia (Lewis, 2007; Gratien, 1975; van Rossenberg, 2008). Lewis (2007) notes examples of separate child burials taking place in Russia, Denmark, Wales, Yugoslavia, and others. As previously mentioned, pot burials were an affordable, ready made burial receptacale for infants and fetuses, making them an easy disposal method for such individuals when little was invested in them. Pot burials were also used at the Greek site of Kylinda which is dated at 600-400BC and is currently the world's largest child cemetery (Hillson, 2009).

Wood (1910a) notes at times the use of "beet-shaped jars" measuring three feet high and one foot in diameter that were used for older children, and adults were placed in

such jars by, “the body [having] been previously broken up” (171). Wood (1910a) mentions such jars were used at Gezer, Palestine and other sites dating from 2500-500 BC. However, it should be noted that there is no specific reference made to when or where those burials were excavated. Though individual 765 from Askut consists of only of cranial remains, if Wood’s (1910a, b) observations hold true then this may suggest that this individual could not fit in its pot; however Figures 10 and 11 show other pots containing nearly complete articulated skeletons, assuming individual 756 was buried in a similarly shaped pot, such speculations would not be accurate. It should also be considered that this absence is due to poor preservation, poor excavation technique during recovery of the skeleton, or disturbance prior to Badawy’s excavation. Unfortunately at this time there is no data available confirming that all individuals were buried in the same sized pots. It should also be noted that this burial pattern is not restricted to this time period in Egypt and Nubia as infant pot burials (also referred to as jar burials) have also been mentioned as occurring in Thailand, Palestine, Greece, Italy, Russia, and Germany, see Table 11 (Tayles, 2003; Wood, 1910 a, b; Soren, 2003).

Table 11: Summary of pot burials, their location, and ages.

Location	Time Period	Age of individuals	Additional Comments	Reference
Kulubnarti, Nubia	600-1000AD	6 months	Endocranial lesions attributed to rapid growth, vertebral aplasia	(Redfern, 2008)
Tell el-Dabaa, Egypt	2050-1650 BC	Fetal-1 year	n/a	(Verlinden, 2008)
Elephantine, Nubia	2050-1650 BC	Juvenile, no specific age provided	n/a	(Verlinden, 2008)
Mirgissa, Nubia	2050-1650 BC	Fetal-1 year	n/a	(Verlinden, 2008; Gratien, 1975)
Riqqeh, Egypt	2050-1650 BC	Juvenile, so specific age provided	n/a	(Verlinden, 2008)

Location	Time Period	Age of individuals	Additional Comments	Reference
Abydos, Egypt	2050-1650 BC	Fetal-1 year, some older individuals	n/a	(Verlinden, 2008; Randall-Maciver, 1902)
Lebanon and Israel	6000-5000BC	Infant	n/a	(Orrelle, 2008)
Sudan	Modern population	Fetal	Womb metaphor	(Orrelle, 2008)
Zimbabwe	Modern population	Fetal	Womb metaphor	(Orrelle, 2008)
Olmec culture, Mexico	1200-400 BC	Fetal	Used in ensurance of rainfall, not sacrificial but used in supernatural manner	(Orrelle, 2008)
Kgalta Culture, Botswana	Modern population	Fetal	Miscarried fetuses, believed to hold power in controlling rain	(Orrelle,2008)
Byblos, Lebanon	4000BC	Variable, children and adults	2059 pot burials/2097 total burials, grave goods present	(Artin, 2008)
Çatalhöyük, Turkey	700-5500BC	Neonatal	n/a	(Moses, 2008)
Kenan Tepe, Turkey	4600-2800 BC	1-5 years	Become buried in more secluded locations over time	(Hopwood, 2008)
Southeastern Europe	6000-4600 BC	Fetal-6years	Appear in three waves of populatity	(Bacvarov, 2008)
Noen U-Loke, Thailand	300BC-500AD	Juvenile, no specific age provided	n/a	(Tayles, 2003)
Askut, Nubia	1260-770 BC	Fetal	n/a	(Smith, 2007; Badawy, 1964)
Megiddo, Israel	n/a	Juvenile, no specific age provided	n/a	(Wood, 1910b)
Jericho, Israel	n/a	Juvenile, no specific age provided	n/a	(Wood, 1910b)
Italy	500AD	Juvenile, no specific age provided	Expected result of malaria epedemic	(Soren, 2003)
Tell Yunasite, Bulgaria	1800-1600BC	Infants	3 double burials	(Mishina, 2008)
Kylindra, Greece	600-400BC	On average 40 weeks though some as young as 24 weeks and some older	Over 2000 infant burials present, just under 2% are double burials,	(Hillson, 2009)

Location	Time Period	Age of individuals	Additional Comments	Reference
Barrio Coto and Barrio Monserrate, Puerto Rico	n/a	Juvenile, no specific age provided	Children buried within pots or bowls, those not in pot burials commonly associated with ceramics	(Gillott, 2009)
Virgin Islands	n/a	Juvenile, no specific age provided	Found at multiple locations, one infant found in decorated vessel	(Gillott, 2009)

During the excavation of Askut three other children (no age was indicated) were found in the Southeast Sector of the fortress (Smith, 2007, pers. comm.); their skeletal remains were wrapped in shrouds which were longitudinally sewn together. Unfortunately there is no additional information available at this time for means of comparison with the pot burials presently here. Though neither Badawy nor Smith provides additional information on these skeletons in their reports, it should be noted that the burials parallel some Egyptian burials at Deir el Medina where placentas were recovered buried in cloth and infants were found buried along with household items within amphorae (Lewis, 2007). This could help indicate an Egyptian influence in the burial styles at Askut.

Several researchers (e.g., Smith, 2003; Bianchi, 2004) have discussed views of Egypt's influence in Nubia during the New Kingdom. Bianchi (2004) describes how native aspects of Nubian life are barely present as Egyptian influence becomes more apparent. Smith (2003) supports this claim by examining the material culture present at Askut by examining the increase in Egyptian pottery present since the Middle Kingdom;

this increase is explained by the colonial policy of Egyptian acculturation at Askut and the other fortresses. It is also important to remember that during this time period Askut is in transition from its original construction as a fortress to its later settlement during the New Kingdom following its abandonment.

Speculation Regarding Infanticide and Pathology

There has been speculation of infanticide as the cause of death for fetal and infant skeletons found in the archaeological record (Moses, 2008; Lewis, 2007; Wood, 1910a, b). Moses (2008) notes the use of children's bodies integral to sacred spaces in Neolithic Turkey, which would employ cremation and pot burials as a means of burying subadults. Fetuses, infants, and older children were buried separately from the adults at the Turkish sites, with neonate remains found within a mudbrick wall of a structure believed to be a shrine. However, despite the context of this location Moses (2008) feels it is a "convenient death" as opposed to sacrifice feeling that this sample (which makes up four out of sixty two burials) is too limited to suggest sacrifice. In this Turkish example the suggestion is made of context and trauma as indicative of sacrifice, and not the presence of pot burials as Macalister suggests (Woods, 1910a).

Individuals exhibiting signs of pathology are also less likely to be buried in the same location as healthy individuals. As previously mentioned the three of the seven individuals from Askut showed signs of pathology, in particular the individual with a deformed sphenoid indicates a congenital malformation which according to some may suggest infanticide as, "children with congenital malformations may have been subject to [it], buried away from the main cemetery and/or stigmatized when alive. This will affect

whether they survive in the archaeological record and therefore are available for study" (Roberts and Manchester, 2007:45). Formicola and Buzhilova, (2004) found children with visible congenital deformities received special burial rights based on associated grave goods. However it is uncertain as to whether the malformations in these skeletons would have manifested in soft tissue and therefore be visible on the body, and as these are fetal remains the concern for lifetime stigma is not applicable.

The possibility of stillborn births should not be overlooked especially in the case of the individual with pathology; similarly increased rates of infant mortality within past populations should be considered. For example, the Kellis 2 cemetery of the Dakhleh Oasis, Egypt (Tocheri et al., 2005) determined that the larger proportion of fetal skeletons found in the cemetery should be attributed to the high mortality rate of newborns at that time; and not to practices of infanticide. Congenital defects, like those seen in three of the Askut skeletons, may also be attributable to cause of death in these young individuals. Other authors have addressed and dismissed the notion of infanticide in infant cemeteries (Murail et al., 2004; Wood, 1910a; Wood 1910b). An infant cemetery from the Classic Kerma Period in Nubia was found not to be the result of infanticide or sacrifice as there are no clear signs of trauma, but there are standardized burial patterns and associated grave goods which suggest planned burials (Murail et al., 2004). Activities such as infanticide or sacrifice had been questioned because the cemetery had a high proportion of fetuses and newborns compared to infants. Wood (1910a, 1910b) notes shortcomings in Macalister's (summarized in Wood, 1910a) argument claiming that pot burials in Palestine were the result of infanticide or sacrifice. Wood feels the pot served as a coffin

and not necessarily the place of burial, claiming the pot burials should not be viewed differently than other burials based on only one previous case.

Though not addressing juvenile pot burials, Tayles (2003) questions whether a Thai woman whose head was placed inside a pot is indicative of murder (due to cranial trauma) or mortuary practice. Despite the trauma, the rest of this individual's burial was consistent with other Thai burials during that time and associated grave goods indicated she was in the upper class of social hierarchy. Ultimately, Tayles (2003) determined that the pot may indicate a form of respect and though murder is not out of the question, Tayles argued that a conclusion of murder was speculative. Also the presence of juvenile pot burials nearby indicates using pots as a vessel for burial was not uncommon at that location.

Given such information it seems unlikely that the burials from Askut represent infanticide. Increased rates of infant mortality in past populations should also be considered when examining such remains. Like the Kerma infant burials examined by Murail et al. (2004), the individuals from Askut show no signs of trauma. Also the fact that pot burials have been found in other parts of the world in different time periods indicates that (though not often published in great depth) pot burials were a fairly common practice. It is speculation to assume all juvenile burials are of such a nature. Both the pot burials and cloth wrapped infants at Askut parallel the burial styles at an ibis cemetery found in Abydos (Loat, 1914). Younger birds were found wrapped in bundles with 93 jars each containing an ibis, which was considered sacred to the Egyptians (Wood, 1910a; Loat, 1914; Whittemore, 1914). It should not be assumed that at Askut,

which showed signs of Egyptian influence, residents would bury victims of infanticide in the same manner that they buried animals viewed as an important part of society. However, these ibis cemeteries should not be viewed as the same as those which represent animal cults (Ikram, 2003).

The pot burials of Askut provide further implications for special treatment of juvenile skeletons as well as to sick individuals as three out of the seven showed signs of pathology. The location of child burials, such as those at Askut, may also indicate views on children and the role their death may play in society. Hopwood (2008) expands upon this idea by examining the varying locations of fetal and child pot burials at Kenan Tepe, Turkey ranging from 4600-2800 BC. He noticed that the earlier burials were found inside houses or near community establishments, suggesting that the deceased were more integrated into the thoughts of daily life, particularly when buried within household structures. Throughout time pot burials became buried increasingly farther away from the main community area of Kenan Tepe, resulting in them being more removed from the daily thought process. This observation may indicate why the fetal pot burials were buried in the abandoned portion of Askut's fortress, suggesting dead children or stillborns were not an integral part of daily life. Also addressing pot burials, Mishina (2008) argues that infants and younger individuals were viewed as nonpersons. However the remains in that population were buried within the settlement area, unlike the Turkish ones Hopwood (2008) examined or the ones from Askut. Although the fortress itself was abandoned, the island of Askut was still inhabited, as shown in Figure 3. The burial within the abandoned portion of the island, however, holds implications of social treatment. The idea of the pot

being, as in Egypt, a ready-made, affordable coffin (Ikram, 2003; Randall-Maciver, 1902) also has socioeconomic implications for the fetal pot burials from Askut. Given the ideas of Hopwood (2008) and Mishina (2008) there are indications that the age of the individual played a role in the location of the pot burial. Due to the age of these individuals it is inferred by their location within the abandoned fort that infants and fetuses at Askut were not fully integrated into society; since there were higher rates of infant mortality during this time, younger individuals were like these were not viewed as a fully integrated part of society as adults or even older children. This suggests that fetuses, stillborns, or pathologic individuals were not viewed by this society in the same light as older individuals who played a greater role in the culture. Considering the view of fetuses as possible nonpersons as suggested by Mishina (2008), the use of a ceramic pot would be more beneficial and practical since it is not as costly or labor intensive as other burial methods which would be employed for older individuals more integrated into that culture. Burial within the abandoned fort suggests that within Askut fetal remains or perhaps other young individuals were not considered in the same manner since they were not buried in cemeteries on the mainland or other island sites (as seen at Mirgissa which which a child cemetery). The pathologies on some individuals also hold significance regarding their location, but that should not be considered the primary purpose to isolation pot burials as four out of seven of the individuals showed no signs of pathology. An additional factor to consider is that perhaps these children were not planned, which parallels patterns found in modern populations when a mother would bury an unwanted

newborn in the outskirts of town or place it in the trash (Marcikić et al., 2006; Adinkrah, 2000).

CHAPTER 6: CONCLUSION

Though Askut, and other second cataract sites, had interactions between Egyptian and native Nubian cultures, including Kerma, C-Group, and Pan Grave cultures, pot burials have not been yet been published as being a major burial practice for fetal or other remains from these Nubian cultures. As these pot burials do not follow the major burial patterns of Nubian populations, and considering their use in Egypt it implies that this usage was the result of Egyptian influence at Askut and not indicative of native Nubian burial styles. However, pot burials are not exclusively an Egyptian style of burial as their presence has also been recorded in Thailand, Italy, Lebanon, Israel, Mexico, Botswana, Turkey, Greece, and Bulgaria (Tayles, 2003; Orrelle, 2008; Hopwood, 2008; Artin, 2008: Soren, 2003) suggesting it was perhaps a worldwide phenomenon, as opposed to being limited geographically as indicated by Gillott (2009) (Table 11).

Both the age and location of the pot burials from Askut hold suggestions for social treatment of fetuses. It may have been beneficial to populations in the past to bury fetuses or infants in pots as ceramic vessels were less costly and labor efficient. This suggests that such skeletons would not receive the same burial practices as people who had had been more integrated into society, especially when considering implications of cultural views on fetuses that they were not fully integrated into society or viewed as nonpersons as described by Mishina (2008). Also considering higher infant mortality, the isolated location of these burials also suggests that at Askut fetuses and other young

individuals were not fully integrated into society since they were not buried in a cemetery on the mainland or on one of the other islands.

The seven individuals examined in this research varied between 36 to 40 weeks gestational age, making them fetal remains, and not children or infants as described by Smith (2007) or Badawy (1965). Though there are some broken or fragmentary remains, overall the bones are well preserved; unfortunately due to lack of documentation it is hard to assess whether any absent bones are the result of poor excavation or if there was a previous disturbance to the bones. There are however some limitations in this study due to the lack of information available from the excavation, such as taphonomy. It should also be noted that neither author indicated that burial number 400-219 Box 152 contained two individuals. Perhaps this shows a family connection or other relationship (Verlinden, 2008); but considering the pathologies are only found on one out of the two individuals suggests there is not a close genetic relationship between these two fetuses, such as a multiple birth. It would be beneficial in future studies on the skeletons from Askut to compare the pathologies on these individuals to those found in pot burials from other locations (such as Egypt) to see if there is any additional relationship between illness and pot burials as has been suggested between age and pot burials.

APPENDIX: INVENTORY OF POT BURIALS FROM ASKUT

Burial 151

Bone	Quantity
Sphenoid Lesser Wing	2 (1L, 1R)
Sphenoid Greater Wing	2 (1L, 1R)
Sphenoid Body	1
Petrous and Mastoid	2 (1L, 1R)
Pars Basilaris	1
Lateral Part of Occipital	2 (1L, 1R)
Zygomatic	2 (1L, 1R)
Maxilla	0
Mandible	0
Clavicle	0
Scapula	1 (R)
Humerus	1 (R)
Ulna	2 (1L, 1R)
Radius	2 (1L, 1R)
Femur	1 (R)
Tibia	2 (1L, 1R)
Fibula	2 (1L, 1R)
Ilium	0
Ischium	0
Pubis	0
Calcaneus	0
Ribs	8
Rib Fragments	23
Vertebral Bodies	13
Neural Arches	27 (1/2 arches)
Cranial Fragments	119
Nasals	2 (1L, 1R)
Auditory Ossicles	2 malleus, 1 Incus
Phalanges	32
Metapodials	16
Miscellaneous Fragments	20
Other	Bags of hair included with skeletal material
	1 dens

Burial 400-406 Box 153

Bone	Quantity
Sphenoid Lesser Wing	1 (R)
Sphenoid Greater Wing	2 (1L, 1R)
Sphenoid Body	1
Petrous and Mastoid	2 (1L, 1R)
Pars Basilaris	1
Lateral Part of Occipital	2 (1L, 1R)
Zygomatic	2 (1L, 1R)
Maxilla	0
Mandible	0
Clavicle	1 (R)
Scapula	2 (1L, 1R)
Humerus	2 (1L, 1R)
Ulna	2 (1L, 1R)
Radius	2 (1L, 1R)
Femur	2 (1L, 1R)
Tibia	2 (1L, 1R)
Fibula	2 (1L, 1R)
Ilium	2 (1L, 1R)
Ischium	2 (1L, 1R)
Pubis	2 (1L, 1R)
Calcaneus	0
Ribs	10
Rib Fragments	48
Vertebral Bodies	16
Neural Arches	49 (1/2 arches)
Cranial Fragments	119
Nasals	0
Auditory Ossicles	2 malleus (1L, 1R) 2 Incus (1L, 1R)
Phalanges	16
Metapodials	10
Miscellaneous Fragments	150
Other	4 fragments of frontal bones 1 dens

Burial 2186

Bone	Quantity
Sphenoid Lesser Wing	2 (1L, 1R)
Sphenoid Greater Wing	2 (1L, 1R)
Sphenoid Body	1
Petrous and Mastoid	2 (1L, 1 R)
Pars Basilaris	1
Lateral Part of Occipital	2 (1L, 1R)
Zygomatic	2 (1L, 1 R)
Maxilla	2 (1L, 1R)
Mandible	1
Clavicle	1 (L)
Scapula	2 (1L, 1 R)
Humerus	1 (L)
Ulna	2 (1L, 1 R)
Radius	0
Femur	2 (1L, 1 R)
Tibia	2 (1L, 1 R)
Fibula	2 (1L, 1 R)
Ilium	1 (L)
Ischium	2 (1L, 1 R)
Pubis	1 (L)
Calcaneus	0
Ribs	15
Rib Fragments	15
Vertebral Bodies	6
Neural Arches	36 (1/2 arches)
Cranial Fragments	29
Nasals	0
Auditory Ossicles	0
Phalanges	0
Metapodials	3
Miscellaneous Fragments	13
Other	1 tooth loose, not in socket
	1 sternebra

Burial 765

Bone	Quantity
Sphenoid Lesser Wing	2 (1L, 1R)
Sphenoid Greater Wing	1 (L)
Sphenoid Body	1
Petrous and Mastoid	2 (1L, 1R)
Pars Basilaris	0
Lateral Part of Occipital	1 (L)
Zygomatic	1 (L)
Maxilla	0
Mandible	0
Clavicle	0
Scapula	0
Humerus	0
Ulna	0
Radius	0
Femur	0
Tibia	0
Fibula	0
Ilium	0
Ischium	0
Pubis	0
Calcaneus	0
Ribs	0
Rib Fragments	0
Vertebral Bodies	0
Neural Arches	0
Cranial Fragments	113
Nasals	0
Auditory Ossicles	0
Phalanges	0
Metapodials	0
Miscellaneous Fragments	10
Other	2 supraorbital borders of frontals (1L, 1R)

Burial 2189

Bone	Quantity
Sphenoid Lesser Wing	2 (1L, 1R)
Sphenoid Greater Wing	2 (1L, 1R)
Sphenoid Body	1
Petrous and Mastoid	2 (1L, 1R)
Pars Basilaris	1
Lateral Part of Occipital	2 (1L,1R)
Zygomatic	2 (1L, 1R)
Maxilla	2 (1L, 1R)
Mandible	2 (1L, 1R)
Clavicle	2 (1L, 1R)
Scapula	2 (1L, 1R)
Humerus	2 (1L, 1R)
Ulna	1 (R)
Radius	2 (1L, 1R)
Femur	2 (1L, 1R)
Tibia	2 (1L, 1R)
Fibula	2 (1L, 1R)
Ilium	2 (1L, 1R)
Ischium	0
Pubis	0
Calcaneus	0
Ribs	16
Rib Fragments	12
Vertebral Bodies	3
Neural Arches	23 (1/2 arch)
Cranial Fragments	90
Nasals	0
Auditory Ossicles	0
Phalanges	0
Metapodials	0
Miscellaneous Fragments	2
Other	1 dens 1 atlas 2 supraobital borders of frontals(1L, 1 R)

Burial 400-291 Box152

Bone	Quantity
Sphenoid Lesser Wing	0
Sphenoid Greater Wing	1 (R)
Sphenoid Body	0
Petrous and Mastoid	2 (1L, 1R)
Pars Basilaris	0
Lateral Part of Occipital	2 (1L, 1R)
Zygomatic	3 (2L, 1 R)
Maxilla	0
Mandible	0
Clavicle	0
Scapula	1 (R)
Humerus	0
Ulna	0
Radius	0
Femur	0
Tibia	0
Fibula	0
Ilium	1
Ischium	2 (1L, 1R)
Pubis	0
Calcaneus	0
Ribs	4
Rib Fragments	0
Vertebral Bodies	49
Neural Arches	20 (1/2 arch)
Cranial Fragments	48
Nasals	0
Auditory Ossicles	3 malleus (2L, 1 R)
Phalanges	10
Metapodials	2
Miscellaneous Fragments	19
Other	1 dens

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