Report on the 2012 skeletal analysis of the South Tombs Cemetery Project

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Introduction

Examination and analysis of the skeletal material recovered during the 2011 excavation season (November-December) from the Amarna South Tombs Cemetery began on 21 May and ended on 9 June 2012. The bioarchaeology project participants were Professor Jerry Rose from the University of Arkansas, Fayetteville USA; Dr. Gretchen Dabbs from Southern Illinois University, Carbondale USA; and a team of 11 student/researchers: Scott Allan, Alissa Bandy, Heidi Davis, Rebecca Hodgin, DC Martin, Ashley Shidner, Teresa Wilson, Robin Wineinger, and Frances Wise. Additionally, three trainees from the Ministry of Antiquities joined the skeletal analysis team on 26 May and departed on 7 June: Ahmed Mohamed Gabr, Zeinab Said Hashesh, Afaf Wahba Abd El-Salam. Our Inspectors from the Ministry of Antiquities were Mr. Ahmed Fathy and Mr. Josef Qased.

Thirty-one small boxes and 76 crates of skeletal remains were removed from the on-site storage magazine on 21 May. This represents the total of the human skeletal remains recovered during the 2011 excavation season plus crates of skulls from previous seasons that were brought out for data collection on periodontal disease and malocclusion of the teeth. The skeletal analyses took place in the Amarna Expedition House.

The research goals for this season were derived from the results of last year’s analysis of data collected during the previous five years of excavation and skeletal examination. This year we continued to collect data on the age and sex of each individual in order to group individuals into their social categories for demographic analysis. Additionally, information was collected on the diseases observed on the skeletal remains, the impact of labor on the skeletal joints, and calculation of individual and average heights. All team members contributed to the collection of data in the laboratory.

Methods

Beginning with four of the most complete skeletons, each bone was cleaned using soft tooth brushes, dental picks, and brushing with the fingers. Next, each skeleton was arranged on a laboratory table in anatomical position from head to feet. Each team of two members was guided through the analysis process by a senior project member from initial cleaning to writing the report and entering information into a database. Team members estimated the age and sex of each individual. Accurate adult age is very important for interpreting the complex demography of Amarna, providing a compelling reason to go beyond the routinely used system of age determination (e.g., Buikstra and Ubelaker 1994) to employ the complex system of transition analysis that required scoring all of the adult pubic symphyses, auricular surfaces of the pelvis, and cranial sutures (Boldsen et al. 2002). Where preservation made it possible, each skeleton produced 86 measurements of the body and 82 measurements of the skull. The teams reviewed each skeleton for evidence of disease and injury (pathological lesions). From the very first skeletons examined, the teams found the most commonly occurring pathological lesions to be compression fractures of the spine, osteoarthritis, fractures of the limbs, and other types of trauma. Pathological lesions and their normal counterparts were photographed and most of them x-rayed to enable later review of the diagnoses.

Results

A total of 41 skeletons were analyzed: 18 (44%) were younger than 15 years and sex could not be determined; 13 (32%) adult males; 9 (22%) adult females; and one adult who could not sexed. One isolated skull was from a male of 45 years or older and another from an adult of unknown sex were also analyzed. The demographic distribution this year did not continue to show a high juvenile mortality: 0–2.9 years = 27%; 3–6.9 = 10%; 7–14.9 = 7%; 15–24 = 17%; 25–35 = 20%; 36–50 = 20%; and none over 50 years of age. Using only sexed individuals there were slightly more males (59%) than females (41%). The Lower Site produced 61% of the individuals, while the Wadi Mouth site provided 39%.
Figure 1 shows the distribution of skeletons whose age at death could be determined. One sees the highest number in the birth to three year age group which then drops down to the 8 to 15 year age group before rising again. This U-shaped distribution is the one expected from the analysis of ancient skeletons. When the age distribution of the skeletons analyzed during the 2012 season are added to all of the previously excavated skeletons from the South Tombs Cemetery, the graphical representation hardly changes with the exception of lowering the percentage of skeletons in the 4 to 7 year age group, slightly raising the birth to three year age group, and slightly lowering the percentage in the 8 to 15 year age group (Figure 2). The three portions of the cemetery are clearly producing different age distributions (Figure 3). The Upper Site which has produced the largest number of skeletons has a gradual increase from birth to the 16 to 25-year-old age group and then remains relatively stable until 50 years of age. It is here that the failure to see any kind of dip in the percentages between three and 15 years of age encourages the suspicion that something strange is going on. The Lower Site has the next largest number of skeletons and has a much more normal shape. But again deaths between 3 and 15 years of age are relatively common, while the least populated age group is between 15 and 25 years of age. The Lower Site has contributed many more individuals between birth and 3 years of age where the largest mortality is expected. The Wadi Mouth Site, with the fewest number of individuals, adds more normality to the South Tombs Cemetery age distribution. It has proportionally produced the largest number of deaths between birth and 3 years of age. It has what we might consider the normal bottom of the U-shape between 3 years and 15 years of age. On the other hand, it has the highest proportion of individuals in the 16 to 25 year age. Examined this way, we might expect that there are different social and/or biological processes influencing the ages of death for people buried in the three portions of the cemetery. Continued excavation and analysis in the Lower and Wadi Mouth Sites are crucial to bringing their sample sizes closer to the level of the Upper Site.

Healed fractures and metabolic problems continue to be common in the South Tombs Cemetery. Cribrar orbitalia was observed in 27% of the eye orbits of all individuals from the 2011 excavations indicating past metabolic problems and 24% of individuals had signs of infection. Those older than 15 years also showed frequent healed fractures: of the head (5%), vertebrae (26%), arms (12%), hands (4%), ribs (48%), leg (9%) and feet (43%). Three of the adult males (23% of all males) displayed healed piercing wounds to the scapula. This increases the number
of adult males displaying these non-lethal wounds of the scapula to eight individuals. The increasing number of males showing this mutilation raise some interesting questions about the frequency of severe punishment.

As with previous seasons, traumatic injury was identified in all classes of individuals (males, females, subadults). To illustrate, the injuries of three individuals are presented below:

**Individual 232** Male 35-60 years Individual 232 has a healed nasal fracture and a possible blunt force traumatic injury (healed) on the right parietal. There are Schmorl’s nodes on T7–10 and L1–3. The ribs show four antemortem fractures (Right-2 & 8; Left-2 & 5). The left scapula demonstrates actively healing sharp force trauma to the scapular body (Figure 4) and the inferior surface of the scapular spine (Figure 5). The left tibia exhibits a well-healed probable greenstick fracture near the middle of the diaphysis. Both tibiae and fibulae exhibit minor active periostitis on the diaphyses. The right third metatarsal exhibits an actively healing fracture of the diaphysis.

**Individual 204** Female 40–60 years A hole can be seen posterior to the foramen magnum on the occipital that extends posteriorly to the nuchal region. A cavity is exposed posterior to the hole and the surfaces inside are smooth and the bone is not reactive. The channel extends through the tables of the skull and into the cranial cavity. The source and cause of this hole and cavity are unknown. The right TMJ is displaced anteriorly and a new TMJ surface has formed with corresponding lipping on the right mandibular condyle. Antemortem fractures with callus formation were observed on the distal ends of the diaphysis of the right ulna, midshaft of the diaphysis of the left ulna, right ribs 6 and 7, and proximal phalanges 4 and 5 of the right foot.

**Individual 214** Subadult 4.5 years A fracture was observed approximately 82 mm from the left proximal end of the femoral diaphysis. The fracture has fully healed, and was biomechanically stable (Figure 6). There is evidence of healing cribra orbitalia in both eye orbits.

*Figure 2. The age-at-death of skeletons recovered during all excavation seasons, from 2006–11.*
Figure 3. The age-at-death of the skeletons recovered from the three separate excavation areas.

Figure 4. The left scapula of Ind. 232 showing actively healing sharp force trauma to the scapular body.
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Using all of the skeletal data collected up to 2010 provides an average stature of 34 males of 163.5 cm, while the average stature of 49 female is 154.4 cm. The 12 adult males excavated in 2011 with complete long bones available for stature estimation have an average height of 161.5 cm and the 9 adult females had an average height of 151.4 cm. The most recently excavated skeletons are shorter than the previous averages. Amarna adults continue to be the shortest reported for ancient Egypt.

Conclusions

When these results are added to the analysis of all the previous skeletons, they continue to show a high mortality rate between 7 and 20 years of age, frequent healed fractures suggesting accidents, and low adult stature as a witness to poor childhood nutrition and health. In fact, adding this year’s individuals to all previous demographic data shows little change to the overall pattern of high subadult mortality. However, comparison between the three excavated areas shows that they differ in the distributions of ages at death. Increasing the number of skeletons excavated from the Lower Site and the Wadi Mouth Site may show that the pattern of ages of death in the Upper Site are abnormal.

Figure 5. The left scapula of Ind. 232 showing the inferior surface of the scapular spine.
Bibliography


Figure 6. Healed femoral fracture of Ind. 214.