

SUDAN & NUBIA

The Sudan Archaeological Research Society



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Front cover: Village on the Island of Dirbi in the SARS concession above the Fourth Nile Cataract (photo: D. A. Welsby).



The Nubian Cemetery at Hierakonpolis, Egypt. Results of the 2007 Season

The C-Group Cemetery at Locality HK27C

Renée Friedman

In 2001 and 2003 preliminary exploration of Hierakonpolis Locality HK27C revealed a cemetery of the C-Group culture (Friedman 2001; 2004). Located 113km north of Aswan, it is the northernmost physical presence of this Nubian culture attested in Egypt. Excavations within the HK27C cemetery were resumed in 2007 and revealed 37 new tombs,¹

bringing the total number of known tombs to 60. The boundaries of this discrete cemetery, which measures approximately 40m north-south x 25m east-west, were reached on all sides except the southwest, where a small area, probably containing not more than 10 additional graves, remains to be explored. The near total exposure of the cemetery now allows for a better understanding of the development of and practices within this unique locality (Figure 1).

All of the burials throughout the cemetery have been disturbed to some degree, ranging from completely emptied to mild disarray of the contents. Nevertheless, sufficient material remained in, or around, the tombs to provide an overall date for the occupation, beginning in the early 11th Dynasty and continuing possibly into the early 13th Dynasty, with a major period of activity in the early 12th Dynasty. This time-frame is roughly equivalent to the C-Group phases Ib-IIa, a synchronism supported by the types of Nubian pottery found at the site (see Figure 2; Bietak 1968). All but the most plundered tombs provided clear evidence

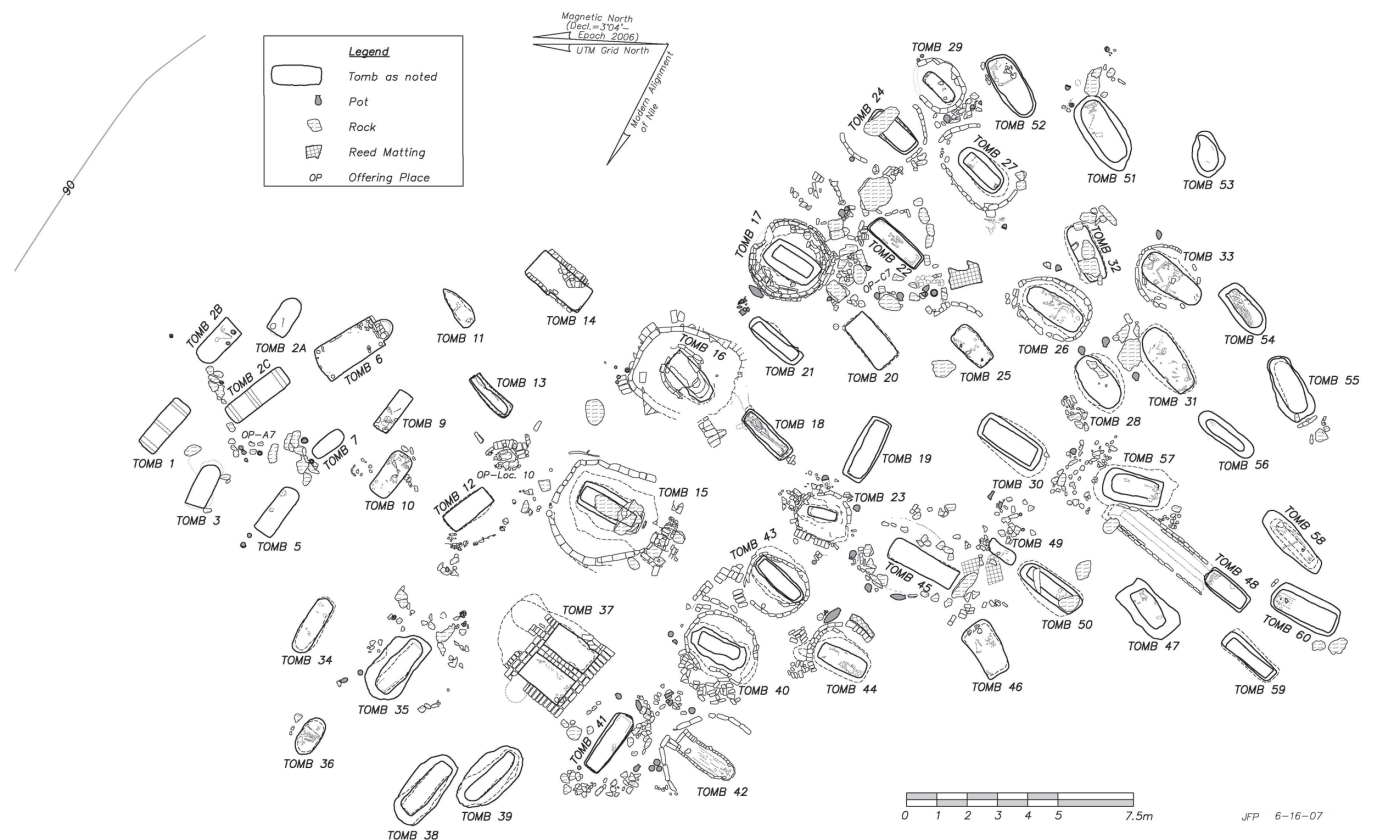


Figure 1. Plan of the C-Group Cemetery HK27C at Hierakonpolis (compiled by J. Paulson) (scale 1:250).

¹ Excavations were undertaken from February 4th to March 22nd, 2007 under the direction of Renée Friedman, with the assistance of Bernadette Dickman, Xavier Droux, Lamia el-Hadidy (conservator), Tom Flanigan, Joseph Majer, Liam McNamara, Joel Paulson (surveyor), Anna Pieri, Jim Rossiter (photographer), Jane Smythe (artist) and Uffe Steffensen. Sean Dougherty, Alain Froment, Margaret Judd and Joel Irish were the physical anthropologists.

for the Nubian cultural affiliation of their owners, preserving (among other aspects) the distinctive architectural feature of a stone or brick-ring superstructure around the burial shaft; the characteristic ritual practice of placing both Egyptian and handmade Nubian pottery externally around the superstructure; and remnants of traditional dress, including typical Nubian jewellery, hairstyles and fine

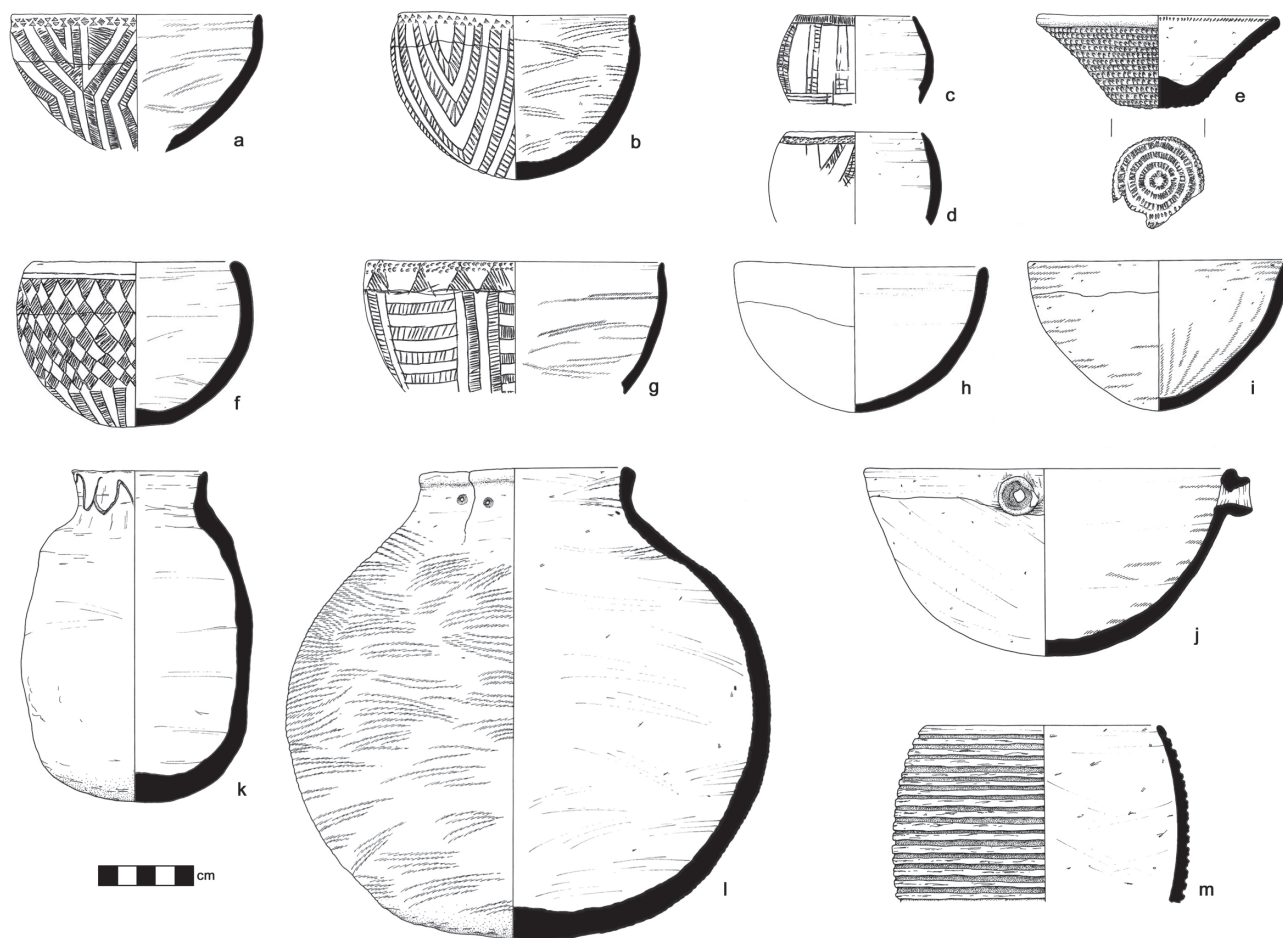


Figure 2. Selected Nubian pottery from the 2007 season. Incised bowls, black topped unless noted: a) Tomb 57, b) Tomb 26, c,d) Tomb 40, black polished, e) Tomb 27/29 impressed decoration, black, f) Tomb 26/27, g) Tomb 50. Black-topped bowls: h) Tomb 51, i) Tomb 20, j) T40, spouted. Coarse ware: k) possibly Tomb 57, wet incised at neck; l) Tomb 27/29 combed exterior, m) possibly Tomb 38, ridged, uncoated. (Drawn by J. Smythe) (scale 1:4).

leather garments (skirts, loincloths and sashes).

The cemetery is situated on a silt ridge in the low desert to the northwest of the sandstone inselberg containing the rock-cut tombs of the elite Egyptian inhabitants of the time.

As a result of the recent excavation, it is now possible to divide the cemetery into northern and southern sectors based on the orientation of the burial shaft. In the south, the elongated oval or rectangular shafts, averaging 1m in depth, are oriented north east-south west reflecting a local east-west orientation in relation to the course of the river (Figure 1). The few cases in which some part of the body remained *in situ*² indicate that the bodies were laid with the head to the north east in accordance with Nubian burial practices documented elsewhere prior to and including phase IIa (Bietak

1968, types Ia2, Ib2, IIa4). In addition to ceramic evidence, a clay stamp seal from Tomb 54 (Colour plate XXVc) indicates a date not later than the early 11th Dynasty for the initial occupation in this sector (cf. Wiese 1996, 54).

Although disturbance has rendered their traces difficult to detect, many of the graves in the southern sector were probably marked by circular tumuli rarely more than 3m in diameter, of locally collected field stones. Better preserved are the mud-brick superstructures, which are prevalent in the south-eastern area.

Offerings of pottery, often in association with ash-stained sediments and heavily burnt sherds, were placed on the exterior of the superstructure, generally adjacent to the head end of the grave. Rectangular (c. 1.2 x 1m), coarse weave reed mats were also found on four occasions laid out on the original ground surface by the offerings.

Rings of mud brick, some preserved to a height of five courses (roughly 500mm), were found around 17 tombs in

² *In situ* human remains attesting to a head northeast orientation were found in Tombs 18 (full body), 46 (arm and hands), 54 (femora), 11, 42, 52, 55, 58 and 59 (feet and/or toes).



Plate 1. Overview of the southern sector of the HK27C cemetery (photo: J. Rossiter).

the southern and central part of the cemetery (Plates 1 and 2).³ Circular to oval in shape, the rings average approximately 2.5m in diameter, rarely much larger than the length of the burial shaft. Brick rings are extremely rare in the archaeological record of the C-Group and the few that have been observed are dated later than those at Hierakonpolis (cf. Bietak 1968, type IIb7). Generally believed to be the result of Egyptian influence, they are only one of many traits the Hierakonpolis Nubians adopted in advance of their brethren in the Nubian heartland south of Aswan.

Egyptian influence is also evident in the three brick-lined

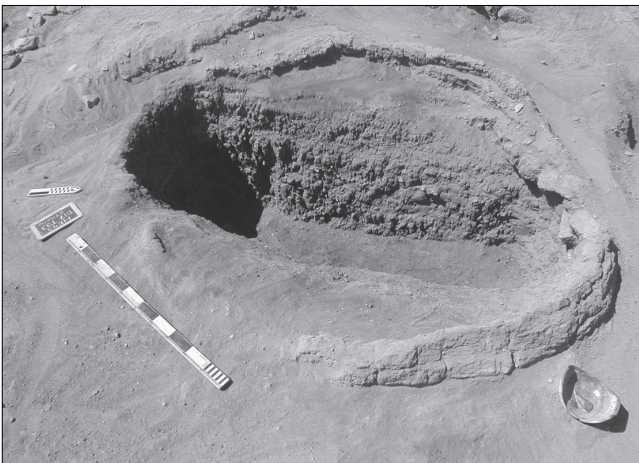


Plate 2. The mud-brick superstructure surrounding Tomb 33.

³ Tombs with brick rings are T15-17, 22-27, 29, 33, 40, 42-44, 46 and 55. Tombs 51, 59 and 60 probably also had brick superstructures, but the evidence is inconclusive. The larger, somewhat irregular, rings, just over 4m in diameter, built around Tombs 15 and 16 (Friedman 2004), preserved to only one brick course, may have served as low enclosures rather than as revetments for tumuli.

and vaulted graves in the cemetery (Tombs 16, 37, 42, but also possibly Tomb 6). In these tombs, long narrow bricks (350 x 160 x 60-80mm) were laid along the long walls of the shaft in a diagonal pattern, allowing a 'leaning' vault to be created without the use of forms or supports. Vaulted brick burial chambers are common amongst contemporary and earlier Egyptian graves (el-Naggar 1999) and this type of brick vaulting was eventually adopted in Nubia, where it enjoyed a long history (Bietak 1968, type IIb6). A brick-built trough, over 4m long, running between Tombs 57 and 48 remains a mystery with regard to both its function and date.

Particularly notable in the cemetery is Tomb 37 (12th Dynasty), which was composed of two adjacent brick-vaulted chambers topped by a low rectangular brick wall, although it is not entirely clear if the upper wall was meant to be seen (Plate 3). In stark contrast to Nubian tradition in general and the usual practice at HK27C, it contained four individuals, potentially a family group of parents and two children, a composition more familiar in Egyptian burial tradition.



Plate 3. Tomb 37: Two mud-brick lined and vaulted chambers entered from the east (photo: J. Rossiter).

Elsewhere, the tombs appear to contain a single inhumation, although plundering has introduced extraneous elements into some. The few examples of multiple interments in Nubian cemeteries usually involved an adult with a child or infant (cf. Junker 1920, 60, 115), but at HK27C, infants (1 year and under) appear to have been placed in or near presumably pre-existing tumuli surrounding the tombs of women. This is suggested by Tomb 49, the shallow grave of a 3-6 month-old infant, wrapped in textile and leather,



which was located beside the tumulus of Tomb 45, which belonged to an older woman. A similar situation can be seen at the foot end of Tomb 27, where a small stick and wattle coffin, infant bones and a Nubian black-topped bowl were discovered. In both cases, proximity to a mat lying on the original surface may be significant. In the Pan Grave cemetery at Hierakonpolis Locality HK47, infants were similarly found within baskets, placed in or beside the tumuli (Friedman 2001).

In the northern sector of the cemetery the orientation of the burial shafts changes. The shafts are now oriented north west-south east, with the head positioned toward the north, reflecting a north-south alignment with reference to the local Nile. This shift is also documented in the cemeteries of Lower Nubia at approximately the same time (beginning in phase IIa and standard practice by phase IIb: Bietak 1968, types IIa5 and IIb8). Coupled with this change in orientation, there appears to be less interest in the creation of tumuli. The evidence for superstructure amongst the graves in the north sector is generally limited to a scattering of stones alongside some of the burial shafts.⁴ At the same time there is an increase in the number of pots placed in the shaft⁵ and a notable decrease in the amount of Nubian pottery placed by the tombs. Instead, these and other vessels appear to be concentrated in central 'offering places', without clear indication as to which grave they were associated.

While rectangular graves, fitted with stout wooden coffins in the Egyptian style, are present in this part of the cemetery (Tombs 1 and 2c), it is notable that they are mixed with smaller, oval graves, mainly of older women, buried in the traditional flexed position, on the right side, wrapped in mats and skins. These three tombs (Tombs 2B, 10 and 36) are the only ones in the entire cemetery where this burial position can be documented from *in situ* remains and may suggest a return to the traditional Nubian burial position as the external manifestations of cultural identity diminished.⁶

Elsewhere, evidence for the position of the body is scarce. Rectangular wooden coffins were adopted fairly early in the history of the cemetery. Averaging about 400mm wide and 1.5 to 1.8m long, they appear to have held the body, laid on its right side in an extended or slightly contracted position. The evidence for this was only clearly preserved in Tomb 18, which contained an almost complete, naturally desiccated body of a male (Irish 2004). Often coated with a

thick white plaster, the walls of the coffins are relatively thin (100mm) and were probably fashioned from local wood.⁷ The more traditional use of matting, some quite elaborate and well-preserved, was also observed in at least nine burials.⁸ Dark stains from the degradation of an organic material were found on the floor of many shafts, but their origin, wood, matting or leather, could not be determined.

Despite the early adoption of wooden coffins, brick masonry and Egyptian pottery, the population maintained their Nubian identity and appearance, at least in death. The level of organic preservation in the cemetery was generally high and leather, textiles, hair and human skin were recovered in large quantities. The leather remains from the cemetery at HK27C now constitute the largest collection of C-Group leather garments currently in existence. In addition to the perforated leather loincloth and hair net found in Tomb 9⁹ (Friedman 2004), the remains of colourful leather skirts worn by women were recovered from several tombs. The leather skirt in Tomb 52, composed of a series of coloured leather panels stitched together, retained the drawstring thong used to tighten the garment at the waist (Colour plate XXVI). Although of later date, the depiction of Nubian women in the Tomb of Huy (Theban Tomb 40) can be used to suggest its original appearance (Davies and Gardiner 1926). Leather loincloths and beaded sashes belonging to men (cf. Fischer 1961) were also recovered in addition to what would appear to be linen undergarments, worn below the leather but against the skin on the lower part of the body of both men and women. Five tombs also contained the remains of sandals, one of which was decorated on the interior sole with an incised pattern of crossing bands (Colour plate XXVII).

Preliminary testing of the leather garments for the use of vegetal tannins was positive. A solution of FeSO₄ left a black stain on most samples due to the reaction of the iron salts presumably with the vegetable tannins (Veldmeijer pers. comm.). Further testing is necessary, but this result may be significant as it is generally believed that vegetal tanning was introduced to Egypt only in the Graeco-Roman period (Van Driel-Murray 2000). The quality and colour of the leather material are unparalleled amongst Egyptian finds of this period. It may well have been for their knowledge and skill in leatherworking that the Nubian population found a continued role in Egyptian society at Hierakonpolis.

⁴ Tombs with an irregular, but seemingly intentional, scatter of stones around them are T7, 10, 12, 35. Tomb 41 is exceptional for the amount of stone surrounding it.

⁵ Tombs with pottery definitely placed within the shaft, even after extensive plundering, are: T2B (Egyptian spouted jar and hemispherical bowl); T5 (Nubian jar and Egyptian bowl flanking the knees); T36 (a marl bowl); T37 (Egyptian marl jar with jar stopper); T58 (Egyptian carinated jar behind the knees); probably T35 (Egyptian marl jar in fill with jar stopper at base of shaft).

⁶ A flexed position is also suggested in Tombs 2A and 9.

⁷ Remains of simple wooden coffins were found at least partly *in situ* in Tombs 18, 22, 35, 41, 42, 58, 59, and 60. These coffins differ from those in Tombs 1 and 2c, which were wider (800mm), apparently made of thicker wood and furnished with three external cross planks (Friedman 2001, 30, fig. 3).

⁸ Matting remains were found in Tombs 2A, 7, 9, 10, 17, 32, 36, 44, 54.

⁹ Impressions on the skin preserved on the skull in Tomb 36 indicate that this older woman also wore a perforated leather head covering, although no traces of this garment were preserved.

In addition to items of clothing, masses of braided locks in Tombs 58 and 41 provide physical evidence for the distinctive coiffure of Nubian men (cf. Tomb of Huy; Fischer 1961). Polished horn arm rings were also recovered from several tombs (T22, 25, 46) along with typical Nubian oyster shell cosmetic holders (T22, 27, 45, 57), shell and wood-bangle bracelets (T15, 46, 48), bone-finger rings (T2A, 46) silver-wire rings (T6, 57), shell pendants (T21, 29), and a variety of faience, ostrich eggshell and stone beads of Nubian or Egyptian manufacture. Bone needles, also known from other C-Group cemeteries, were also found (T50, 54) (cf. Säve-Söderbergh 1989; Williams 1983 for comparanda).

In Tomb 46, jewellery *in situ* on the left arm included a shell-bangle bracelet and string of 52 garnet beads around the wrist, while a bone ring graced the middle finger (Colour plate XXVa-b). In Tomb 36, a string of 594 blue faience beads was found wound six times around the right wrist. Green stains on the finger and wrist bones in Tomb 58 indicate that copper-alloy jewellery was originally present. The relatively negligible number of beads and other items of jewellery found in other contexts, despite fine sieving of all sediments, suggest that jewellery was one of the targets of an initial round of plundering that must have taken place in antiquity.¹⁰

Pottery was the most common item of material culture preserved in the cemetery, although the tomb with which it was associated could not always be determined.

Far outnumbered by the Egyptian collection, the Nubian assemblage was still rich and varied, suggesting the importance that these vessels had in the funerary ritual (Giuliani 2001; 2004). In total, only 10 examples of the distinctive incised bowls, the hallmark of the C-Group culture, were found, although this may to some extent be the result of plunder (Figure 2a-g). Their shape and designs place them in the Nubian Ib-IIa stage¹¹ (Bietak 1968, types Ib4; Ib5; Ib7; IIa8; IIa16; IIa21), which is roughly equivalent to the date provided by the Egyptian pottery assemblage (cf. Marchand 2004; von Pilgrim 1996 for comparanda).¹² Their rarity at this cemetery, compared



to Lower Nubia, suggests that these ornate vessels may have been imported from further south. Black-topped bowls were far more frequent (Figure 2h-j). While excavation in the northern part of the cemetery suggested that each tomb possessed at least one of these bowls, investigations of the southern sector indicate a greater prevalence, at least around certain tombs. Their number (fragments of about 80 individual vessels) and the recovery of handmade coarse-ware, utility jars, with combed or rough exteriors and some ridged bowls, reminiscent of cooking ware (Figure 2k-m), suggest that some pottery making may have taken place locally.

Jars and bowls mainly of Nile silt, but also in a range of marl wares, dominate the wheel-made Egyptian assemblage. Typical Middle Kingdom hemispherical and carinated bowls become more frequent with time (Giuliani 2001; 2004). The large marl storage jars, favoured as offerings around tumuli in other cemeteries of the Nubian cultural homeland (cf. Williams 1983; Junker 1920, 72ff), were also present around the richer tombs at Hierakonpolis (Figure 3). Several retained incised potmarks made after firing. Conical Middle Kingdom bread moulds were also found with some frequency.

Other Egyptian finds include three scarabs (T2A, 27, 41), one rectangular clay-stamp seal (T54) (Colour plate



Figure 3. Egyptian Marl A3 storage jar from Tomb 45. Potmarks dry incised. (Drawn by J. Smythe) (scale 1:4).

¹⁰ When the first incidents of plundering might have occurred is unclear, but one Coptic sherd was found in the fill of Tomb 32. Tobacco papers from deep in the shafts of Tombs 28 and 57 attest to another round of disturbance in the early 20th century. That the cemetery had been disturbed, or was perhaps investigated to some extent by Henri De Morgan in 1907-8, is suggested by the fragment of a coarse Nubian 'milk jar' incised with a cow, which he collected. This sherd, although misidentified as Predynastic, almost certainly belongs to the vessel we recovered in HK27C Tomb 5 in 2001 (Needler 1984, 387-89, pl. 88.5 compare to Giuliani 2001, fig. 4).

¹¹ A fragment of a thick black-polished bowl incised with pendant triangles (Giuliani 2001, fig. 8g), from the north end of the cemetery, may belong to phase IIb.

¹² We are grateful to Irmgard Hein, Anne Seiler and Robert Schiestl for their knowledgeable advice on the Egyptian ceramic assemblage.



XXVc-e) and scattered fragments of stone vessels. In addition, one large bronze fishhook was found.

The effort expended on the construction of the tombs and the wealth still evident in them, even after at least two phases of plundering, indicate that the Nubian population was not financially disadvantaged in comparison to those in their cultural heartland. In fact, the early adoption of wooden coffins and Egyptian pottery, both apparently considered status symbols in Nubia, suggests they were perhaps better off than their countrymen, at least during the early history of the cemetery. While clearly a discrete cemetery, its very visible setting adjacent to the burial grounds of the contemporary Egyptian population strongly suggests that the C-Group population was not considered an underclass despite the disdain voiced in official documents of the 12th Dynasty (Smith 2003).

What brought this seemingly singular community of Nubians to the site some 113km north of Aswan and kept them there over several generations is not clear. Suggestive, is a scene painted in the nearby rock-cut tomb of Ny-anekh-Pepy, the governor of Hierakonpolis in the early 12th Dynasty (Davies 2001), which shows Nubian bowmen, distinguished by their skin colour, hair style with feather and clothing, seated with their dogs (cf. Fischer 1961, figs 3, 4, pls xii-xiii), waiting to assist the tomb owner in a lion hunt in the desert (Figure 4). It is, therefore, tempting to create a scenario in which the Nubians, initially recruited from the south into the private armies of the First Intermediate period governors (Meurer 1996), continued their service to the elite as hunters, herdsman, entertainers or other careers for which a Nubian identity might be useful or lend prestige.

On the other hand, comparison with the site of Kubaniya, the only other C-Group cemetery found north of Aswan (Junker 1920), shows very little difference between the two cemeteries. Kubaniya North, a village with no apparently political significance or resident elite, is located only 12km north of Aswan, yet the cemetery of 100 C-Group graves

shares with HK27C a large number of significant features, amongst them: its proximity to the local Egyptian cemetery; a limited number of Nubian decorated vessels (only 15 examples); a high percentage of Egyptian pottery; and the early use of wood coffins (11 examples) and mud-brick construction (mainly for shaft lining, but also one brick ring). With regard to other elements of the material culture, the two cemeteries are almost identical, and compare favourably with more southerly C-Group assemblages; the lack of shell hair-rings at HK27C is the only item that sets them apart.

With its history of A-Group occupation (Junker 1919), Kubaniya has generally been considered the long-term cultural border between Egypt and Nubia, a border that has appeared more porous in a southerly direction than northward. Yet, the evidence from the HK27C cemetery, coupled with an increasing corpus of A-Group materials at the site (cf. Needler 1984, 224-231; Gatto 2003) and other remnants of C-Group activity (cf. HK64, Friedman *et al.* 1999), suggests that the part of Egypt from Hierakonpolis southward may have long been home to a resident population of Nubians, who were well integrated into the local communities. Recent study of the HK27C skeletal material by Joel Irish (see below) has shown that the inhabitants were biologically dissimilar to Nubians in the southern part of the C-Group territory, suggesting that they were not recruited directly from the south, but may instead represent, both culturally and biologically, a northern facie of the Nubian C-Group culture.

To what extent the political events of the age affected the resident Nubian population at Hierakonpolis remains to be determined. The decrease in overtly Nubian features in the cemetery in its latest phase could be evidence of the gradual assimilation of Egyptian culture in advance of that seen in Lower Nubia itself and/or a response to a less friendly climate occasioned by events in Nubia and southern Egypt (cf. Davies 2003).

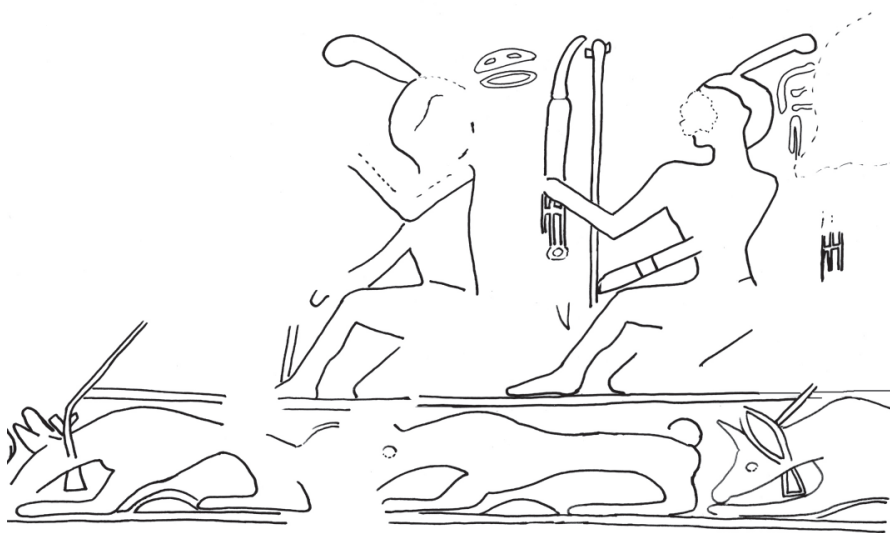


Figure 4. Nubian archers with their dogs from the tomb of Ny-anekh-Pepy at Hierakonpolis.

Overview of the Hierakonpolis C-Group Palaeopathology

Margaret Judd

Introduction

The Hierakonpolis C-Group cemetery at HK27C represents the most northerly location of Nubian human remains in Egypt and dates from the 11th and 12th Dynasties possibly into the early 13th Dynasty (*c.* 2080-1700BC), a particularly volatile period in Nile Valley history. Preliminary studies of the burial structure, grave goods and dental pathology suggested that these individuals were not slaves or prisoners of war, but that they were fairly affluent people who displayed their Nubian ethnicity in death (Friedman 2004; Irish 2004). Recent analyses of dental morphology reveals that this group was closely affiliated with non-C-Group Nubians as well as Middle Kingdom Egyptians at Thebes (Irish, this volume). This blurring of biological affinity and perhaps allegiance provides additional support that the Hierakonpolis C-Group people were part of a long-term population that was well-integrated in this southerly Egyptian territory. This pathological overview provides information about the lifestyle of these individuals and their relationships with others. All the graves had been looted and as a result many of the bones recovered were broken and the skeletons incomplete.

Demography and Health

The demographic distribution of 74 HK27C individuals is presented in Table 1 and is comparable to that of the Second Cataract C-Group excavated by the Scandinavian Joint Expedition (SJE) (Nielsen 1970) and the contemporary Bronze Age Nubians from the Northern Dongola Reach (NDR) (Judd 2001) and Kerma (Buzon 2006) in Upper Nubia. Childhood diseases such as weanling diarrhea, malaria and anemia, as well as accidental deaths due to burning or drowning, may have contributed to the deaths of those under 12 years of age. Once puberty was achieved,

few deaths occurred until individuals reached about 25 years of age. The majority of the population succumbed to death at middle adulthood, while a smaller number attained old age. An expansion of lacy and spiculated bone was observed among the orbital bones of two of the four fragmentary child's skulls; 38% (three out of eight skulls) of females and 11% of males (one out of nine skulls) bore similar lesions. This expansion of bone marrow occurs when the iron content of blood haemoglobin is reduced and bone marrow increases red blood cell production in areas of high trabecular content—the eye orbits (cribra orbitalia) and parietal bones (porotic hyperostosis) (Ortner 2003). Reduced iron content has been attributed to low dietary iron, trauma and excessive bleeding, while malaria and other parasitic infections can induce an anaemic state, though not to the extent observed during the medieval period when agriculture intensified (Judd 2004). Other disease processes can produce similar skeletal reactions, such as the genetic anaemias (thalassemia and sickle cell anaemia), cancers, scurvy and rickets, but in these cases other post-cranial and cranial modifications are involved (Ortner 2003). A similar distribution of cribra orbitalia was observed among the contemporary Second Cataract C-Group (SJE) (Nielsen 1970), the rural NDR Nubians (Judd 2001) and the Nubians at Kerma (Buzon 2006). The higher frequency among females is more likely explained by the cyclical depletion of iron during pregnancy, lactation and menses. This tendency of females to suffer greater systemic stress parallels the finds associated with dental enamel hypoplasia described by Irish (this volume).

Trauma

The very presence of the C-Group in Egyptian territory during this period of increasingly hostile relations with Upper and Lower Nubia begs the question 'why was this Nubian group there?' It had been hypothesized that some members of this group may have been recruited as mercenaries to serve in the Egyptian army. If this were true, a higher prevalence of injuries associated with group and interpersonal aggression, as well as ill health, was to be expected. This was not the case, at least according to the skeletal evidence. Skulls that were more than 50% complete were examined for evidence of sharp and blunt force trauma. One male skull out of eight exhibited a mandibular condylar impaction and one female skull out of seven bore a small circular depression injury less than 10mm in diameter—hardly evidence for lethal battles. Two of three female forearm fractures involved the ulna and adhered to the classic 'parry pattern' defensive injury (Judd 2002). One of these females and one other suffered from radial injuries typical of breaking a fall with an outstretched hand (Loder and Mayhew 1988). The middle-aged male from Tomb 57 bore a healed oblique humeral shaft injury that would require a

Table 1. Demographic distribution in the Hierakonpolis C-Group cemetery (HK27C).

Age Cohort	Subadults		Males		Females		Total	
	N	%	N	%	N	%	N	%
< 1	3	4.1					3	4.1
1 - 5	7	9.5					7	9.5
5 - 12	5	6.8					5	6.8
13 - 17	1	1.4			1	1.4	2	2.7
18 - 25	1	1.4	2	2.7	2	2.7	5	6.8
25 - 35		0.0	4	5.4	6	8.1	10	13.5
35 - 50		0.0	4	5.4	13	17.6	17	23.0
50+		0.0	4	5.4	5	6.8	9	12.2
Unknown	5	6.8	4	5.4	7	9.5	16	21.6
Total	22	29.7	18	24.3	34	46.0	74	100.0



Plate 1. Healed oblique humeral shaft fracture, Tomb 57.

substantial force to break (Plate 1). The angle fractured line indicates an indirect force, perhaps twisting. Various small injuries to the hands and feet affected 17% and 28% of the sample respectively and can be the outcome of numerous events, such as hitting or kicking an object or person, tripping, animal bites and sports, among others (Ip *et al.* 1996; Jonge *et al.* 1994; Perron *et al.* 2002); as a result, these lesions are not diagnostic of an injury mechanism.

More telling violence-related injuries were those of the ribs (Plate 2). Rib injuries can be due to numerous mechanisms, such as compression, coughing, accident or sports (DeMaeseneer *et al.* 2000; Sinha *et al.* 1999). Three of four old adults bore multiple anterior rib injuries, whose healing pattern indicated that the injuries were due to a direct force that struck the individual repeatedly in the chest (Galloway 1999, 107-8). Except for the ribs, the incidence of injuries associated with violence was substantially less than those

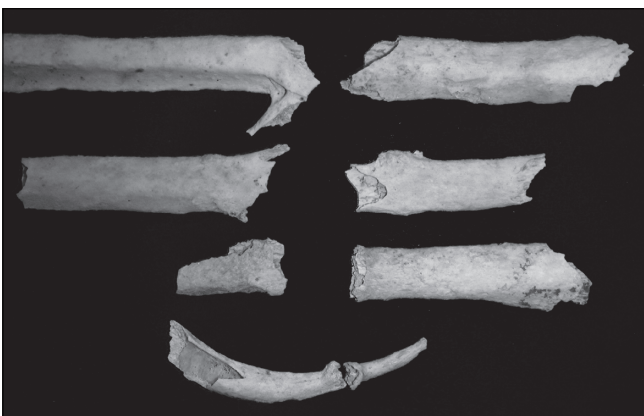


Plate 2. Multiple rib fractures consistent with injuries received from a direct force, Tomb 42.

observed among the contemporary Kerma and NDR individuals (Judd 2004; 2006).

Activity

Though the Nubians were renowned archers and had been employed as mercenaries in the Egyptian army as early as the Old Kingdom (Fischer 1961), there was little skeletal evidence for this activity at Hierakonpolis. The detachment of the acromial tip of the scapula has often been associated with archery, although genetic predisposition may be involved (Hunt and Bullen, *forth.*). There was no evidence for this anomaly here as opposed to the high frequency of os acromiale observed among the NDR people (Judd 2001). When combined with the absence of violence-related trauma there was no suggestion that military recruitment was central to the formation and longevity of this community. The C-Group people at Hierakonpolis were relatively peaceful in contrast to their southern-Nubian neighbours.

Nubian skills of leather making, dancing and wrestling were also admired by the Egyptians. While it is tempting to try to associate assorted skeletal anomalies with occupation, we must be aware that many physical actions performed are generalized and contribute to a vast number of activities (Stirland 1991; 1998). We should also consider that some activities, or their tangible residue, are absent from the archaeological record. For example, masses of leather clothing were preserved at this site and are distinctly Nubian in style and manufacture (Friedman 2004). While it may be that this group manufactured fine leather clothing and accessories, there is at present no evidence from the site, aside from the leather, to support this. Even in documented cases of similar occupations, for example the weavers of Victorian Spitalfields, no correlation was found between skeletal modifications such as osteoarthritis of the hands or other markers of activity with individuals known to be weavers (Waldron 1991).

In addition to physical exertion from repetitive activity, osteoarthritis has been linked with body mass, biological sex, age, nutrition and bone mass, among other physiological processes. It is, therefore, difficult to attribute habitual activity alone to osteoarthritic lesions caused by the cartilage deterioration that exposes underlying bone. These lesions may appear as osteophytic outgrowths around joint margins or on the bone's surface in an attempt to restore stability, microfractures that expand to become bone cysts, grooving or polishing of bone due to friction and finally joint fusion (Rothschild and Martin 1993). When osteoarthritis was observed here there was no difference in severity between the sexes. As was expected, osteoarthritis increased with age for males and females, but this may not be due to a life time of repetitive labour. More recent research found that the plastic nature of bone allows it to become conditioned to repetitive actions begun early in life and the development of osteoarthritis is not associated with individuals who commence work at a very young age (Weiss and Jurmain, *forth.*).

Sports-related injuries and skeletal modifications may prove to be the most fruitful source of information with which to interpret some of the anomalies observed among this group. Standard methods of aging include the degeneration of the pubic symphysis and auricular surface that form the articulation points of the pelvis. Both features showed more extensive destructive and formative bone activity than expected even among older individuals, and in the case of Tomb 32, both pubic faces were completely eburnated (Plate 3). Muscle pulls along the iliac crests and ischia of eight of 13 female innominates and two of three male innominates indicated excessive use of the muscles that move the lower body. These actions typically involve violent muscle contractions during the course of sudden

high level of violence would be observed due to the Nubian presence in Egyptian territory, but this was not found. The general health of the group paralleled that of other contemporary groups and no doubt the people practiced a similar subsistence and enjoyed the same diet as their Egyptian counterparts. Nubians were known for their stunning leather work, skill as archers and athletic abilities, but skeletal evidence for the latter was only hinted at in this preliminary analysis. Caution must be used when trying to link occupation or activity with skeletal anomalies, but at Hierakonpolis, some males and females were exceptionally active in labour, sport or entertainment.

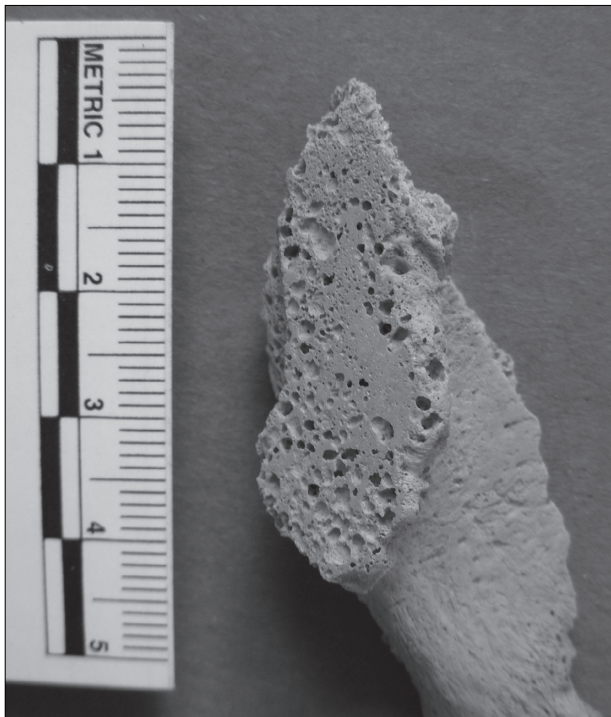


Plate 3. Right eburnated pubic symphyseal face caused by excessive friction between joint surfaces of both pubic symphyses, Tomb 32.

movements involving kicking, twisting, running or jumping that occur in athletics such as soccer, football, dancing or gymnastics (Rodriguez *et al.* 2001; Rossi and Dragoni 2001). These lesions affected all age groups and the more severe pubic damage would have rendered the individual unstable and produced severe groin pain during bodily functions. While clinicians now intervene to correct these common injuries, ancient people would have suffered excruciating pain with every movement.

Conclusion

This synopsis of the C-Group lifestyle at Hierakonpolis presents a peaceful and active group. It was expected that a



Overview of the Hierakonpolis C-Group Dental Remains

Joel D. Irish

Introduction

In a cursory dental study (Irish 2004), 10 dentitions from the HK27C cemetery were examined initially to assess:

- 1) biological affinity - relative to known C-Group remains from Lower Nubia and a contemporary Egyptian sample from nearby Thebes
- 2) diet - utilizing attrition patterns and caries presence
- 3) health - based on the occurrence of enamel hypoplasia, among other disorders

In brief, a qualitative comparison of 10 nonmetric traits showed that the Hierakonpolis sample had fewer frequencies in common with the Nubian C-Group than with the Egyptians - perhaps and unexpectedly, suggesting a closer affinity to the latter. Characteristic wear and many caries revealed that the diet contained a large amount of grit and was high in carbohydrates. Lastly, an absence of hypoplasia and other oral pathologies indicated that the individuals were in a good state of dental and, perhaps, overall hard tissue health. However, the findings were tempered by the caveat that the sample was extremely small and, as such, may not be representative of the greater Hierakonpolis (HK) C-Group populace.

During the 2007 field season at HK27C, additional skeletons were recovered to yield an adequate dental sample size (n=52 individuals with extant permanent teeth) for more formal quantitative (i.e., statistical) biological distance analyses. The larger sample also allows better representation with which to characterize the population's diet and health. A synopsis of these new findings is presented herein. A complete report on all aspects of the HK27C dental remains is currently in preparation.

Biological Affinity

Materials

To better assess the biological place of the HK C-Group relative to other time-successive regional populations, 36 dental nonmetric traits were recorded in it (Table 1) and compared to those in 26 samples from Upper and Lower Egypt and Nubia.¹ The 13 comparative Egyptian samples

range in age from the predynastic through Roman periods. From oldest to most recent they include: Badarian (abbreviated as BAD in Figure 1), Naqada (NAQ), a predynastic sample from Hierakonpolis (HRK), Abydos (ABY), Tarkhan (TAR), Saqqara (SAQ), Thebes (THE), Lisht (LIS), Qurneh (QUR), Giza (GIZ), el-Hesa (HES), Greek Egyptian (GEG), Kharga (KHA) and Hawara (HAW). With dates extending from Late Neolithic through the Christian era, the 13 Nubian samples include: R12 (R12), Gebel Ramlah (GRM), A-Group (AGR), Kawa (KAW), Kerma (KER), C-Group (CGR), Pharonic (PHA), Soleb (SOL), Kushite (KUS), Meroitic (MER), X-Group (XGR), and Christian (CHR). These samples are described in detail elsewhere (Irish 1998a,b,c; 2005; 2006; forth.).

Table 1. Dental trait percentages (%) and number of individuals scored (n) for the HK 27C sample.

Winging UI1 (+=ASU 1)	% n	0.0 28
Labial Curvature UI1 (+=ASU 2-4)	% n	41.2 17
Palatine Torus (+=ASU 2-3)	% n	0.0 22
Shoveling UI1 (+=ASU 2-6)	% n	33.3 15
Double Shoveling UI1 (+=ASU 2-6)	% n	0.0 17
Interruption Groove UI2 (+=ASU +)	% n	0.0 8
Tuberculum Dentale UI2 (+=ASU 2-6)	% n	25.0 8
Bushman Canine UC (+=ASU 1-3)	% n	0.0 9
Distal Accessory Ridge UC (+=ASU 2-5)	% n	14.3 7
Hypocone UM2 (+=ASU 3-5)	% n	88.9 18
Cusp 5 UM1 (+=ASU 2-5)	% n	37.5 8

¹ (cont.) Museum of Natural History); V. Davies, D. Welsby, J. Filer, and M. Judd (British Museum); and R. Foley, M. Lahr and M. Bellatti (University of Cambridge). Most of this research was supported by NSF grants BNS-9013942 and BNS-0104731, the ASU Research Development Program, and the American Museum of Natural History. From Hierakonpolis, collection of comparative data there was funded by Raymond and Beverly Sackler, the Friends of Nekhen, and an NSF grant (BCS-0119754) to J. Rose. From the Combined Prehistoric Expedition I thank R. Schild, M. Kobusiewicz, and J. Kabaciński; work at Gebel Ramlah was funded by the Bioanthropology Foundation, and Institute of Archaeology and Ethnology, Polish Academy of Sciences.

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Carabelli's Trait UM1	%	70.0
(+=ASU 2-7)	n	10
Parastyle UM3	%	0.0
(+=ASU 1-5)	n	14
Enamel Extension UM1	%	9.1
(+=ASU 1-3)	n	11
Root Number UP1	%	84.2
(+=ASU 2+)	n	19
Root Number UM2	%	54.5
(+=ASU 3+)	n	11
Peg-Reduced UI2	%	3.7
(+=ASU P or R)	n	27
Odontome P1-P2	%	4.5
(+=ASU +)	n	22
Congenital Absence UM3	%	3.7
(+=ASU -)	n	27
Midline Diastema UI1	%	4.2
(+>0.5 mm)	n	24
Lingual Cusp LP2	%	78.6
(+=ASU 2-9)	n	14
Anterior Fovea LM1	%	50.0
(+=ASU 2-4)	n	10
Mandibular Torus	%	0.0
(+=ASU 2-3)	n	28
Groove Pattern LM2	%	42.9
(+=ASU Y)	n	21
Rocker Jaw	%	13.3
(+=ASU 1-2)	n	30
Cusp Number LM1	%	0.0
(+=ASU 6+)	n	16
Cusp Number LM2	%	50.0
(+=ASU 5+)	n	16
Deflecting Wrinkle LM1	%	35.7
(+=ASU 2-3)	n	14
C1-C2 Crest LM1	%	0.0
(+=ASU +)	n	14
Protostylid LM1	%	43.8
(+=ASU 1-6)	n	16
Cusp 7 LM1	%	4.2
(+=ASU 2-4)	n	24
Tome's Root LP1	%	12.5
(+=ASU 3-5)	n	32
Root Number LC	%	3.1
(+=ASU 2+)	n	32
Root Number LM1	%	0.0
(+=ASU 3+)	n	24
Root Number LM2	%	96.2
(+=ASU 2+)	n	26
Torsomolar Angle LM3	%	7.4
(+=ASU +)	n	27

Methods

With the exception of midline diastema (see Table 1), all of the nonmetric traits are included in the Arizona State University Dental Anthropology System (ASUDAS), which is used to assess morphological variation in permanent teeth (Turner *et al.* 1991). These traits were selected because they are easy to record, resist wear, have a high genetic component in expression, and evolve slowly (Scott 1973; Turner *et al.* 1991; Scott and Turner 1997); the latter two features, in particular, make the traits ideal for biodistance analyses (Larsen 1997). Because there is little trait sexual dimorphism (Scott 1973; Smith and Shegev 1988; Turner *et al.* 1991; Hanihara 1992; Irish 1993), it is standard procedure to pool the sexes.

To compare the traits among samples, the mean measure of divergence (MMD) statistic, using the Freeman and Tukey angular transformation (Berry and Berry 1967; Sjøvold 1973; Green and Suchey 1976) for small sample sizes, and low (< .05) or high (> .95) trait frequencies (Sjøvold 1977) was employed. The result is a quantitative estimate of inter-sample biological divergence based on the phenetic similarity of all traits. It is assumed that phenetic similarity approximates genetic variation (Scott *et al.* 1983). However, rather than provide a cumbersome 27 x 27 matrix of the inter-sample MMD distances, SPSS 12.0 Procedure Alscal was used to illustrate the various relationships via multidimensional scaling (MDS). MDS provides a spatial representation of 1 to *n* dimensions consisting of a geometric configuration of points (the dental samples) (Kruskal and Wish 1978).

Results

A two-dimensional, interval-level MDS of the HK C-Group and 26 comparative samples pairwise MMDs is provided in Figure 1. As can be seen, Egyptians occupy the left half of the figure and Nubians the right; this patterning indicates a measurable difference between, and (diachronic) similarity within, these two broad regional groupings. The HK C-Group is clearly associated with other Nubians although, interestingly, not with the C-Group (CGR) sample from Nubia itself. Indeed, as previously alluded to (Irish 2004), the HK C-Group is actually closer to a contemporary Middle Kingdom sample from nearby Thebes (THE). However, because it can now be seen that the HK C-Group is dentally Nubian, its affinity to THE may not so much be an indication of Egyptian genetic influence, but that the CGR sample is distinct from all others - including Nubians in Nubia. This distinctiveness and possible reasons for it have since been examined in detail (see Irish 2005).

Indicators of Diet in the HK C-Group Sample

The diet of the HK27C people was previously posited (Irish 2004) to have contained a substantial amount of grit and carbohydrates. The former observation was based on

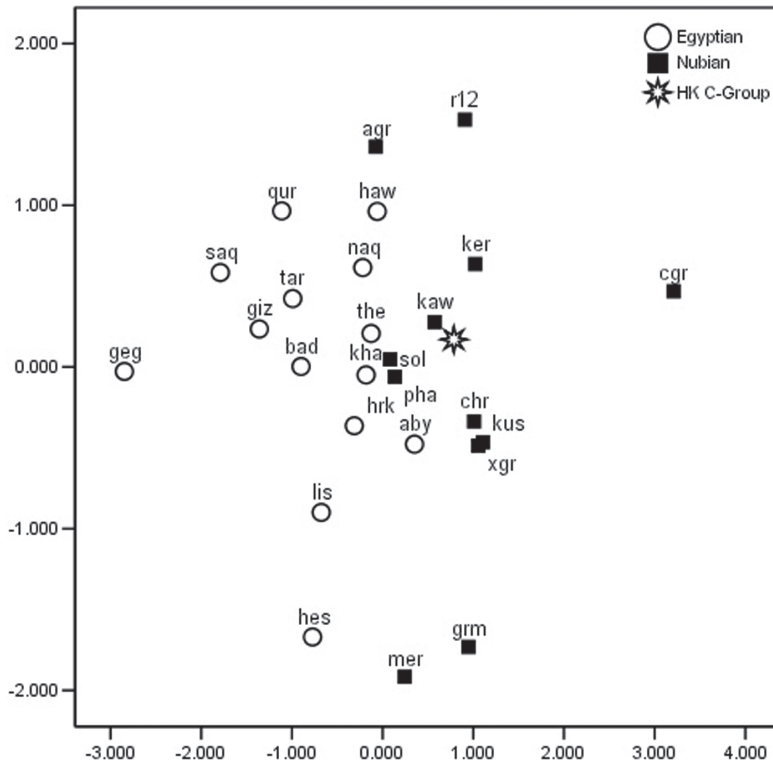


Figure 1. Two-dimensional MDS of MMD distances between the HK C-Group and 26 Nubian and Egyptian comparative samples. The three-letter sample abbreviations are defined in the text.

extensive attrition in teeth of the adults. Moreover, some teeth exhibit occlusal cupping, a characteristic that occurs when grit (e.g. desert sand, perhaps grinding stone grit) is introduced into the food (Hinton 1981). The high-carbohydrate determination was based on the presence of caries in many of these same teeth (Irish 2004).

Attrition

Analysis of the newly enlarged sample supports these impressions. The attrition score on the ASUDAS scale (Turner *et al.* 1991), a modified version of Broca's method ranging from 0 - no wear, to 4 - crown worn away, averages 2.41 in 40 adults with 441 surviving teeth. There may be some evidence of sex-based variation; the mean score in 173 teeth from 14 males is 2.48, whereas the score in 26 females with 268 teeth is 2.36. However, the males, on average, tended to live longer. All teeth, including the late-erupting third molars, were included in these evaluations.

Caries

Of the 441 teeth in the 40 adults, 53 (12%) were carious. Nineteen of these individuals (47.5%) had at least one carious lesion. Both rates are extremely high, which confirms that their diet would have contained a significant amount of carbohydrates. To illustrate, the HK C-Group (HCG) is compared with nine regional samples in Figure 2. Nubian comparative data were previously recorded in individuals

from: Late Neolithic R12 (Judd *forth.*), Final Neolithic Gebel Ramlah (GRM) (Irish 2007), *Kerma Ancien* and *Moyen* (KER) (Judd 2001), and the aforementioned C-Group (CGR) (Irish 2004). They range from a low of 0% (GRM) to 17% (KER). Egyptian individual data are from a pooled predynastic sample (PDY) (Ibrahim 1987), predynastic Hierakonpolis (HRK) and Naqada (NAQ) (Greene 2006), a pooled dynastic sample (DYN) (Ibrahim 1987) and previously-mentioned dynastic Thebes (THE) (Irish 2004). Though notably higher than the Nubians, Egyptian caries rates of 13-36% are still much lower than that in the HK C-Group individuals.

Interestingly, the two samples that are closest to the HK C-Group in caries incidence are also geographically proximate, i.e., predynastic Hierakonpolis and Middle Kingdom Thebes. Perhaps there were some cariogenic foods particularly favoured within this region through time; possible candidates may include, for example, dates (Nelson *et al.* 1999), local high-starch and -calorie beer, and other high-carbohydrate foods like tubers or honey (Morcos and Morcos 1977). On the other hand, the caries frequency in the C-Group sample from Nubia (CGR) is markedly lower than the HK C-Group. Details on all comparative samples can be found in the preceding references and Irish 2005 and 2006.

Contra the attrition scores, HK C-Group females had more caries than did males. Fifteen of 26 females (57.7%) were affected, including 44 of their 268 (16.4%) teeth. This latter figure is, however, inflated by one old female (Tomb 36) with caries in 14 of her 24 extant teeth. Four of 14 males (28.6%), involving nine of the 173 teeth (5.2%), had caries. In all cases, possible caries-related ante-mortem tooth loss, which would likely increase these figures markedly (Lukacs 1995), was not taken into account at this time. Nonetheless, this high-female/low-male dichotomy is consistent with previous findings world-wide (e.g. Lukacs and Largaespada 2006).

Calculus

An additional diet indicator, not mentioned in the initial study (Irish 2004), is calculus (i.e. calcified plaque composed of precipitated salivary mucoids, oral bacteria, and decomposed carbohydrates) on dental crowns. Using the system of Dobney and Brothwell (1987), calculus presence was observed in amounts ranging from slight to moderate in 13 of 28 adults (46.4%). The sexes were equally affected: six of 13 males (46.2%) and seven of 15 females (46.7%) exhibited calculus. Although the deposits are not heavy, the percent of affected individuals is high - in some cases over twice that of regional comparative samples (e.g. Kerma; see Judd 2001). These rates not only substantiate a high-carbohydrate diet, but indicate that at least some food being consumed was soft and sticky in consistency.

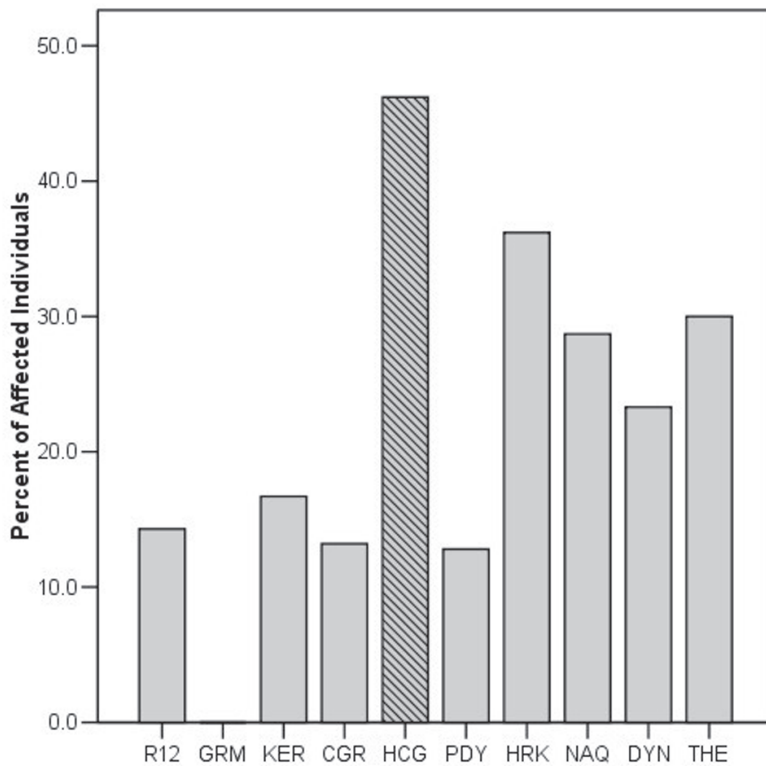


Figure 2. Bar graph of caries presence in HK C-Group individuals (HCG) and nine Nubian and Egyptian comparative samples. The three-letter sample abbreviations are defined in the text.

Indicators of Health in the HK C-Group Sample

Enamel Hypoplasia

Lastly, the initial study revealed no signs of enamel hypoplasia (EH) in the permanent teeth - a thinning of enamel due to disruption of its deposition during formation of the crown (Goodman *et al.* 1980). Such a disruption may result from systemic stress (i.e. starvation, illness, weaning, etc.) that affects an individual during childhood (Goodman *et al.* 1980; Rose *et al.* 1985). In the present sample 32 individuals, including four children, retained permanent teeth that could be inspected for EH; that is, their crowns were completely formed, but not overtly affected by EH-concealing attrition. Four individuals (12.5%) have an EH defect in at least one tooth. In all cases, the defect was determined to be acute (i.e. short term) in duration and slight (i.e. depth) in expression. In individuals where the sex could be determined, zero of 11 males and three of 17 females (17.6%) are affected. Thus, based on this small sample, females appeared to have experienced greater childhood stress than did males. The overall rate, however, is comparatively low, sustaining the original impression (Irish 2004) of good childhood health. Regionally, LEH varies from a slightly lower occurrence at Kerma (Judd 2001), to a high of 93% in Meroitic Nubians from Semna South (Ensor and Irish 1995).

Other Considerations

In addition to EH, other common disorders were recorded that can provide an indication of health, including: periodontal disease, periapical abscessing and temporomandibular joint disease, among others. Although the first two are often associated with calculus, caries and/or attrition, they are presented here because:

- 1) they are not necessarily indicators of diet in and of themselves
- 2) they are pathological (i.e., related to oral health)

First, 25 of 32 adults (78.1%) with at least a partial mandible or maxilla fragment exhibit alveolar resorption, either generalized or local, due to periodontal disease. The latter involves irritation of the gingiva, which becomes inflamed, pulls away from the tooth, and leads to a low-grade infection that can cause resorption (Pindborg 1970; Hillson 1996). Eight of 11 males (72.3%) and 17 of 21 females (81%) demonstrate bone resorption which is characterised by a flat 'shelf-like' appearance and absence of cloacae. The range of expression varies from slight to marked, using the ASUDAS scale (Turner *et al.* 1991).

Second, another form of alveolar bone resorption can result from pulp perforation and infection of individual teeth (due to caries, attrition, fracture, etc.).

It manifests as localized, sometimes sharp- or rough-edged resorption with cloacae for drainage of necrotic tissue - to result in a periapical abscess (Hillson 1996); because healed abscesses can mimic periodontal pockets, only those active at the times of death were recorded. Overall, 10 of 34 adults (29.4%) have at least one identifiable abscess. By sex, four of 11 males (36.4%) have one or two, and five of 22 females (22.7%) have one or more abscesses; the jaws of the old female mentioned above (Tomb 36) exhibit 10 abscesses.

Third, three of 19 adults (15.8%) show temporomandibular joint (TMJ) disease (a.k.a. osteoarthritis of the TMJ). This includes one of seven individuals (14.3%) identified as male, and two of 12 females (16.7%). In the male and two of the females, involvement was scored as 1 (slight) on the ASUDAS scale, which ranges from 0 (no damage) to 3 (severe) (Turner *et al.* 1991). In the third female (again Tomb 36) the right condyle shows severe involvement to the point that it was almost completely resorbed, and its glenoid fossa is roughly twice its normal size and heavily pitted; the left condyle is absent post-mortem.

Lastly, there are, of course, additional oral disorders; for example, cementum deposition is present on the roots of some individuals; however, this phenomenon is largely age related, not pathological. There is one obvious case of hypercementosis (on all roots of the female in Tomb 36), but there are no signs of cementum hypoplasia, amelogenesis



imperfecta, enamel opacities, or any other types of dental pathology in the remaining dentitions. There are a few interesting anomalies and evidence of habitual/occupational dental changes, but this and other information will be detailed in the final report mentioned above.

Acknowledgments

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*Colour plate XXV. Hierakonpolis.
Jewellery and small finds: a,b) jewellery
from Tomb 46 in situ and repaired; c)
clay stamp seal from Tomb 54; d)
scarab from Tomb 27; e) scarab
from Tomb 41.*

*Colour plate
XXVI.
Hierakonpolis.
Leather garment
from Tomb 52.*



*Colour plate XXVII.
Hierakonpolis.
Decorated sandal from
Tomb 27 (photo: J.
Rossiter).*

Hillat el-Arab. The Joint Sudanese-Italian Expedition in the Napatan Region, Sudan

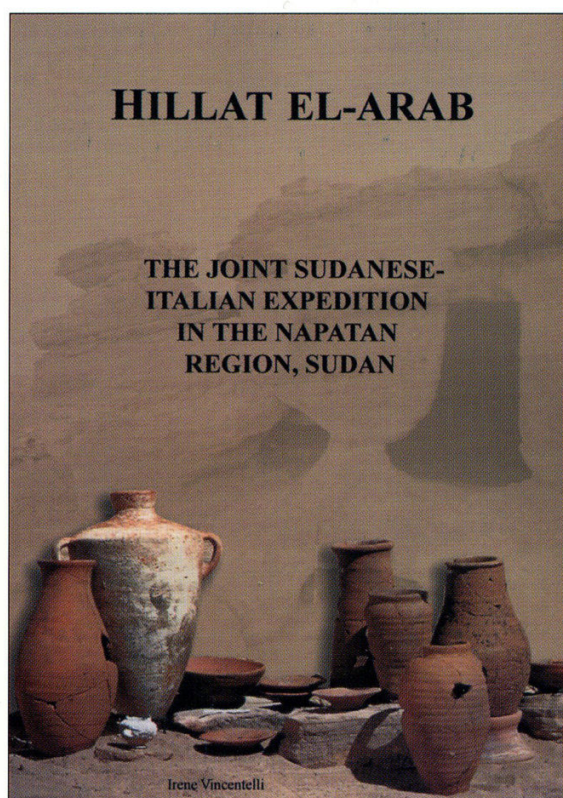
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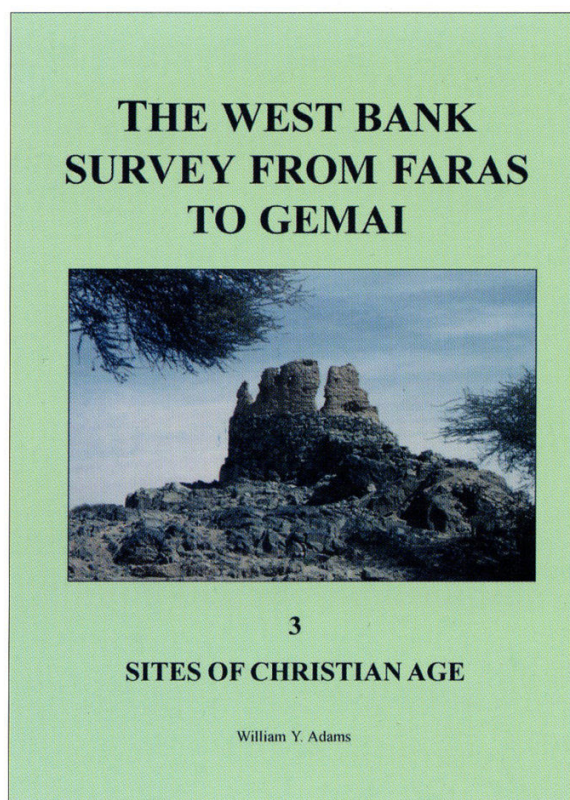
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Hinkel's pontoon raft at Semna (photo: W. Y. Adams).



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