2008

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Source: *The Journal of Egyptian Archaeology*, Vol. 94 (2008), pp. 165-181

Published by: [Egypt Exploration Society](#)

Stable URL: <http://www.jstor.org/stable/40345866>

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A BIOARCHAEOLOGICAL PERSPECTIVE ON EGYPTIAN COLONIALISM IN NUBIA DURING THE NEW KINGDOM*

By MICHELE R. BUZON

During the New Kingdom, Egypt began a military campaign to regain command over Nubia. Extremely successful, their control extended to the fourth cataract by the time of Thutmose III. The circumstances of this power, however, are not well known. It is unclear whether Egyptian colonists or locals administered Nubia during this time. Using a bioarchaeological approach via the study of human skeletal remains and archaeological data from the New Kingdom site of Tombos in Nubia and comparative Egyptian and Nubian skeletal samples, this paper addresses these long-standing questions. Analyses suggest that the Tombos individuals were an ethnically and biologically mixed group. The examination of health indicators suggests that the people of Tombos endured a relatively high degree of physiological stress, despite possible resources obtained through trade networks. Additionally, the Egyptianisation of Nubians at Tombos may have provided a peaceful environment in which few traumatic injuries were seen.

THE precise nature and extent of the presence of Egyptian populations in Lower and Upper Nubia during the New Kingdom and the role of indigenous Nubian populations remains a lively area of discussion and research,¹ yet is hampered by the lack of archaeological evidence and skeletal remains. The University of California Santa Barbara Dongola Reach Expedition (led by Stuart Tyson Smith) has begun to address these questions of Egyptian and Nubian colonial activities and involvement through survey and excavation at the site of Tombos (located at the third cataract of the Nile).² Tombos is one of only three clearly defined Egyptian sites in Upper Nubia (in addition to Kawa and Gebel Barkal). No Egyptian colonial sites were found during the 1997 survey on the west bank of the Nile that began at the third cataract (at Hannek) and ended 140 km to the south. In addition, no significant evidence from this survey or others has been found to suggest a substantial Egyptianised imperial culture or colonial occupation south of the third cataract.³ This paper addresses the issues concerning the New Kingdom colonial agents using a bioarchaeological approach.

* This paper is based on work published in M. R. Buzon, 'Biological and Ethnic Identity in New Kingdom Nubia: A Case Study from Tombos', *Current Anthropology* 47/4 (2006), 683–95. I am grateful to the editors of *Current Anthropology* and *JEA* for the opportunity to present this work directly to an Egyptological audience. This research was supported, in part, by the NSF grant no. 0313247.

¹ Contrast the general accounts of D. B. O'Connor, *Ancient Nubia: Egypt's Rival in Africa* (Philadelphia, 1993), 134, who suggests that towns were developed with largely Egyptian populations in Lower and Upper Nubia, and S. T. Smith, *Wretched Kush: Ethnic Identities and Boundaries in Egypt's Nubian Empire* (London, 2003), 87, who contends that it is not clear whether Egyptians occupied these towns.

² Convenient summary in Smith, *Wretched Kush*, Chapter 6. I draw heavily on this work for presenting the Tombos material in this paper.

³ Smith, *Wretched Kush*, 136–7; D. N. Edwards, *The Nubian Past: An Archaeology of the Sudan* (London, 2004), 94.

Bioarchaeology combines the information produced in archaeological and historical research with biological data (human skeletal remains excavated from archaeological sites) in order to gain further insight into human history.⁴ The analysis of this material can provide important data on age and sex, health, activity patterns, as well as cultural and biological identities.

The bioarchaeological approach is particularly appropriate in investigating questions surrounding the New Kingdom Egyptian occupation of Nubia, and the site of Tombos is particularly well suited for investigating Nubian and Egyptian interactions. Owing to its location (fig. 1), Tombos was an important strategic point of control for the Egyptians and Nubians. At Tombos, culturally diagnostic burial associations are suggestive of a population that is ethnically Egyptian. However, the Egyptianisation during this time makes a determination of identity based solely on artefacts difficult. As the status of Nubian natives for most of the New Kingdom remains unknown, the excavation of the Tombos cemetery of bureaucrats and their community provides a unique opportunity to test theories concerning the origins and history of the colonial agents of Egypt's empire.

Biological identity in the Nile Valley

Biological identity

A person's biological and cultural identities are both inextricably linked to the past and can only be understood within their historical context. Biological identity is a result of a long history of interactions that occur between that person's ancestors and earlier natural and sociocultural environments. Tracing these biological relationships can offer insight into the important archaeological and biohistorical questions.⁵

The biological identities of peoples from the past can be investigated through skeletal studies. Generally, biological affinities are assessed through the analysis of cranial and dental measurements. Although factors such as climate, diet, and nutrition can have important influences, groups with similar cranial shape tend to be related more closely to each other than groups that show more divergence.⁶

Biological relationships in the Nile Valley

Although Egyptian depictions of themselves and foreigners reveal perceived physical differences, with Egyptians tending to be represented as having red-brown skin and black hair, and Nubians with black skin, broad flat noses, and short hair in ringlets,⁷ the numerous investigations into the biological affinities of various past and present populations in the Nile Valley reveal that demonstrating differences between Egyptian and Nubian populations is far from straightforward. Often called the Corridor to Africa, it seems evident that the Nile Valley would have been a passageway for human migration from sub-Saharan Africa to the Mediterranean, going back to the beginnings

⁴ M. R. Buzon, J. T. Eng, P. M. Lambert, and P. L. Walker, 'Bioarchaeological Methods', in H. D. G. Maschner and C. Chippindale (eds), *Handbook of Archaeological Methods* (Walnut Creek, 2005), 871.

⁵ C. S. Larsen, *Bioarchaeology: Interpreting Behavior from the Human Skeleton* (Cambridge Studies in Biological and Evolutionary Anthropology 21; Cambridge, 1997), 302–5.

⁶ J. Buikstra and D. Ubelaker, *Standards for Data Collection from Human Skeletal Remains* (Arkansas Archaeological Research Series 44; Fayetteville, 1994), 69.

⁷ See conveniently Smith, *Wretched Kush*, 21–4.

FIG. 1. Location of skeletal collection sites (dark circle). SJE = Scandinavian Joint Expedition sites area.

of the spread of humans. Anatomically modern humans should have passed through the Nile Valley on their way 'out of Africa'. The Nile is a constant source of water and it seems a likely path to have followed.⁸ However, some archaeological evidence suggests that there was a significant frontier zone between northern and southern areas of Lower Nubia. The Nile Valley pathway has been considered by some researchers as more of a cul-de-sac than a corridor based on archaeological interpretations.⁹

Some researchers support the idea of gene flow through the Nile Valley through the analysis of DNA from living populations. For example, Lalueza Fox¹⁰ suggests

⁸ C. Lalueza Fox, 'MtDNA Analysis in Ancient Nubians Supports the Existence of Gene Flow between Sub-Saharan and North Africa in the Nile Valley', *Annals of Human Biology* 24/3 (1997), 217.

⁹ J. Alexander, 'The Saharan Divide in the Nile Valley: The Evidence from Qasr Ibrim', *African Archaeology Review* 6 (1988), 89.

¹⁰ Lalueza Fox, *Annals of Human Biology* 24/3, 223.

the existence of south–north gene flow during or before the Meroitic period based on mtDNA, synthesizing evidence from archaeology, history, linguistics, and genetic data. Keita¹¹ demonstrates the results of continuous bidirectional migrations in the region, and Lucotte and Mercier¹² associate genetic data with north to south migration during and before the New Kingdom period and south to north migration with the Twenty-fifth Dynasty. Krings and co-workers¹³ assert that there have not been any significant local barriers to migration (as suggested by Alexander),¹⁴ and that migration of populations with northern mtDNA types to the south is older than migration of populations with southern mtDNA types to the north in the Nile Valley. In contrast, other researchers report a high degree of biological isolation for both Nubian and Egyptian population, based primarily on craniometric studies.¹⁵

It is also important to note that the number of foreigners entering Nubia and Egypt during these various events would not have been equal and that Egyptian and Nubian populations were vastly different in size during the New Kingdom; Egypt is estimated to have had approximately 3.5 million people,¹⁶ while Nubia likely had no more than a tenth of that figure. It is probable that the larger numbers of Egyptians entering the less populous Nubia would have had a more significant biological effect than the reverse.¹⁷

Hypotheses regarding the biological and cultural effects of Egyptian–Nubian interaction at Tombos

Biological relationships

Individuals buried using Egyptian rituals in Nubia can represent two groups: biological Nubians from the local population who have been culturally Egyptianised, or recent immigrants from Egypt (and their offspring). The bioarchaeological analysis of skeletal remains offers a way in which to investigate whether the people buried at Tombos were biologically Egyptian or Nubian. In order to assess the association between Egyptian and Nubian groups, biological relationships, as measured by differences in cranial dimensions, were evaluated. In addition to the Tombos sample, two different groups of native Nubian populations (C-Group and Kerma), two series of skeletons from Nubian sites similar to Tombos with architecture and artefacts that appear Egyptian (Shellal and the Scandinavian Joint Expedition Pharaonic sample from the area of the second cataract), and two groups from Egypt (Qurna and

¹¹ S. O. Y. Keita, 'History in the Interpretation of the Pattern of the p49a,f *TaqI* RFLP Y-Chromosome Variation in Egypt: A Consideration of Multiple Lines of Evidence', *American Journal of Human Biology* 17 (2005), 563–6.

¹² G. Lucotte and G. Mercier, 'Brief Communication: Y-Chromosome Haplotypes in Egypt', *American Journal of Physical Anthropology* 121 (2003), 65.

¹³ M. Krings, A. el-H. Salem, K. Bauer, H. Geisert, A. K. Malek, L. Chaix, C., D. Welsby, A. Di Rienzo, G. Utermann, A. Sajantila, S. Pääbo, and M. Stoneking, 'MtDNA Analysis of Nile River Valley Populations: A Genetic Corridor or a Barrier to Migration?', *American Journal of Human Genetics* 64 (1999), 1172–3.

¹⁴ Alexander, *African Archaeology Review* 6, 89.

¹⁵ For example, C. Loring Brace, D. P. Tracer, L. A. Yaroch, J. Robb, K. Brandt, and A. R. Nelson, 'Clines and Clusters versus "Race": A Test in Ancient Egypt and the Case of a Death on the Nile', *Yearbook of Physical Anthropology* 36 (1993), 22; D. S. Carlson and D. P. Van Gerven, 'Diffusion, Biological Determinism and Biocultural Adaptation in the Nubian Corridor', *American Anthropologist* 81 (1979), 573.

¹⁶ K. W. Butzer, *Early Hydraulic Civilization in Egypt: A Study in Cultural Ecology* (Chicago, 1976), 85.

¹⁷ Buzon, *Current Anthropology* 47, 686.

Memphis)¹⁸ were analysed. Published biometric data from Eighteenth Dynasty sites located in the area north of Thebes (Abydos and Sheikh Ali) were also used in order to provide comparative assessment for the Tombos data.¹⁹

First, craniometric differences between people buried in Egypt and Nubia must be explored. Are these groups physically different? If so, do the people of Tombos more closely resemble those from Egypt or Nubia? If the people buried at Tombos are indeed colonists from Egypt, they should more closely resemble the Egyptian populations than those from Nubia and possibly show close relations with other Egyptian immigrants buried in Lower Nubian Pharaonic cemeteries. Alternatively, if the Tombos population is derived from local ruling families, they should most closely resemble native Nubians, such as the people buried at Kerma or in C-Group cemeteries.

Health and disease

This study also explores the effects that this conquest and socio-political transition had on the health and physical well being of the Tombos population.²⁰ Although determining a specific cause of death based on skeletal remains is usually quite difficult,²¹ skeletons can provide important data regarding the interaction of the socio-economic environment with conditions that individuals experienced during life, such as nutritional deficiency, disease, activity patterns, and traumatic injuries. Fully incorporated into the Egyptian system at this important and strategic location, it is hypothesized that the people of Tombos may have had excellent access to local resources and trade goods acquired from Egypt. Upper Nubia also likely supplied considerable numbers of cattle, sheep, and goats during the New Kingdom.²² These connections would probably have provided substantial supplies. Additional resources provided by the integration of Tombos into trade networks may have buffered the individuals at Tombos against some nutritional stress. However, this increased contact through trade may also have provided a mechanism for introducing infectious disease.²³

Ethnic identity at Tombos²⁴

Architecture

The 2000 and 2002 excavation seasons revealed indications of ethnic identity of the Tombos population in the form of architectural features and mortuary practices. The remains of a large pyramid tomb were uncovered during the first season of excavation (fig. 2). Funerary cones (fig. 3) found in the fill of the shaft indicate that the tomb belonged to Siamun, a high-ranking official. His titles included Scribe of the Treasury

¹⁸ 'Memphis' is the label accompanying the remains in the Duckworth Collection at Cambridge, and is retained here. Some, but not all, of these were also marked 'Saqqara'.

¹⁹ A. Thomson and D. Randall-MacIver, *The Ancient Races of the Thebaid: Being an Anthropological Study of the Inhabitants of Upper Egypt from the Earliest Prehistoric Times to the Mohammedan Conquest based upon the Examination of over 1500 Crania* (Oxford, 1905), inset 12–14, 27–30.

²⁰ For additional detailed analyses see M. R. Buzon, 'Health of Non-elites at Tombos: Nutritional and Disease Stress in New Kingdom Nubia', *American Journal of Physical Anthropology* 130 (2006), 26–37.

²¹ C. Roberts and K. Manchester, *The Archaeology of Disease* (3rd edn; Cornell, 2005), 13–14.

²² P. Iacumin, H. Bocherens, L. Chaix, and A. Mariotti, 'Stable Carbon and Nitrogen Isotopes as Dietary Indicators of Ancient Nubian Populations (Northern Sudan)', *Journal of Archaeological Science* 25 (1998), 300.

²³ Larsen, *Bioarchaeology*, 86; A. R. Zink, M. Spigelman, B. Schraut, C. L. Greenblatt, A. G. Nerlich, and H. D. Donoghue, 'Leishmaniasis in Ancient Egypt and Upper Nubia', *Emerging Infectious Diseases* 12 (2006), 1616.

²⁴ See Smith, *Wretched Kush*, Chapter 6 for discussion of the cemetery, which I draw on here.

FIG. 2. Pyramid tomb at Tombos (photo by S. T. Smith).

and Overseer of Foreign Lands. The cones also mentioned his wife, Weren, the Mistress of the House. A middle-class component of the cemetery was also discovered in the first season, with excavation continuing into the second season. It consisted of several pit tombs and three underground mud brick chamber tombs (fig 4).

The architecture of the pyramid tomb is similar to that of contemporary elite burials in Egypt. It is also comparable to colonial cemeteries in Nubia (e.g. Aniba and Soleb). The pyramid included a superstructure that surrounded a shaft with three chambers. An enclosure wall surrounded the complex, creating a courtyard in the rear. The funerary cones, which likely would have been placed into plaster in a decorative frieze along the tomb's façade, have only been found elsewhere at the Egyptian capital, Thebes, and the provincial capital in Nubia, Aniba. The middle class structures also reflect Egyptian burial styles, also seen in Egypt and other colonial cemeteries (e.g. Fadrus, located near the first cataract of the Nile).

Grave goods

The grave goods found in the middle-class cemetery also strongly reflect Egyptian customs. Several burials at Tombos revealed signs of an associated coffin in the form of dark stains around the body and remnants of organic materials, such as wood and paint (fig. 5). Fragments of decorated plaster and ceramic fragments from mummiform coffins were also found in both the pyramid fill and chamber tombs.

A total of four ushabtis (fig. 6), one of the hallmarks of Egyptian burial, were found in both the pyramid fill (1) and middle-class burial area (3). The jewellery found with

the burials also suggests a connection with Egyptian beliefs; a small carnelian heart amulet, several Bes amulets, Taweret figurines, eye of Horus amulets, and scarabs all reflect Egyptian practices.

Cosmetic equipment recovered from Tombos included a container for kohl and ebony and hematite applicators. Decayed pieces of furniture, such as a folding seat, were found as well as an ebony throwing stick.

The most common grave inclusion at Tombos was pottery which, for the most part, is Egyptian in style. There are also two Mycenaean juglets and scant amounts

FIG. 3. Face of funerary cone from Tombos pyramid (photo by S. T. Smith).

FIG. 4. Middle class tomb at Tombos (photo by S. T. Smith).

FIG. 5. Coffin and extended Egyptian-style burial at Tombos (photo by S. T. Smith).

FIG. 6. Ushabti figurine from Tombos (photo by S. T. Smith).

of Nubian pottery (concentrated in the courtyard of the pyramid). Specialised beer bottles and 'flowerpots' are the most common pottery types, objects that carry Egyptian religious connotations connected with offerings to the dead.

Burial position and mummification

The vast majority of burials at Tombos for which position could be assessed were found in an Egyptian burial position (fig. 5). All but four individuals were extended with hands over the pelvis and head to the west. Some indications of mummification were present. A few small pieces of linen survived, in addition to impressions of fabric around the bodies.

During the second season of excavation, four burials were uncovered that suggest Nubian burial rituals. These four burials, all women, were flexed on their side, with head oriented towards the east and facing north, a position typical of Nubian traditions at Kerma (fig. 7).²⁵ A Nubian bowl was found at the head of two of the women, providing additional evidence of Nubian ethnicity. One of these women wore Bes amulets around her neck. Several additional burials in this middle-class area may have been flexed, but disturbance due to looting made determining their original position impossible.

Overall burial practice at Tombos

The vast majority of indicators of ethnicity in the Tombos cemetery are consistent with an Egyptian identity. Nearly all of the burials adhere to typical Egyptian

FIG. 7. Flexed Nubian-style burials at Tombos (photo by S. T. Smith).

²⁵ Edwards, *The Nubian Past*, 87; F. Gues, 'Burial Customs in the Upper Main Nile: An Overview', in W. V. Davies (ed.), *Egypt and Africa: Nubia from Prehistory to Islam* (London, 1991), 64.

standards. However, the presence of the four women buried following Nubian traditions indicates that Nubians did interact with this predominantly ethnically Egyptian community at Tombos. Yet some questions still remain unanswered. While the people buried at Tombos appear to display a mostly Egyptian identity, were they in fact colonists from Egypt, or were they Egyptianised Nubians? These questions will be explored in the next section through the analysis of cranial measurements.

Analysis of human skeletal remains from Tombos

One hundred individuals from the site of Tombos were examined for this study. In addition, 1,287 individuals from Egyptian and Nubian populations were included for comparison (Table 1). An attempt was made to obtain a geographic distribution in the Nile Valley during the general period of the Tombos site occupation. All individuals were aged and sexed, if possible, using standard osteological procedures.²⁶

TABLE 1 *Populations examined for this study*

	Site	Date	Sample size
Nubia	Tombos	New Kingdom–Third Intermediate Period	100
	Kerma	Middle Kingdom–Second Intermediate Period	307
	Shellal	New Kingdom	157
	SJE C-Group	Second Intermediate Period–New Kingdom	249
	SJE Pharaonic	New Kingdom	92
Egypt	Qurna	New Kingdom	174
	Memphis	New Kingdom	103
	Abydos	New Kingdom	117
	Sheikh Ali	New Kingdom	88
Total			1,387

Quantitative analysis of biological relationships

Nine measurements of the skull were used in the study: nasal height, upper facial height, nasal breadth, bizygomatic breadth, basi-bregma height, maximum cranial breadth, maximum cranial length, biauricular breadth, and basi-nasion length. These measurements were chosen because they corresponded to the published data by Thomson and MacIver.²⁷

The metric data were standardized to prevent large measurements from contributing more than small measurements.²⁸ Principal components analysis (PCA), which reduced the data from the original variables to obtain a smaller set of factors that

²⁶ Buikstra and Ubelaker, *Standards for Data Collection*, 15–38.
²⁷ Thomson and Randall-MacIver, *Ancient Races of the Thebaid*; a more detailed analysis of these cranial measurements can be found in Buzon, *Current Anthropology* 47, 689–90.
²⁸ R. S. Corruccini, ‘Size and Shape in Similarity Coefficients Based on Metric Characters’, *American Journal of Physical Anthropology* 38 (1973), 743–5.

account for most of the variability in the samples, was performed on the cranial measurement data. Females and males were analysed separately. The sites were divided into four groups based on ethnic indicators such as burial style, architecture, and grave goods: (1) Egyptian: clearly Egyptian-style burials in Egypt (Abydos, Sheikh Ali, Qurna, Memphis), (2) Nubian: clearly Nubian-style burials in Nubia (Kerma, C-Group), (3) Other: Egyptian-style burials in Nubia (Shellal, Pharaonic group), and (4) Tombos.

First, the differences between Egyptian and Nubian groups were assessed. Four principal component factors had eigenvalues greater than 1.0 (accounting for 82% of the variability), with two factors accounting for the greatest amount of variance in the data. One factor reflected cranial breadth or, wideness of the skull (highest loading by maximum cranial breadth 0.86–0.89), and the other factor reflected facial height (highest loading by nasal height 0.87–0.88, and upper facial height 0.87–0.88). While all of the groups overlap, some differences are apparent. For both males and females, Egyptians have greater facial height (longer faces) and more narrow cranial breadth, while Nubians tend to have lower facial heights (shorter faces) and wider cranial breadth. The ‘Other’ group and Tombos are mixed, but tend toward the Nubians.

Logistic regression equations, which produce a prediction of group membership, were used to assign individuals to a group (Egyptian or Nubian) based on the factors produced from the principal components analysis (figs 8 and 9). Using the two preassigned groups of clearly defined Egyptians and clearly defined Nubians (groups 1 and 2 described above), the results of the logistic regression prediction suggest

FIG. 8. Predicted ethnic groups based on logistic regression equations (M=male, F=female).

FIG. 9. Predicted ethnic groups based on logistic regression equations by site.

some interesting differences between the populations. Egyptian males and females from Abydos, Sheikh Ali, Memphis, and Qurna are classified correctly (greater than 75% Egyptian) much more frequently than Nubians from C-Group and Kerma sites (~40–50% Nubian). This is likely due to the individuals of the Egyptian group having a more distinctive, consistent cranial shape. The Nubians, in contrast, are predicted to be more evenly divided between the Egyptian and Nubian groups, suggesting that the cranial shape of the individuals in this group is less consistent. The ‘Other’ group, which included the Pharaonic and Shellal sites, is mixed, but includes more individuals with ‘Egyptian’ cranial morphology. The Tombos sample is divided more evenly between the two categories.²⁹

Interpretation of biological relationships at Tombos

What do these data indicate about the composition of Tombos? It is clear that the cemetery at Tombos contains more than just Egyptian colonists. The mixture of Egyptian and Nubian morphology in the Tombos sample is typical of the other Nubian samples. However, when examining these data in combination with archaeological indications of identity, it seems likely that Tombos was composed of both Nubians and Egyptians. Cultural contact between Egyptians and Nubians at Tombos is evident in the archaeological finds. The four Nubian-style burials within

²⁹ Buzon, *Current Anthropology* 47, 690.

a largely Egyptian cemetery undoubtedly indicate some intersection of these groups. While the pyramid tomb at Tombos may have been a way for Siamun, the Overseer of Foreign Lands, to display his power and authority in the Egyptian hierarchy and promote an in-group solidarity, the burials of some Nubian women sent a different message by using rituals that declared their Nubian identity.³⁰

All of the Nubian-style burials were found in the lowest (and earliest) layers of the tomb chambers. During the early use of this colonial cemetery, it is possible that Nubian and Egyptian individuals interacted but maintained some ethnic differences. Later, with increased incorporation into the Egyptian administrative system, Nubians may have conformed to Egyptian burial practices. Clearly, there were advantages to looking and acting Egyptian during this time.³¹ The changing of ethnicity over time suggests that people at Tombos were using these cultural symbols in advantageous ways, supporting the idea that ethnicity is fluid, dynamic, and situational.³² Overall, this study indicates that the colonial cemetery at Tombos was composed of both native Nubians and immigrant Egyptians, suggesting that individuals from both cultures contributed to the administration of Nubia during the New Kingdom.³³

Quantitative analysis of health and activity patterns at Tombos

The analysis of human remains is the most direct way of assessing past health and intersection of biology with social, political, and economic processes.³⁴ While many reports describing royal burials in Nubia and Egypt have been produced, few studies concerning lower-status New Kingdom skeletal series have been completed and published.³⁵ The Tombos burials thus provide a unique opportunity to learn about the health status and living conditions of an important, yet little studied, population.

Recent research has suggested that the New Kingdom period of Egyptian occupation in Nubia was positive, providing mutual benefits,³⁶ rather than exploitative and demoralizing.³⁷ This analysis provides an excellent occasion to explore the idea that the people of Tombos may have benefited from being integrated into the Egyptian trade network. How were the people of Tombos affected by the Egyptian colonial interaction during this period? To address this question, the skeletal remains from Tombos were examined for indications of health status and activity patterns.

Several pathological conditions, which reflect the skeletal reaction to physiological

³⁰ Smith, *Wretched Kush*, 193.

³¹ Ibid., 197.

³² Jones, *The Archaeology of Ethnicity*, 113.

³³ Buzon, *Current Anthropology* 47, 693; additional evidence suggesting the presence of local and non-local individuals is provided by strontium isotope ratio analysis (⁸⁷Sr/⁸⁶Sr): M. R. Buzon, A. Simonetti, and R. A. Creaser, 'Migration in the Nile Valley during the New Kingdom Period: A Preliminary Strontium Isotope Study', *Journal of Archaeological Science* 34 (2007), 1391–401.

³⁴ A. H. Goodman and D. Martin, 'Reconstructing Health Profiles from Skeletal Remains', in R. H. Steckel and J. C. Rose (eds), *The Backbone of History: Health and Nutrition in the Western Hemisphere* (Cambridge, 2002), 12.

³⁵ Several studies of Nile Valley populations from other time periods have been published, e.g. G. Armelagos, 'Disease in Ancient Nubia', *Science* 163 (1969), 255–9; S. Hillson, 'Chronic Anaemias in the Nile Valley', *Museum Applied Science Center for Archaeology (MASCA) Journal* 1 (1980), 172–4; W. V. Davies and R. Walker, *Biological Anthropology and the Study of Ancient Egypt*, (London, 1993); M. Judd, 'Continuity of Interpersonal Violence between Nubian Communities', *American Journal of Physical Anthropology* 131 (2006), 324–33.

³⁶ R. Morkot, 'Egypt and Nubia', in S. E. Alcock, T. N. D'Altroy, K. D. Morrison, and C. M. Sinopoli (eds), *Empires: Perspectives from Archaeology and History* (Cambridge, 2001), 238; O'Connor, *Ancient Nubia*, 61.

³⁷ W. Y. Adams, *Nubia: Corridor to Africa* (London, 1977), 218.

stress, were recorded.³⁸ Cribra orbitalia (abnormal lesions in the eye orbits) is linked with chronic health problems such as nutritional deficiency (folic acid, Vitamin C, iron).³⁹ Enamel hypoplasia (horizontal grooves in tooth enamel due to disruption in enamel development) is associated with systemic metabolic stress.⁴⁰ Osteoperiostitis (abnormal growths on the surface of bones) is an indication of bacterial infection, common in the Nile Valley.⁴¹ The length of adult long bones, such as the femur (thigh bone), can indicate childhood growth disturbance due to nutritional deprivation and disease.⁴² Diet can be assessed through the recording of dental conditions, such as cavities (indication of carbohydrate consumption) and loss of teeth before death.⁴³ The recording of traumatic injuries (evidence of blows to the head, fractured bones, etc.)⁴⁴ and arthritic changes⁴⁵ can shed light on activity patterns.

At Tombos, nutritional deficiency is fairly common. The rate (11%) of this condition in the Tombos sample is similar to the other populations in this study. However, the lesions (and frequency, 100%) of this condition found in the Tombos children are different than those found in the comparative populations. For the Tombos individuals, the lesions indicate that children died when the condition (nutritional deficiency) was still present. This is in contrast to the other populations, where the children's lesions show evidence of recovery. The assessment of growth (length of the femur) also suggests that Tombos children were affected by ill health. The Tombos adults, especially the males, are shorter on average than the other populations, suggesting that childhood growth was compromised. The other pathological conditions associated with poor health show more similarities with the other groups. The rate of systemic stress (enamel hypoplasia 21%) is similar to the other groups in this study. The indication of infection (45%) on bone (osteoperiostitis) at Tombos is also comparable to the other populations examined.⁴⁶ Diet, as reflected by the level of cavities (24%) and tooth loss (72%), indicates that the people of Tombos were eating large amounts of carbohydrates, a finding common in comparative samples. These populations probably relied on milled cereal grains and only small amounts of meat.

³⁸ For additional information on pathological conditions at Tombos and in the comparative populations, see M. R. Buzon, *A Bioarchaeological Perspective on State Formation in the Nile Valley* (PhD thesis, University of California, Santa Barbara, 2004); Buzon, *American Journal of Physical Anthropology* 130.

³⁹ P. L. Walker, 'Porotic Hyperostosis in a Marine-Dependent California Indian Population', *American Journal of Physical Anthropology* 69 (1986), 351; D. J. Ortner, E. H. Kimmerle, and M. Diez, 'Probable Evidence of Scurvy in Subadults from Archaeological Sites in Peru', *American Journal of Physical Anthropology* 108 (1999), 330; U. Wapler, E. Crubézy, and M. Schultz, 'Is Cribra Orbitalia Synonymous with Anemia? Analysis and Interpretation of Cranial Pathology in Sudan', *American Journal of Physical Anthropology* 123 (2004), 338.

⁴⁰ K. Dobney and A. H. Goodman, 'Epidemiological Studies of the Dental Enamel Hypoplasias in Mexico and Bradford: Their Relevance to the Archaeological Skeletal Studies', in H. Bush and M. Zvelebil (eds), *Health in Past Societies: Biocultural Interpretations of Human Skeletal Remains in Archaeological Contexts* (BAR IS 567; Oxford, 1991), 85.

⁴¹ Roberts and Manchester, *The Archaeology of Disease*, 172–3.

⁴² A. H. Goodman, 'Health Adaptation and Maladaptation in Past Societies', in Bush and Zvelebil (eds), *Health in Past Societies*, 33.

⁴³ S. Hillson, 'Diet and Dental Disease', *World Archaeology* 11 (1979), 150–1.

⁴⁴ P. L. Walker, 'A Bioarchaeological Perspective on the History of Violence', *Annual Review Anthropology* 30 (2001), 582.

⁴⁵ Roberts and Manchester, *The Archaeology of Disease*, 143.

⁴⁶ Buzon, *American Journal of Physical Anthropology* 130, 5–7.

The low level of iron and other nutrients in these grains may have contributed to overall nutritional deficiency and ill health.⁴⁷

What might account for the higher level of childhood illness at Tombos? It has been suggested that diarrheal infections in young children caused by contamination of water sources plays an important causal role in nutritional deficiency.⁴⁸ There is a high incidence of parasite and bacterial infection (such as hookworm and schistosomiasis) in the modern Nile Valley.⁴⁹ It seems likely that these infections were common in ancient times, as parasites have been found in Ancient Egyptian mummies.⁵⁰ The widespread disease would have provoked an inflammatory response and diarrhea, ultimately resulting in deficiencies of essential nutrients and the formation of skeletal lesions.⁵¹ Micro-environmental variation in the level of infectious pathogens between Tombos and the other populations likely adversely affected health.

Another factor that may have played a role is the difference in social status between the Tombos burials and other sites. The majority of skeletal remains from Tombos in this study are from the middle-class cemetery. At the other sites, there is some indication of higher, elite status. For instance, although little burial information is available for the Qurna and Memphis groups, the skulls show evidence of resin and scraping marks from the removal of skin after death, suggesting they may have had elite mummification. Also, the cemetery at Kerma clearly displays some obvious class distinctions with burials of a chief body, officials, and what some have called 'sacrifice' victims.⁵² While there are no physical signs of sacrifice,⁵³ if the individuals were indeed sacrificed, they may have been healthier than a typical cemetery population as they did not die from natural causes. This higher status of some of the comparative populations may account for their lower rates of poor health indicators.⁵⁴

Although not indicative of the overall effects of the colonial period on health status, several other, more anomalous pathological conditions were recorded in the Tombos population. For example, two bones (femur and radius) found in the disturbed fill of the pyramid indicate the presence of an individual who may have been a dwarf. The bones, a radius (forearm) and a femur, show typical deformations associated with achondroplastic dwarfism, a congenital abnormality. They are characteristically shortened and disproportionately wide at the ends.⁵⁵ Also, two males have a benign neoplasm, or abnormal bone growth, on the right pelvis (hip bone). These bone growths are osteochondromas, common benign tumours that are the result of faulty

⁴⁷ Buzon, *Bioarchaeological Perspective*, 101–7.

⁴⁸ Walker, *American Journal of Physical Anthropology* 69, 351.

⁴⁹ H. Kloos and R. David, 'The Paleoepidemiology of Schistosomiasis in Ancient Egypt', *Human Ecology Review* 9 (2002), 14; Zink et al., *Emerging Infectious Diseases* 12, 1616.

⁵⁰ R. L. Miller, N. De Jonge, F. W. Krijger, and A. M. Deelder, 'Predynastic Schistosomiasis', in Davies and Walker (eds), *Biological Anthropology and the Study of Ancient Egypt*, 58.

⁵¹ S. O. Y. Keita and A. J. Boyce, 'Diachronic Patterns of Dental Hypoplasias and Vault Porosities during the Predynastic in the Naqada Region, Upper Egypt', *American Journal of Human Biology* 13 (2001), 736.

⁵² T. Kendall, *Kerma and the Kingdom of Kush 2500–1500 BC: The Archaeological Discovery of an Ancient Nubian Empire* (Washington, 1997), 60; G. A. Reisner, *Excavations at Kerma* (Harvard African Studies 5–6; Cambridge, 1923), 70–9.

⁵³ M. Judd, J. Irish, and A. Froment, 'Dying to Serve: Human Sacrifice during the Classic Kerma Period', paper presented at the Annual Meeting of the Society for American Archaeologists, San Juan, Puerto Rico (2006).

⁵⁴ Buzon, *American Journal of Physical Anthropology* 130, 35.

⁵⁵ Buzon, *Bioarchaeological Perspective*, 115–16.

growth plate development.⁵⁶ And, finally, adult leg bones found in the disturbed fill of one of the middle-class chambers show evidence of lower limb paralysis. These normally weight-bearing bones reveal no signs of muscle attachment and are too thin to have allowed normal activity. While there are many potential causes of paralysis, it is possible that this individual was affected by polio.

In addition to providing information about health, pathological conditions can also shed light on activity patterns. Deterioration with advancing age is an occurrence in all organisms. Degenerative changes can also occur from repeated activity and injury. The joints are the most commonly affected areas in the skeleton. Arthritis is common in the adults at Tombos. Overall, this rate (49%) is similar to the comparative populations. There are no particular areas of the skeleton that are affected more than others. The degenerative changes are likely the result of their daily activities. The people at Tombos likely participated in agricultural chores and quarrying, as the area is known for its granite supply.⁵⁷

A great deal can be learned about a population through evidence of trauma, such as information regarding lifestyle, such as occupation, environment, economy, and interpersonal violence. The occurrence of traumatic injuries at Tombos is relatively low. Only 1.4% of the limb bones display injury, and only one cranial injury was found. This virtual lack of cranial injuries in addition to a low rate of 'parry' fractures (fractures to the forearm assumed to be the result of defending a blow) suggests a low level of interpersonal violence at Tombos. It has been proposed that the patterns of injuries found in Kerma population reflect a 'culture of violence' in the Nubian society.⁵⁸ As suggested, the rate of cranial injuries and forearm fractures in the Kerma sample is significantly higher than that of the Tombos group. The Kerma population lived during the Second Intermediate Period, a time when Egypt was often in conflict with Nubia over the Nile trade route. In contrast, the Tombos population lived during the New Kingdom. The mutual benefits of interaction during this time, as suggested by researchers, appear to be reflected in the low level of injuries indicative of interpersonal violence at Tombos.⁵⁹

Conclusions

Through the use of a bioarchaeological approach, as well as data from human skeletal remains in conjunction with information from historical texts, archaeological contexts, and the ecological setting, long-standing questions concerning the events that occurred between the Nubians and Egyptians during the New Kingdom period were addressed. This research has provided a means through which the archaeological and historical hypotheses could be tested. These analyses reveal that the colonial

⁵⁶ For additional information on the osteochondromas, see M. R. Buzon, 'Two Cases of Osteochondroma in New Kingdom Nubia', *International Journal of Osteoarchaeology* 15 (2005), 377–82. A summary of other tumours found in the ancient Nile Valley can be found in W. M. Pahl, 'Tumors of Bone and Soft Tissue in Ancient Egypt and Nubia: A Synopsis of the Detected Cases', *International Journal of Anthropology* 1 (1986), 267–75.

⁵⁷ Buzon, *Bioarchaeological Perspective*, 131–2.

⁵⁸ M. A. Judd, *Trauma in Ancient Nubia during the Kerma Period (ca. 2500–1500 BC)* (PhD dissertation, University of Alberta, 2000), 135.

⁵⁹ M. R. Buzon and R. Richman, 'Traumatic Injuries and Imperialism: The Effects of Egyptian Colonial Strategies at Tombos in Upper Nubia', *American Journal of Physical Anthropology* 133 (2007), 789.

population buried at Tombos most likely consisted of local Nubians and immigrant Egyptians. The intersection of ethnic and biological identities confirms that cultural identity is fluid and dynamic, changing as the socio-political environment varies. The mixed population at Tombos suggests that Nubians and Egyptians had an important role in Egyptian administration during the New Kingdom period.

While the Tombos population displays the same indications of physiological stress as the comparative populations, the few small differences in the frequencies are significant in the overall picture of health at Tombos. The high rate of unhealed lesions (cribra orbitalia) in children and stunted growth (femur length) at Tombos suggests that they were enduring a higher degree of nutritional deficiency and/or infection compared to the other sites examined. Local ecological differences in the level of infectious agents and variation in social status likely account for this difference. Although the population at Tombos may have been fully incorporated into the Egyptian colonial system, this study reveals that those resources could not protect them from all physiological stressors. Finally, the adoption of Egyptian cultural standards by the Nubians at Tombos may have been partly responsible for the relatively peaceful coexistence at Tombos as suggested by the low level of traumatic injuries indicative of interpersonal violence.

In sum, the analysis of human remains from the site of Tombos has contributed significantly to an overall understanding of interaction between Nubians and Egyptians during the colonial New Kingdom Period. In addition to providing information about the inhabitants of a colonial site during this time, this study shed light on the health affects of this period of sociopolitical transition. Continued excavations at Tombos and in the region will provide additional opportunities to further explore the effects that the New Kingdom colonization of Nubia had on people living during that time.