Introduction

This report describes ongoing bioarchaeological research on human skeletal remains excavated from the Elmina archaeological site in the Central Region of coastal Ghana. Elmina was the first and largest Atlantic period European trade fort established in sub-Saharan Africa. The occupation of the associated African settlement predates the arrival of the Europeans in the late fifteenth, and extends through the nineteenth century, charting the emergence of the settlement as one of the largest pre-colonial European trade emporia in sub-Saharan Africa. This project is the first comprehensive bioarchaeological analysis of the human skeletal remains of the approximately 100 individuals excavated from the Elmina site, most of whom were African inhabitants of the settlement during the period of European contact and trade (DeCorse 2001: 187-189). The assemblage constitutes the largest post-fifteenth century human skeletal sample recovered in West Africa—a geographical area where there has been little bioarchaeological research, particularly with regard to Atlantic period populations (e.g. Merkyte and Randsborg 2009; Schaffer and Agorsah 2010; also see Cox et al 2010). Analyses of these remains offers a lens through which to glimpse the life experiences and histories of Elmina’s inhabitants. This skeletal biography provides a perspective missing from much of the documentary record of the area, which is heavily reliant upon contemporary European narratives.

Elmina: Historical and Archaeological Contexts

The Elmina settlement and its associated hinterland has been the focus of archaeological research since 1985, and it remains a focus of the Central Region Project (Figure 1; Also see Chouin and DeCorse 2010; DeCorse 2001: 5; DeCorse and Spiers 2009; DeCorse et al 2009). In many respects, the African settlement of Elmina encapsulates the years of European contact, trade, and colonization better than many sites in Africa. The town was the major trade entrepôt in the portion of West Africa the Europeans called “Mina” or the “Mine” and, later, the Gold Coast because of the gold that could be obtained there. The Portuguese stronghold of Castelo de São Jorge da Mina, founded in 1482 adjacent to an existing African settlement, was the first fortified European trade post in sub-Saharan Africa. Elmina Castle, as the fortress eventually came to be known, played a crucial role in Portuguese attempts to monopolize the West African trade and it became a focal point of European rivalry in the region. The Dutch captured the Castle in 1637 and Elmina remained the headquarters of Dutch mercantile interests in West Africa until its transfer to the British in 1872. The destruction of the African town by the British in 1873, and the subsequent abandonment of the early town site, illustrates dramatic changes in African-European interactions. The late nineteenth century witnessed much more overt European involvement in African affairs and the colonial partition of Africa.

During the four centuries following the European’s arrival on the coast, the African, predominantly Akan, settlement of Elmina grew from a small fishing and farming village of a few hundred inhabitants into a major trading port with a population of 15,000-20,000 people during the eighteenth and nineteenth centuries. As a center of European trade, the settlement experienced increased population growth and dramatically increased urban density, accompanied by transformations in dietary patterns, subsistence, and sociopolitical organization.

Because they involve various artifacts and features, as well as the burials themselves, funerary complexes provide some of the best loci for delineating a variety of sociocultural phenomena such as religious beliefs and social organization, as well as health and nutrition...
(e.g. Agarwal and Glencross 2011; Buikstra and Lane 2006; Price et al 2012). Ethnographic descriptions of Akan mortuary rituals preceding burial, the actual interment, and subsequent obsequies express multiple influences, including age, gender, religion, social status, and wealth, as well as a diversity of other sociocultural affiliations such as patrilineal, matrilineal and agnatic kin ties. These are not dichotomous, bounded categories and their relative significance likely changed through time. These complex phenomena are represented in burials.

African mortuary practices are extremely varied. Specially designated burial areas outside of settlements have been used by the Akan in both the past and the present. Today, coastal Akan burials are typically placed in cemeteries located outside of settlements. However, historical and archaeological data from Elmina attest to the previous predominance of burial beneath house floors prior to the twentieth century (see review in DeCorse 2001: 187-191, 248 n. 56). In fact, chiefs may still be buried within the house today. The majority of the Elmina burials recovered archaeologically are from subfloor contexts dating to the eighteenth and nineteenth centuries. There are, however, also internments that may represent discrete burial areas located outside of the settlement, as well as tombs; at least some of which appear to date to the late nineteenth century and so post-date the destruction of the town in 1873. These varied contexts likely represent only a subset of pre-twentieth century mortuary practices. For example, archaeological data has not yet provided clear indication of the placement of skulls of enemies or sacrificial victims in graves—practices that are frequently noted in documentary accounts.

Figure 1: Map of Elmina showing excavation loci.
The location, placement, and detail of the individual interments are highly variable. Grave markers of various kinds, as well as coffin burials, only appeared during the late nineteenth and twentieth centuries. The customary Akan practice prior to the late nineteenth century was to wrap the body in a specially prepared cloth or mat (see DeCorse 2001: 248 n. 55). Akan burials and burial grounds were traditionally unmarked or marked in ways distinct from European practices, the area for the most part intentionally left unaltered and natural. Grave shafts are often only indicated by slight depressions or low stone cairns. There is limited documentary and ethnographic evidence that burials were at times oriented in specific ways. However, orientation of the interments at Elmina was highly varied, even amongst individuals that were buried in associated contexts (see Figure 2). This may have been necessitated by the limited options afforded by sub-floor burial at Elmina, which were often positioned in shallow soil deposits resting on bedrock (Figure 3).

The mortuary complex may reflect more continuity than change in Akan beliefs, but Elmina worldview and its physical expression were by no means static. One characteristic of the burials was the presence of grave goods, a feature which archaeological and documentary data indicate was a feature of coastal Akan mortuary ritual by the early seventeenth century. The custom, however, likely predates European contact. The practice is well documented in Elmina, as well in adjacent areas. Notably, trade ceramics, including Chinese porcelain plates, Rhenish stoneware *krugge*, creamware, whiteware mugs and ointment jars, as well as pewter tankards, European clay pipes, jewelry, and a wide variety of glass beads were more commonly found in burials than were ceramics and other items of local manufacture.

Full evaluation of the range in mortuary ritual among the coastal Akan is constrained by the lack of information on pre-European contact practices. It is, however, clear that the advent of colonial rule in the late nineteenth century witnessed new practices, including the establishment of discrete burial areas, coffins and masonry tombs, which are now the norm. Perhaps even more telling is the gradual disuse and destruction of formerly sacred groves (e.g. Chouin 2002).
The Skeletal Assemblage

The skeletal remains discussed here were recovered during excavations directed by DeCorse in 1986, 1990 and 1993 (DeCorse 1993; 2001). The burial contexts represented, their preservation, recovery, and condition are extremely variable. Given the prevalence of sub-floor burial, internments were found in virtually all excavation units that extended below house floors and skeletal remains were recovered from almost all of the excavation loci. Sub-floor burials were typically shallow hollows, sometimes clay lined. Later interments both within the house and in burial grounds often disturbed earlier graves: it was not uncommon to find multiple overlapping internments, the group sometimes further cut by nineteenth century construction. Nineteenth century brick tombs post-dating the town’s 1873 destruction also revealed evidence of disturbance, probably looting, and contained no skeletal remains.

The preservation of the Elmina skeletal remains is variable. Some individuals are relatively complete and in good condition, while others are poorly preserved and fragmentary. As noted, many were severely impacted by later internments and/or construction, and the comingling of the remains of multiple individuals was common. Excavation of the skeletal remains was also difficult. Apart from the usual challenges of excavation, poor site security and the risk of disturbance necessitated the removal of the burials as quickly as possible. The excavation units were looted on several occasions, including the removal or damage of skeletal material.

Basic information, including drawings, descriptions, and preliminary assessment of the age and sex was recorded in the field. Curation and analysis facilities available in Ghana were limited. In one instance, an articulated burial was given out for study without consultation and subsequently lost. Consequently, there is no information on this individual. Insect damage, lack of climate controlled storage areas, and the partial collapse of the roof of the storage facility at the University of Ghana, Legon led to the decision to remove the materials for study in the United States in 1990. Further analysis was subsequently undertaken at Kent State University between 1992 and 2002 (Mork 2002). This study focused on 54 individuals to provide a paleodemography, including a crude death rate, expectation of life at birth, expectation of life at age fifteen, and survivorship at age fifteen.

Current Analysis

Current work on the assemblage was initiated by Renschler at the University of Pennsylvania Museum of Archaeology and Anthropology in 2007, and then relocated to the archaeology facilities at Bowdoin College in Brunswick, Maine. Analysis of the assemblage aims at documenting all of the individuals represented. A major time investment has been the reconstruction of individuals from the often fragmentary, broken, and disarticulated
remains. Information gathered includes determination of the age and sex of the individuals represented, as well as what can be known about their life histories using skeletal and dental markers. The data discussed here focus on some of the more complete individuals, from whom the most information can be gleaned. This relatively well-preserved skeletal material originated from Loci A, E, and G (see Figure 1).

Physical anthropological data was collected following standard protocols based upon Buikstra and Ubelaker (1994). Subadults with dentition present were aged according to dental development and, where dentition was not present, epiphyseal closure of long bones or basic size comparisons. Adult age was estimated using a multifactorial approach, combining methods, which varied depending upon state of preservation (including pubic symphysis morphology, dental wear, auricular surface morphology, cranial suture closure, presence of arthritis and osteophyte formation, and rib end morphology). Adult sex was estimated using a combination of pelvic morphology, cranial features, and general robusticity. The method and reliability of sex estimation varied depending on the completeness of the individual. Unfortunately, because of a general lack of biological anthropology research on West African skeletal populations, standards of sex-related differences in cranial robusticity specific to West African populations have not been developed. Sex-related cranial robusticity varies both within and between populations which could limit the accuracy of sex determination in our study.

**Preliminary Results: Locus A, E, and G**

What follows is an overview of our analysis of the burials excavated from a subset of the entire Elmina...
assemblage recovered at three Loci: A, E, and G (n=47). Thirty-three individuals have been identified from Locus A, ten from Locus E, and four from Locus G (see Figure 1; DeCorse 2001: 82-86). All of these burials date to the eighteenth and early nineteenth centuries, though they present contrasting contexts. Locus A individuals were recovered from sub-floor burials beneath a stone dwelling in one of the oldest areas of the settlement and one that included some of the settlement’s most impressive structures. Locus E individuals were excavated from an area of the town southeast of Elmina Castle known as Fisherkrom (the Fishermen’s Village). This area was occupied later than Locus A, only after the Dutch takeover of the Castle in 1637. These burials were also sub-floor internments, recovered from within a large, stone walled dwelling dating from the late eighteenth and nineteenth centuries. In contrast, Locus G is located on the western margin of the settlement in an area associated with the town slaves. The burials were recovered from below stone foundations dating to the nineteenth century. The burials, however, date to the eighteenth century and it unclear if they represent sub-floor internments. It is possible that the burials were located beneath an earlier house floor destroyed by nineteenth century construction. It is, however, also possible that this was originally a burial area located outside the western margin of the town.

Of the 47 individuals from these three loci, 18 were estimated as subadults (<20 years), and 29 as adults (20+ years). The age range extends from infants to older adults. Of note is a relatively high frequency of children (estimated age between 3 to 12 years) found in the total sample (28%). Sex determination of the adult sample estimated 9 of the individuals as male and 17 as female.
Insight into dental health among the individuals from these three loci is gained by observing the frequencies of caries, dental infection and antemortem tooth loss, when possible given preservation. In individuals where dentition was present, evidence for caries is not found in the sample overall. However, an absence of caries does not in itself support a lack of poor dental health at Elmina because a number of adults (12%) lost teeth before death. These cases of tooth loss could have resulted from carious lesions, dental infection, or periodontal disease. Dental infection was observed in two individuals examined, both from Locus G.

Four indicators of physiological stress have been examined thus far in the sample, including; linear enamel hypoplasia, cribra orbitalia, porotic hyperostosis, and periostitis. These indicators represent events of non-specific responses to physiological stress and are commonly associated with dietary deficiency and/or nutritional inadequacy and disease (anemia) (e.g. Temple and Goodman, 2014).

The linear enamel hypoplasia results indicate that some individuals were affected, though most cases were faint in appearance. Of note is that linear enamel hypoplasia were found only in individuals from Locus A, which also showed the largest sample size. None was observed in individuals from Locus E or G both with smaller sample sizes. Cribra orbitalia and porotic hyperostosis results indicate that a number of the subadults showed these lesions. The cases were mild to moderate in severity. All of the subadult cases were active at the time of death. Two adults showed healed cribra orbitalia and only one adult showed healed porotic hyperostosis. Non-specific periosteal lesions were present in some cases but were not common in the total sample; a total of 4/31 (13%) of individuals showed periostitis.

Also of note was evidence of dental modification and pipe-smoking facets. Several adults in the sample showed habitual pipe-smoking facets on their dentition (n=5)(see Figure 4). One older male from Locus A, another adult male from Locus G, and three individuals from Locus E showed evidence of pipe-smoking abrasions. Two individuals exhibited dental filing (see Figure 5).

**Discussion and Conclusions**

Work on the Elmina skeletal assemblage is continuing. Two aspects of the project have been challenging. First, the complexity of the burial contexts represented, comingling, and poor bone preservation made basic inventory especially time consuming. Secondly, because of a general lack of biological anthropology research attention on West Africa, there is a paucity of regional comparative studies in which to contextualize this work. In addition, there are no regionally established standards for sex and age identification.

The skeletal analysis undertaken thus far reveals several interesting findings that warrant further inquiry and examination. The first preliminary observation regarding Elmina remains is that evidence for cavities is absent in the teeth examined thus far. While, it is possible that antemortem tooth loss might have masked evidence for poor dental health, we are interested in contextualizing this finding in light of both historical understandings of dietary patterns in the region, as well as future isotopic research. Comparisons with contemporary skeletal populations in other areas of Africa and diasporic peoples from the Americas will also help further contextualize these findings. Also of note is that the two cases of dental infection observed in the sample analyzed thus far come from Locus G—an area of the town believed to have been inhabited by slaves. Further research on isotopic signatures in these individuals may help illuminate whether they came from a different region.

In terms of evidence of indicators of physiological stress, we observe a relatively high prevalence of porotic hyperostosis and cribra orbitalia in the younger individuals analyzed thus far. These markers of non-specific physiological stress indicate events of disruption in physiological homeostasis; the body’s normal balance or equilibrium (for general discussion see Temple and Goodman, 2014). When understood within a broader context, these indicators can provide insight into the lives of the Elmina individuals; including the diseases, nutritional stress, injury, and other health risks that they faced.

A number of dentitions show evidence for habitual pipe-smoking. These observations correspond with documentary and archaeological information from Elmina, both with regard to the site as a whole and some of the specific archaeological contexts represented. The use of European clay tobacco pipes was probably introduced during the later Portuguese period and extends through the seventeenth, eighteenth, and nineteenth centuries (De-
Corse 2001: 163-167). This skeletal evidence is the first actual documentation of pipe smoking on the remains of people who inhabited Elmina. These add to the limited evidence for pipe wear faceting in historic West African populations (e.g. Merkyte and Randsborg 2009; Schaffer and Agorsah 2010).

The reconstruction of the remaining skeletal material and preparation of a basic inventory of all of the remains is currently underway. As work continues, the differences between the populations represented at the different loci and, if present, what these difference might mean will be examined. It is, for example, known that immigrants from other areas settled in Elmina, including peoples from eastern Ghana and slaves that may have originated in the North. Can non-local populations be distinguished from the coastal Akan? In addition to information from skeletal morphology and associated archaeological material, the isotopic signatures and ancient DNA of the individuals will be examined. Continued work promises to provide unique insight into this historic population.

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