

APPENDIX 3

HUMAN SKELETAL REMAINS FROM CHOTUNA

JOHN W. VERANO

Nineteen human burials were excavated at Chotuna during the 1980–82 field seasons. All can be assigned to the Late Phase (AD 1370–1600).

Skeletal preservation at Chotuna is variable. Of the 19 burials found, 4 contained skeletal remains in such poor condition that they could not be recovered. The remaining 15 vary considerably in the quality of bone preservation, ranging from relatively complete skeletons to highly fragmentary remains. The specific causes of these preservation differences are unknown, but likely factors include interment in sandy soil and depth of burial relative to the water table.

Laboratory analysis of the Chotuna skeletal remains included determination of age and sex, estimation of living stature, and visual examination for evidence of skeletal or dental pathology. The initial analysis was conducted by the present author in the summer of 1983, with a follow-up study and additional photographic work in 2007, in collaboration with the archaeologist Mellisa Lund Valle of the National Museum of Archaeology, Anthropology, and History of Peru.

Estimation of age at death for juvenile remains was based on tooth calcification, eruption, and root closure, long bone length, appearance of ossification centers, and epiphyseal closure. Adults were aged on the basis of pubic symphysis morphology, dental attrition, and cranial suture closure, as well as on degenerative changes such as vertebral osteophytosis and osteoarthritis (Bass 1971; Buikstra and Ubelaker 1994; White and Folkens 2000).

As clearly defined sex differences in the human skeleton do not become manifest until after puberty, no attempt was made to assign sex to the infant and child burials. For the adults, sex was determined on the basis of pelvic

morphology, supplemented by observations on the general size and robusticity of the skeleton (Buikstra and Ubelaker 1994; White and Folkens 2000).

Estimation of living stature for adults was calculated using regression formulas developed by Santiago Genovés (Genovés 1967), generally considered to be the best available formulas for estimating living stature for Andean skeletal remains (Verano 1997). Only two adults had long bones sufficiently preserved to permit stature estimation.

HUACA GLORIA BURIALS

The Huaca Gloria burials (A2 T1–A2 T9) were found on the east side of the huaca, and all date to the Late Phase (ca. AD 1370–1600).

BURIAL A2 T1

Tomb 1 contained the fragmentary remains of a 25–35 year-old male. Although young, he suffered from multiple dental pathologies, including carious lesions on two premolars and the antemortem loss of three molars. No skeletal pathology was observed, and no measurements could be taken due to the fragmentary nature of the remains.

BURIAL A2 T2

The occupant of Tomb 2 was an adult male over 50 years of age. Advanced age is suggested by morphology of the pubic symphysis, which shows marginal lipping and degenerative changes to its surface (Fig. 209), and by degenerative changes to the vertebral bodies (Fig. 210), hip (Fig. 211), and the shoulder joints. Muscle attachment areas show pronounced enthesophyte development (Figs. 212, 213), another feature commonly seen only in older adults. The frontal bone has several irregularly shaped lesions that may mark an old injury or soft tissue infection (Fig. 214). Their margins are rounded, indicating that they had healed. Another healed injury was noted on a right rib, which shows a well-healed fracture of the shaft (Fig. 215). Dental problems included the antemortem loss of many teeth and an active abscess of the upper right canine.



Figure 209 Right pubic symphysis, A2 T2.



Figure 211 Degenerative changes on the superior rim of the acetabulum, A2 T2.



Figure 210 Vertebral osteophytosis on lumbar vertebrae, A2 T2.



Figure 212 Anterior view of the proximal ends of the femora of A2 T2, showing enthesophytes on the greater trochanters.



Figure 213 Ischia of A2T2, showing enthesophyte development on the ischial tuberosities.



Figure 214 Lesion on frontal bone of A2 T2.



Figure 215 Healed fracture of right rib, A2 T2.

BURIAL A2 T3

Tomb 3 contained the well-preserved skeleton of a young adult male, approximately 25–35 years of age. Measurement of the maximum length of the right femur produced an estimated living stature of 161 +/- 3.4 centimeters, or approximately 5 feet 4 inches, which is within the normal range for males in prehistoric northern coastal Peruvian populations (Verano 1997). Dental pathologies include the premature loss of three molars and enamel hypoplasia on the upper and lower canines (Fig. 216).

A developmental anomaly is present on the eleventh thoracic vertebra (Figs. 217, 218). An oval defect in the vertebral body, approximately 1 centimeter in maximum diameter, marks where the fetal notochord failed to be absorbed during ossification of the centrum. Known as a cleft or “butterfly” vertebra, this defect can range from a small opening (as in this case) to a large cleft. Other cases have been described in prehistoric Peruvian skeletons, although the defect is relatively rare (Barnes 1994; Mann and Verano 1990). In modern clinical cases, the defect is clinically silent and is normally an incidental finding in radiographs. Severe cases, however, can lead to scoliosis. In the case of the skeleton in Tomb 3, the body of the affected vertebra is only mildly abnormal in shape, as seen in anterior view (Fig. 219), and probably would not have presented any difficulties to its owner.



Figure 216 Lower canine of A2 T3 with multiple linear enamel hypoplasias.



Figure 217 Eleventh thoracic vertebra of A2 T3, superior view.



Figure 218 Eleventh thoracic vertebra of A2 T3, inferior view.



Figure 219 Anterior view of thoracic vertebrae T10–T12 of A2 T3.

BURIAL A2 T4

Tomb 4 contained the fragmentary remains of a male of approximately 20–22 years of age. All long bone epiphyses are fused, but the iliac crest epiphysis shows incomplete union (Fig. 220), and the sternal end of the clavicle shows no epiphysis present (Fig. 221). The upper third molars are in occlusion, but the lowers are unerupted. Thus, skeletal and dental development were still incomplete in this individual at the time of death. All four canine teeth show pitting and linear defects, indicating bouts of childhood illness or malnutrition (Fig. 222). No other pathologies are present, although the fifth metatarsal bones of both feet are bowed outward (Fig. 223).



Figure 220 Right ilium of A2 T4, showing incomplete fusion of iliac crest epiphysis.



Figure 221 Medial end of clavicle of A2 T4, showing no epiphyseal development.



Figure 222 Lower (to the left) and upper canines of A2 T4, showing enamel hypoplasias.



Figure 223 Fifth metatarsals of A2 T4, showing lateral bowing of the distal ends.

BURIAL A2 T5

Tomb 5 contained the very fragmentary remains of an infant. The crowns of the second deciduous molars are fully calcified, which suggests an age of at least ten months, but the roots of the deciduous incisors are still incomplete, which places an upper age limit at around 18 months. No visible pathology is present.

BURIAL A2 T6

Tomb 6 contained the relatively complete remains of an 11–13 year-old child. This burial was of particular interest when first discovered, because it showed extensive eroded areas on the skull that had an appearance suggestive of cranial syphilis. When examined in the laboratory, the skull indeed looked pathological (Fig. 224). However, close inspection demonstrated that the lesions are strictly erosive in character, with no evidence of bone reaction or healing, as would be expected in treponemal infection (Hackett 1976; Ortner 2003). Further evidence inconsistent with syphilis included the fact that the lateral aspect of the maxillae and mandible also had erosive damage (Fig. 225), and these are not areas typically involved in syphilis. No lesions were present on the post cranial skeleton, where they are commonly found in the case of syphilis. We noted also that the eroded areas of the skull are darkly stained, which is consistent with postmortem taphonomic change. Why the skull and mandible are more affected than the rest of the skeleton is not clear. Perhaps textiles wrapping the head retained more moisture, or perhaps there was some localized soil difference in the head area. Since first examining this skull in 1983, I have seen similar erosive defects in Moche burials at Pacatnamu in the Jequetepeque Valley and at the Pyramid of the Moon in the Moche Valley, so this specimen is not unique.

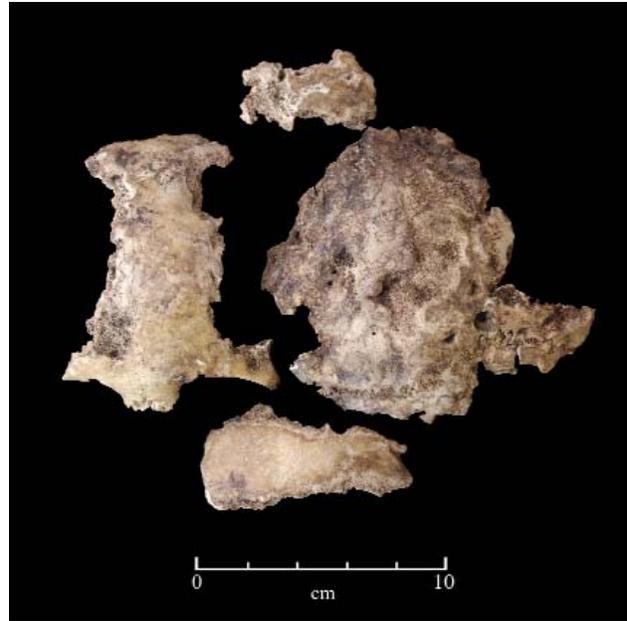


Figure 224 Erosive defects on the skull vault of A2 T6.



Figure 225 Eroded areas on the left maxilla and mandible of A2 T6.

BURIAL A2 T7

Tomb 7 contained the relatively complete remains of an infant. The first deciduous molar crowns are fully calcified, but not the second molars, and the lower incisors were just beginning to erupt, which indicates an age at death of between 6–8 months. Maximum length of the left femur without epiphyses is 105 millimeters, consistent with the dental age estimate (Johnston 1962; Ubelaker 1989). No pathology was observed.

BURIAL A2 T8

Tomb 8 contained the fragmentary skeleton of a male, approximately 35–45 years of age. Living stature is estimated to have been relatively short, 146 centimeters, or 4 feet 11 inches, based on the length of the left femur. He suffered from a large carious lesion on the lower left third molar and had periodontal disease, as indicated by a loss of alveolar bone around the roots of the teeth. Vertebral osteophytosis is present on the lumbar vertebrae and on several thoracic vertebrae, but otherwise no skeletal pathology was observed.

BURIAL A2 T9

Tomb 9 contained the fragmentary skeleton of a child 11–13 years of age. Enamel hypoplasias are visible on all four permanent canines.

ARTISANS QUADRANGLE BURIALS

The Artisans Quadrangle burials (AQ T1–AQ T6) all date to the Late Phase. Three of the burials (AQ T1–AQ T3) had such poor bone preservation that they could not be recovered. Only AQ T4–AQ T6 will be described here.

BURIAL AQ T4

Tomb 4 contained the very fragmentary remains of a 7–11 year-old child. Preservation was very poor, but age could be estimated on the basis of dental development. Hypoplastic lines are present on the canines and upper central incisors.

BURIAL AQ T5

Tomb 5 contained the fragmentary remains of a 12–15 year-old adolescent of undetermined sex. Enamel hypoplasias are visible on the permanent canines.

BURIAL AQ T6

Tomb 6 contained the highly fragmentary remains of a 7–11 year-old child. Only bone fragments and teeth were recovered from this burial, but the following observations could be used to estimate age: the first permanent molars show little occlusal wear and have open roots; the second permanent molars have not erupted; and the third molar crowns are only partially calcified. No pathology was observed.

DISCUSSION

As was noted in the introduction, all the burials found at Chotuna can be assigned to the Late Phase. On the basis of associated grave goods, they can be subdivided into the following groups:

Chimu Late Phase AQ T1–AQ T6

Chimu-Inca Late Phase A2 T1–A2 T4

Colonial Late Phase A2 T5–A2 T9

Given the small number of burials recovered from Chotuna, statements about differences in pathology and general health through time must be made with caution. However, some general observations can be made. There is no skeletal evidence for the introduction of any new diseases during the Colonial Late Phase, as was originally suspected in the case of Burial A2 T6. Of course, this does not rule out the arrival of infectious diseases such as smallpox, bubonic plague, measles, or influenza, which do not leave evidence in bone, but are known to have ravaged coastal Peru after European contact (Cook 1981; 1998). The most common pathological conditions seen at Chotuna (dental caries, periodontal disease, tooth loss, enamel hypoplasia) do not appear to show changes in frequency through time. Dental disease, in the form of caries, periodontal disease, and antemortem tooth loss, was a common problem for adults at Chotuna and is most likely due to a diet rich in carbohydrates such as maize. Similar frequencies of dental disease have been reported for other prehistoric coastal Peruvian populations (Verano 1997).

Also common at Chotuna was enamel hypoplasia, a condition where normal enamel development in a developing tooth crown is disrupted, leading to pits or linear defects on the lingual or buccal surface of the tooth crown. Hypoplastic defects have been linked to childhood illnesses and episodic dietary stress (Goodman and Rose 1990; Skinner and Goodman 1992). They are most frequently seen on the permanent canine teeth and provide a visible record of metabolic stress suffered in the roughly 2–5 year age range, when the canine tooth crowns are developing.

In the 10 Chotuna burials that could be examined for enamel hypoplasia, half had visible enamel defects. This high frequency suggests that childhood diseases or periodic food shortages put children at Chotuna under significant stress during the growing years. Moreover, multiple hypoplastic lines are present in most cases, indicating repeated bouts of illness or nutritional stress.

There are very few other examples of pathology at Chotuna. Only one individual (A2 T2) shows evidence of osteoarthritis. This low incidence of such a universally common affliction of old age is no doubt due to the fact that A2 T2 was the only individual over age 45 found at Chotuna. Vertebral osteophytosis (degenerative changes on the bodies of the vertebrae) was common in adults, although not strongly developed in any one individual. The only examples of traumatic lesions were seen in Burial A2 T2: a healed wound on the frontal bone, and a healed rib fracture.

In total, the skeletal remains of three infants, five children, two adolescents, and five adults were recovered in excavations at Chotuna. Although these remains are for the most part fragmentary and must represent a very small sample of the total number of individuals who were buried at this site over the centuries, they nonetheless provide some information about health and disease at Chotuna. Ongoing study of human skeletal remains from other north coast sites in Peru should soon provide a background against which the pathologies seen at Chotuna can be better interpreted.