Human skeletal remains from Tomb 1, Sipán (Lambayeque river valley, Peru); and their social implications

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The Moche tombs at Sipán, on the north Peruvian coast, are a major addition to our knowledge of high-status élite burial rituals. Its Tomb 1 contains the remains of nine individuals — three adult males, one adult female, three adolescent females and one child — besides the principal burial. Who are these people, as their biological remains instruct us?

Introduction

In late 1987 and early 1988, an archaeological team led by Walter Alva, Director of the Brüning Archaeological Museum, excavated the first of a series of high-status Moche tombs at the site of Sipán (Huaca Rajada), in the central Lambayeque River Valley on the north coast of Peru. The context and contents of the Sipán tombs have been described by Alva & Donnan (1993) and Alva (1994); they provide a rare opportunity to examine the mortuary practices of the élite in the early to middle phases of the Moche state (c. AD 300) (Donnan 1995). This article presents my analysis of the human skeletal remains recovered from the first large chamber tomb at Sipán, designated Tomb 1 (Alva & Donnan 1993).

In January 1988, at the invitation of Walter Alva, I visited the site of Sipán and recorded information on the skeletal material as it was being excavated. After the remains had been removed from the field, I conducted additional study of the material at the Brüning Museum in Lambayeque. The objective was to provide information on the age, sex and physical characteristics of the individuals interred in Tomb 1, and to examine the remains for evidence of pathology and possible cause of death.

The skeletons

Nine human skeletons were recovered from Tomb 1, designated (FIGURE 1):

- Skeleton 1: the principal burial in the tomb
- Skeleton 2: adult male placed above roof of the tomb
- Skeleton 3: adolescent female at head of Skeleton 1
- Skeleton 4: adolescent female at feet of Skeleton 1
- Skeleton 5: adult male at Skeleton 1’s right side
- Skeleton 6: adult male at Skeleton 1’s left side
- Skeleton 7: adolescent female under Skeleton 3
- Skeleton 8: child in southwest corner of the tomb
- Skeleton 9: adult female in niche above the roof of the tomb

General observations

Human skeletal remains and other organic materials in Tomb 1 are relatively poorly preserved compared to contemporaneous materials I have examined from other Moche sites (Verano 1987; 1994a; 1994b; 1997). Factors causing this likely include pressure from tomb fill and overlying sediment, acidity of the clay matrix in which the tomb contents were embedded, and dampness from ground water and occasional episodes of heavy rainfall.

In an attempt to preserve the fragile skeletal remains and to facilitate their removal, the excavation team applied a polyvinyl acetate consolidant to the skeletons as they were exposed. While the consolidant permitted the skeletons to be removed in block for transport

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to the Brüning Museum (Figure 2), its presence made subsequent cleaning and study of the osseous remains more difficult. Solvents applied to separate the skeletal material from its cemented matrix of clay and consolidant were found to cause additional damage to the fragile bone. For this reason, treatment was limited to gentle cleaning of the exposed surfaces of bones. The presence of metal objects, beaded pectorals and other grave-goods presented additional challenges. Many of these were removed during excavation, others left in place and treated with polyvinyl acetate. In such cases, little of the underlying skeletal material could be observed, and complete examination of the skeleton was not possible.

**Skeleton 1**

I examined the skeleton of the principal burial of Tomb 1 at the Brüning Museum. The bones are in very poor condition, and most are splintered into small fragments. The best-preserved elements of the skeleton are the skull and mandible, the bodies of four vertebrae (T11, T12, L1, L2), and the calcanei.

Burial position was extended on the back, with the hands at the sides. The bones comprising the left elbow joint are well enough preserved to indicate that the left forearm was supinated, with the palm of the hand facing upward. The right arm, less well preserved, appears to have had a similar orientation. Both feet were strongly plantarflexed, with the soles of the feet facing one another.

Silver sandals lay between the feet, with the right sandal slightly overlapping the left. The sole of the right sandal, well preserved, has a maximum length of 230 mm along the central axis, and a maximum width at the ball of the foot of 102 mm. If the sandals conformed to the size of the feet of the deceased, these measurements indicate relatively short, wide feet. Unfortunately, the poor state of preservation permits few measurements of the skeleton (Table 1).
**Figure 2.** Skeletons 5 & 6 (foreground) after their removal to the Brüning Museum.

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<td>153.3±3.8*</td>
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<td>158.4±2.8</td>
<td>160.4±3.4</td>
<td>157.2±3.8*</td>
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* epiphyseal union incomplete

**Table 1.** Bone measurements and stature estimates. Regression equations developed by Genovés (1967) were used to estimate living stature from long-bone length. The appropriateness of the Genovés formulae for prehistoric coastal Peruvian populations is discussed in Verano (1994).
The skull, although badly crushed by overburden in the tomb, can be reconstructed (Figure 3). It shows moderately developed superciliary arches, relatively large mastoid processes with well-developed supramastoid crests and a prominent external occipital protuberance. It also exhibits pronounced artificial flattening of the occipital region. The dentition is relatively well preserved, although a number of tooth crowns are broken or have portions of enamel spalled off. A complete adult dentition is present, with no ante-mortem tooth loss or other evidence of dental disease, with the exception of the lower left second molar, which shows a carious lesion on its occlusal surface. The teeth show little occlusal wear, limited in most cases to enamel polishing and moderate cusp wear. Dentine exposure is confined to several small patches on the occlusal surfaces of the first molars.

Several indications of age-related degenerative changes are seen in the skeleton. The margins of the centra of the 11th and 12th thoracic vertebrae show slight osteophytic lipping. The head of the right eleventh rib also shows pitting and lipping of the margins of the articular surface. No other evidence of skeletal pathology is present, but very little of the skeleton is sufficiently preserved to allow observations.

Although the os coxae is too poorly preserved to be useful for sex determination, morphological features of the skull (relatively large mastoid processes, well-developed supramastoid crests and external occipital protuberance) and postcranial skeleton (general size and robusticity of the bones) suggest the remains of a male. The incipient arthritic changes seen in the vertebrae and ribs, along with the lack of pronounced dental wear, suggest an age at death of approximately 35 to 45 years (age and sex determinations use techniques outlined in Bass (1987), Krogman & Iscan (1986) and Ubelaker (1989)).

Evidence of cultural alteration is present in the artificial flattening of the occipital bone, a finding reported in Moche burials from other sites (Stewart 1943; Weiss 1972; Donnan & Mackey 1978). In a sample of 96 Moche crania from the site of Pacatnamú in the Jequetepeque River Valley, 58 (60%) show some degree of occipital flattening, with deformation present in approximately equal frequency in males and
in females. It varies substantially in its degree of expression and is usually asymmetrical relative to the sagittal plane, suggesting that the flattening is more likely an unintentional result of cradle-boarding during childhood than an attempt to alter head shape for aesthetic reasons (Verano 1994:1997). The occipital flattening on the skull of this high-status individual indicates that he was bound to a cradleboard as an infant like any common Moche child.

The right femur of skeleton 1, badly fragmented, was measured in situ; with Genovés' (1967) formula it yielded a stature estimate of approximately 166 cm. TABLE 2 presents stature estimates for Moche burials at the site of Pacatnamú in the Jequetepeque Valley (Verano 1997) and measurements of modern residents of two traditional communities in the Lambayeque Valley (Lasker 1962). Compared to the prehistoric and modern samples, the principal burial in Tomb 1 was relatively tall, falling near the upper end of the range for Pacatnamú males.

**Skeleton 2**

Skeleton 2, the 'guard' of Tomb 1 (Alva 1988), was also examined at the Brüning Museum. Burial position was extended on the back, with the hands at the sides. The skeletal remains are very poorly preserved, and none of the long bones can be measured. Morphology of the pelvis indicates male sex, and dental eruption, tooth wear, and morphology of the pubic symphysis are all consistent with an age at death of between 20 and 30 years, most likely closer to 20. No evidence of pathology is visible, although very little of the skeleton could be examined.

During the excavation of Skeleton 2, it had been noted that the bones of the feet were missing (Alva 1988; Alva & Donnan 1993: 55; Alva 1994: 45). I examined the skeleton for evidence of cut marks or other trauma, but the distal ends of the tibiae and fibulae were too poorly preserved to permit observations.

**Skeleton 3**

Skeleton 3 lay at the south end of the coffin of the principal burial. Body position was extended, face down, with the head to the east. Both arms run parallel to the body, with the hands to the sides. Morphology of the greater sciatic notch and pubis indicate a female. Epiphyses of the proximal tibiae, distal femora, proximal humeri, distal radius and ulna, and hand metacarpals and phalanges are unfused, indicating an age at death of approximately 15–18 years. The skull shows artificial flattening of the occipital bone. Maximum length of the left femur yielded a stature estimate of approximately 153 cm (epiphyseal union not complete); (TABLE 1). No evidence of skeletal or dental pathology is present.

**Skeleton 4**

Skeleton 4 lay at the feet of the principal burial. Burial position was extended, with the head to the west. The body appears to have been placed on its right side, although there is some incongruity in the position of certain skeletal elements (below). Most of the skull, obscured by a copper headdress, could not be examined. Pelvic morphology indicates that the skeleton is that of a female. All visible long-bone epiphyses appear to be closed, but the heads of several metatarsals are still unfused. Maximum length of the right femur yields a stature estimate of approximately 159 cm (TABLE 1).

**Skeleton 5**

Skeleton 5 lay to the east side of the principal burial. Burial position was extended on the back, with the head to the south. Most of the skeleton was covered with copper objects, which obscured all but the top of the skull, a portion of the mandible, and bones of the lower legs and right hand. The mandible is large and
strongly built, with a rectangular chin and large teeth, features that suggest a male. Dental wear is pronounced, with dentine exposed over the entire crown of the first molars and in large patches on the second and third molars. Dental wear suggests an age of 35–45 years at death, based on attrition rates I have observed in other Moche samples. From maximum length of the right tibia (Table 1), living stature was estimated at 158 cm.

**Skeleton 6**

Skeleton 6 was found to the west side of the coffin of the principal burial. The skeleton lay extended on its back with the head to the north, the feet placed together, and the hands at the sides. Size and robustness of the skull and mandible indicate a male. Dental wear is comparable to that of Skeleton 5, with exposure of dentine over most of the occlusal surfaces of the first molars, and patches exposed on the
second and third molars. The loss of the upper left central incisor during life is the only evidence of dental pathology. From the degree of dental wear and the absence of pronounced degenerative changes in the skeleton, age at death is estimated at between 35 and 45 years. From maximum length of the right femur, living stature is estimated at approximately 160 cm (Table 1).

Skeleton 7
Skeleton 7 lay at the south end of the coffin of the principal burial, directly under Skeleton 3. It lay on its back with the legs extended and the head to the east. The left arm was fully extended, with the hand lying alongside the pelvis. The right arm was flexed nearly 90° at the elbow, and lay across the abdominal region.

Age of death is estimated at 15–18 years based on dental calcification and epiphyseal closure. Epiphyses showing no union include the coracoid process of the left scapula, the head of the right humerus, proximal left radius and distal right ulna, distal tibiae, and epiphyseal rings of the vertebrae; epiphyses of the proximal and distal femur show partial union. The permanent dentition is complete, with the exception of the third molars, which are partially erupted, with roots approximately two-thirds complete. The pelvis is too fragmentary to assess sex, but the skull shows small mastoid processes and a lack of pronounced muscle attachment areas. These features, along with general size of the skeleton, suggest a female. Maximum length of the left femur yields a stature estimate of approximately 157 cm (Table 1).

Examination of the dentition reveals a large carious lesion on the lower right first molar that destroyed nearly half of the tooth crown (Figure 4a). Smaller dental caries are present on the interproximal surfaces of the upper right canine and first premolar, and cervical caries on the upper left first and second premolars.
(Figure 4b). No other pathologies are visible, but the high frequency of caries in such a young individual suggests poor health.

Skeleton 8
Skeleton 8 was found in the southwest corner of the tomb, seated with its back against the corner. The individual appears to have been fully articulated when buried, although there was subsequent collapse and settling of skeletal elements. The remains are those of a child, approximately 9–10 years of age, from dental calcification and eruption.

Examination of the dentition reveals a large carious lesion on the occlusal surface of the deciduous upper second molar, and multiple hypoplastic lines on the permanent canine crowns. The hypoplastic lines reflect several episodes of developmental stress, either illness or dietary deficiency, from which the child had recovered, but which left a permanent record in the developing tooth crowns (Skinner & Goodman 1992). The carious lesion on the deciduous molar also might reflect poor health, as caries on the deciduous teeth are quite rare in other Moche skeletal samples (Verano 1997).

Skeleton 8 also shows a developmental defect, occipitalization of the atlas (Barnes 1994: 81–99), or fusion of the first cervical vertebra to the occipital bone. The fusion, probably not noticed during life, would have caused minor loss of mobility in the neck. A number of examples of the defect are known from prehistoric skeletal samples from coastal Peru; it is not considered particularly rare (Barnes 1994: 92). No other evidence of pathology is seen in the skeleton.

Skeleton 9
Skeleton 9 was found in a seated position in a niche cut out of the tomb chamber wall above the level of the timber roof (Alva & Donnan 1993: figure 134; Alva 1994: Lamina 141). It was unavailable for study during my visits to the site, but photographs indicate clearly female morphology of the os coxae, and the presence of an erupted lower third molar and fused epiphyses of the long bones indicates adult age.
Burial position and articulation patterns
During examination of the skeletons in situ, and subsequently at the Brüning Museum, some unusual patterns were noted in body position and articulation. The four male skeletons (1, 2, 5 & 6), fully articulated, lay in the tomb extended on their dorsal side, the characteristic Moche burial position documented at numerous Moche sites (Larco Hoyle 1945; Ubbeholde-Doering 1959; 1967; Donnan & Mackey 1978; Verano 1987; Donnan 1995). The other burials in Tomb 1 showed variations from this position: Skeletons 8 and 9 were in a seated position, and the three adolescent females lay on their sides or face down. More importantly, disarticulation and scattering of some skeletal elements is evident in the three adolescent females.

The adolescent females
Features of Skeletons 3, 4 & 7 suggest their remains were placed in the tomb not around the time of death, but after substantial decomposition of the soft tissues. The evidence is most apparent in Skeletons 3 & 7 from the south end of the tomb, with nearly complete disarticulation and jumbling of the ribs and vertebrae (Figures 5, 6). Skeleton 7 shows additional skeletal elements out of normal position, including a fragment of the body of the sternum, a bone from the right wrist and an isolated third mo-
lar — all found during cleaning of the matrix around the right parietal bone. Skeleton 4, the adolescent female from the north end of the tomb, does not show the degree of bone scattering seen in Skeletons 3 & 7 (Figure 7), but disarticulation and rotation of skeletal elements are beyond what is expected in the in situ decomposition of a fresh body. Specifically, there is an incongruity between the orientation of the upper and lower halves of the body. The legs, pelvis and visible portions of the vertebral column are oriented properly for a body lying face down. The left arm, shoulder and part of the rib-cage are rotated approximately 90° anti-clockwise, into the appropriate position for a body lying on its right side. Also the right elbow is disarticulated, the foot bones are jumbled and the left patella lies on the dorsal side of the left tibia — clearly out of normal position (Figure 8).

This evidence suggests the three adolescent females were not primary interments; the rotation of limbs and jumbling of bones indicate that the remains were moved following the early stages of decomposition. Differential patterns of bone disarticulation suggest that the thoracic and abdominal regions were more thoroughly decomposed at the time the bodies were moved, while limbs preserved sufficient soft tissue to maintain joint articulations. Given the normally dry conditions of the Lambayeque Valley, it is difficult to estimate how much time elapsed between death and final burial of the adolescent females. Spontaneous mummification is common in bodies buried in the dry sand of the northern coastal valley margins, and desiccated bodies can remain relatively stable for centuries if protected from moisture. The principal individual in Tomb 1 was buried in a wood plank coffin. The surrounding extended burials (Skeletons 2–7) were buried in cane coffins or on cane frames wrapped in textile (Alva & Donnan 1993; Alva 1994; Donnan 1995). It is possible that the adolescent females were buried or stored in their cane coffins in another location, then disinterred and placed in Tomb 1 along with the principal burial; the transporting and lowering of the coffins into the tomb shifting their contents.

Relationships of the skeletons in Tomb 1

The presence of seven human skeletons surrounding the coffin of the principal burial of Tomb 1 raises the question of their relationship to him, as well as to one another; their identified sex and ages may provide insight. Skeleton 2, a young adult male, is presumed to have the role of guarding the tomb. Skeleton 9, the adult female placed in a niche above the roof of the tomb, is also presumed to be a retainer for the tomb. Skeletons 5 & 6, both males of approximately the same age (35–50 years) lay at each side of the principal coffin. Like Skeleton 1 they were extended in the standard Moche burial position and presumably were primary interments.

At the head and feet of the wooden coffin were three adolescent females, with patterns of skeletal disarticulation suggesting secondary, or delayed burial. One can only speculate as to whether they were relatives, wives, consorts or sacrifices; their being females in the 15–20-year age-range lends support to the idea of sacrifice rather than natural death.

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**Figure 8.** Lower leg and foot bones of Skeleton 4, showing the left patella (arrow) lying on the dorsal surface of the left tibia, and the jumbling of foot bones.
etons surrounding the principal burial strongly suggests individuals who either sacrificed themselves or were sacrificed by others to accompany him to the grave.

**Tombs 2 and 3**

A second large chamber tomb, Tomb 2, discovered at Sipán in 1988 (Alva & Donnan 1993; Alva 1994), shows similarities to Tomb 1 in its general form and contents. It also contained a principal burial in a wood plank coffin, surrounded by extended burials in cane coffins or burial shrouds. Although Tomb 2 also had a young adult male 'guard' with missing feet, and a female retainer in the tomb chamber, none of the skeletons showed disarticulated or jumbled elements. The third high-status tomb at Sipán, Tomb 3, considerably smaller in size, contained only a principal burial and a sacrificed female forced into a small space at one end of the tomb (Alva & Donnan 1993; Alva 1994; Verano 1995: 197). From the three intact high-status tombs excavated at Sipán, it is clear that there was considerable variability in the form and contents of élite tombs.

**Sipán and Moche funerary tradition**

In a recent survey of Moche funerary practices, Donnan (1995) argues that the Sipán tombs, although clearly the most elaborate ever scientifically excavated, conform to basic canons of mortuary behaviour shared by both commoners and élites in Moche society. This pattern involves standardized burial position, the placement of the corpse in a shroud and additional wrappings of mats, cane tubes or coffins; the placement of objects in the hands and mouth, and general features of the burial chamber. Donnan sees a continuum from the simplest shroud-wrapped bodies in shallow pits with few grave-offerings to élite tombs with large quantities of grave-offerings, including animal and human sacrifices. Retainer burials in Moche tombs are relatively rare, but have been reported from élite Moche tombs in four northern coastal valleys (Donnan 1995). In most of these cases, the retainers appear to have been sacrificed and placed (often in a perfunctory manner) in the tomb of a high-status individual. Female retainers in Tombs 2 and 3 at Sipán conform to this pattern (Verano 1995). The distinctive feature of Tomb 1 is the evidence of delayed burial of three of the individuals accompanying the principal interment.
While this is the first reported example of such behaviour among the Moche, recent excavations at the site of San José de Moro in the Jequetepeque River Valley have uncovered additional examples of jumbled bones in some of the relatively high-status ‘boot’ tombs at the site. Nelson & Mackey (1997) report patterns of disarticulation and jumbling of the bones of the thoracic area quite similar to that seen at Sipán, and interpret this as evidence of delayed burial. Unlike Sipán, however, are not sacrifices accompanying an elite burial, but are the principal occupants of tombs. Nelson & Mackey suggest as possible explanations an extended funerary ritual resulting in partial decomposition of the corpse, followed by shifting of the body during transportation and lowering of the coffin into the tomb.

In the case of Tomb 1 at Sipán, the most complex and elaborate Moche tomb known, an extended mortuary ritual would certainly be expected; it is possible that many or all of the bodies, including the principal burial, were in a state of advanced decomposition when the tomb was sealed. However, the principal burial and the two males flanking him either were not substantially decomposed when lowered into the tomb or were handled in such a way that the contents of their coffins did not shift. Perhaps the adolescent females were manipulated more than others during the placement of offerings in the tomb, resulting in greater disturbance of their remains. Alternatively, their bodies may have been brought from distant locations, perhaps as offerings. Given the unusual preservational conditions of coastal Peru, it is possible that these individuals had been dead for many years before being relocated to Tomb 1.

Old World parallels
Brothwell (1987) has found a similar pattern of partially disarticulated skeletons in medieval burials from the Jewebury cemetery in York. He notes (1987: 23) that in these cases,

The disarray of bones affected the trunk in particular, so that ribs and vertebrae could be scattered well out of alignment...[while] the long bones usually display less disturbance.

Brothwell suggests that the Jewebury burials with ‘tumbled bones’ are those of individuals who died in Lincoln, 76 miles away, and were transported to Jewebury for burial; the extended time involved in funeral arrangements and travel resulting in decomposition and partial disarticulation of the body. Boddington (1987) reports similar patterns of disarticulation in many of the burials in the Anglo-Saxon cemetery at Raunds, Northamptonshire.

Disarray of the vertebrae and ribs has been observed in radiographs of certain Egyptian mummies (Figure 9) (Fawcitt et al. 1984; Brothwell 1987). In this case, the disarticulation is not the result of natural decomposition and delayed burial, but is the result of post-interment disturbance of a mummified body, either by grave robbers or during transportation from tomb to museum.

Conclusion
The cases described above provide parallels to findings at Sipán and San José de Moro, and suggest that one of several mechanisms could produce the observed patterns of disarticulation. The Moche left no written accounts of their mortuary practices. While rare glimpses of mortuary ritual appear in their art (Donnan & McClelland 1979), the archaeological record provides the most detailed body of evidence — limited as it may be. Donnan (1995) estimates that less than 350 Moche burials have been excavated and recorded by archaeologists, and the quality of information varies considerably. The recent findings at Sipán and San José de Moro underline the importance of careful field recording and analysis of skeletal remains, for these data are critical to our understanding of Moche funerary behaviour.

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