A PRELIMINARY REPORT ON THE HUMAN REMAINS FROM A ROCK-CUT CHAMBER TOMB NEAR 'IRĀQ AL-'AMĪR

by

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Introduction

In 1996, the archaeological survey in the area called al-Qaṣabāt on the hill slopes east of Wādī as-Sīr exposed a concentration of rock-cut chamber burials from the late Chalcolithic period or possibly the transition to the Early Bronze I period. In the same year, a salvage excavation was carried out as part of the survey project at one of the rock-cut chambers (Ji 1997). In this tomb, two layers were found on the floor. Layer 1, a surface layer brown to red in colour, contained 12 human skulls and a large quantity of human long bones. The postcranial bone pile and associated skulls were placed about 10-15 cm deep. Layer 2 was a 15-20 cm deep dark gray ash layer mixed with many small bone fragments and several scattered long bones. The prevalence of disarticulated long bones and incomplete skeletal remains points out this tomb as a possible multiple, secondary burial site.

The tomb under consideration was cut into a block of soft limestone rock and carved in a rectilinear shape. The interior of this tomb measures 2.4 m long, 1.8 m wide, and 1.4 m high. The ceiling is slightly rounded, and at the back is an irregularly-shaped bedrock depression that measures 30 cm wide and 15 cm deep. The entrance is oriented toward the west and is 95 cm high and 90 cm wide. Thus, the general plan, except for the depression in the rear, is typical of rock-cut chamber tombs found in the region of Wādī as-Sīr and Wādī Ḥisbān (Ji 1997). Many boulders blocked the tomb when the survey team discovered it.

Results of the Analyses

On the basis of the work completed thus far, a total of at least 27 individuals were buried in this tomb chamber. The bone piles from the tomb yielded skeletal remains from 14 adults in addition to the remains of six subadults18 years old or younger. One fetal skull (approximately 8 to 9 months prenatal) was also found in the tomb. Yet, a total of 25 right and 22 left femoral bones have been identified in skeletal specimens. Since there are undoubtedly some examples where a right femoral does not have a matching bone from the left, 27 should be viewed as the minimum number of individuals buried in the tomb. In general, the skeletal remains are poorly preserved and thus some pathological information may not have been recovered.

Relevant macroscopic methodologies have been applied to determine age and sex (cf. Brothwell 1981; Krogman 1962; Meindl and Lovejoy 1985; 1989; Meindl *et al.* 1985; el-Nofely and Iscan 1989; Sjovold 1990; Szilvassy 1990). Age is estimated on the basis of molar analysis, cranial suture, and ossification of the long bones, while sex is determined according to the discriminating characters of the skull, pelvis, and bone robustness. Cranial and femoral morphology indicates that at least five males and five females are present among the adults. Sex cannot be estimated reliably using cranial and femoral morphology for the remaining four adults. Ages at death are estimated from the extent of dental attrition and innominate morphology. The following number of individuals are assigned to four and nine year intervals: two from 20 to 24 years; one from 20 to 29 years; five from 25 to 29 years; one from 25 to 34 years; one from 30 to 39 years; one from 35 to 44 years; one from 40

to 49 years, and one 50 years or older. On the other hand, the youngest of the six identified subadults (Subadult 1) is 0-12 month old, as estimated from crown-rump length. The age of Subadult Number 2 is 9 years + 24 months as estimated from dental formation; Subadult Number 3, 11 years +30 months. Subadult Number 4 is 0-3 years old as estimated from the chronological order of appearance and fusion of epiphyses. Estimated age at death for Subadult Numbers 5 and 6 is between 14 and 18 years.

Innominate morphology indicates seven males and four females. Sex cannot be estimated reliably for the remaining five innominata. Age-related changes of the pubic symphysis are scored using the Todd and Suchey-Brooks scoring methods. Morphological changes of the pubic symphyseal face are considered to be among the most reliable criteria estimating age-at death in adult human remains (Ortner and Putschar 1981; Ubelaker and Buikstra1994). The five undetermined os coxae were in very poor condition with less than 25% completeness. There are 10 adults whose age ranges from 20 to 35 years; five adults, 35 to 50; one adult, 50 or more. Estimation is based on measurements of the ventral arc, subpubic concavity, ischiopubic ramus ridge, greater sciatic notch, and the preauricular sulcus (Buikstra and Mielke 1985; Jaffe 1972; Milner 1992;Phenice 1969).

Living stature is estimated from long bone lengths using the regression formulae developed by Trotter and Gleser (1958; Saunders 1992). All estimates are made from femoral lengths (Table 1). The stature for three females averages 161 cm with the range between 157.2 cm and 164.8 cm, whereas that of four males, 165.5 cm with the range between 161.7 cm and 169.3 cm.

The burned skeletal specimens from this chamber exhibit two types of reaction to burning. Bāby (1954) suggests that when bones are dry at the time of burning, they may split but do not become deformed. If

Table1. Inventory of the Human Remains.

Identification Number	Right femoral Length in centimeters	Estimated Stature in centimeters	Sex
1	45.26	169.88	M
2	43.23	165.51	M
3	44.25	167.71	F
4	--	--	F
5	--	--	M
6	41.92	162.70	M
7	42.42	163.77	M
8	40.79	160.27	F
9	--	--	F
10	--	--	F
11	--	--	F
12	38.35	155.02	F
13	--	--	F
14	--	--	U
15	--	--	M
16	--	--	F
17*	22.35	120.62	M
43	--	--	F
212	--	--	M
219	--	--	M
226	--	--	F
214	--	--	F
220	--	--	U
227	--	--	F
213	--	--	M

M=Male; F= Female; U=Uncertain; * Juvenile
Stature was calculated on the basis of Trotter and Gleser (1958); Sex determination on the basis of Krogman (1962).

the bones are covered with flesh, however, they tend to develop transverse fractures and marked deformation. In our case, evidence of the former condition is found on cranial bones and numerous long bones, the latter condition on one humerus and possibly one parietal.

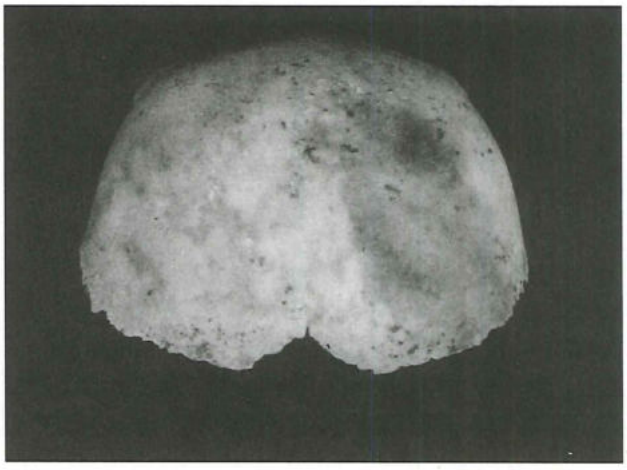
Turning to pathological evidence, we note that two of the bones examined show abnormal periosteal bone apposition, remodeling, thickening of the cortex, or other infectious disease. Ubelaker (1981) has described periosteal lesions of a fibula fragment, much like the one of the two bones found at our rock-cut chamber tomb. The periosteal surfaces of a tibia and a fibula show the lesions were inactive at the time of death.

Porotic hyperostosis is present on five subadults and five adults, and the cranium of an infant shows extensive cribra orbitale in both orbits. Subadult 2 shows porosity on

the occipital and parietals near the lambdoidal suture; Subadult 3, perforation concentrations in the same area as well as in the right orbit. On the other hand, Subadult 4 shows slight cribra orbitale in the left orbit with fine perforations on the posterior side of the left and right temporals. Subadult 5 shows cribra orbitale in the left socket with pinpoint perforations on the palatine process as well as fine perforations along the superciliary arch, glabella, and supra-orbital margin. The cranium of Adult 1 shows perforations and thickening on the occipital above the nuccal lines and on most of the posterior third of the parietals. Adult 2 includes the evidence of perforation concentrations in the palatine process. Perforations on other adult crania include the internal occipital protuberance along the occipital crest. The bone marrow reactions in a skeleton with porotic hyperostosis include porous labyrinth-like lesions of the skull vault. A broken section of a parietal presents an expansion of the diploe. Investigators have generally attributed this kind of lesion to a bony response to anemias, which are either reditarily hemolytic (causing the destruction of red blood cells), or caused by iron deficiency, vitamin deficiency, or such diseases as malaria and thalassemia as possible causative factors (el-Najjar, Lozoff, and Ryan 1975; el-Najjar and McWilliams 1978). Walker (1986) has suggested that porotic hyperostosis is sometimes due to nutrient losses associated with diarrheal diseases rather than a diet *per se*, a position supported by Kent (1987). Mensforth and his colleagues (Mensforth and Lovejoy 1985; Mensforth *et al.* 1978) demonstrate, using the prehistoric Libben sample, that a common cause of porotic hyperostosis is the normal physiological sequelae of infection. They have found a direct relationship between periostitis (infection) and porotic hyperostosis (iron deficiency) in adults. This is consistent with clinical data suggesting that iron stores may be sequestered within the body as a defence against infection. Thus, much prehistoric porotic hyperostosis may be the secondary consequence of infectious disease, not of diet (White and Folkens 1991).

A frontal bone of a 0-5 year old is normal except for the 32.2 x 59.4 mm area that presents a lesion perhaps of interest to the paleopathologist (Fig. 1). In general, this predominantly dark purple bruise-like lesion presents itself in one concentrated area; however, the superior lateral and inferiolateral areas of the frontal bone have 1-2 mm red-brown lesions. Whether this is due to a congenital problem or trauma is not clear. Further study and analysis are needed. Yet, the texture and appearance of the outer and inner tables of this subadult frontal bone are normal.

Of the long bones, the femur was the most frequently affected with specified conditions. Conditions in a long bone may be the response to the same disease: lipping and exostoses may be the result of an arthritic infection, or perhaps even a manifestation of the aging process (Ubelaker 1981). Swelling of the shaft, especially in the femur and tibia, is the most frequent condition in our human remains. Tibial and femoral swelling are localized usually in the middle of the shaft. Bowing is also evident, although whether the pronounced bowing in the long bones can be considered pathological is not

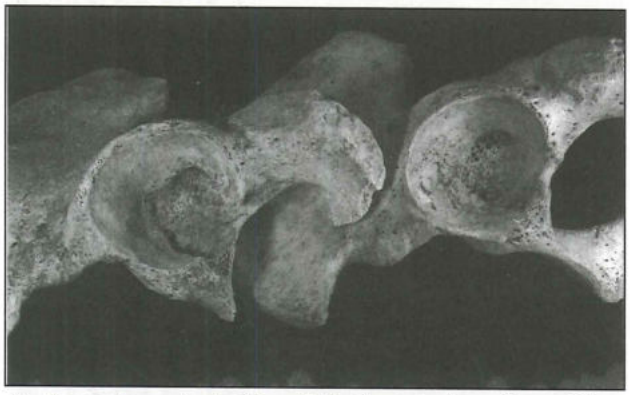


1. External View of the Frontal Bone of a 0-5 year Old with predominantly Dark Purple Bruise-like Lesion (32.2 x 59.4 mm).

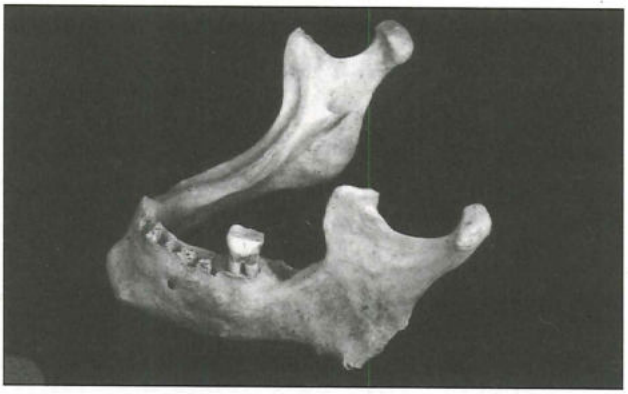
certain.

The innominate, sacrum, and scapula are also examined for pathology and anomalies. The innomiate of females manifest about two times the incidence of pathology noted in males, especially in the prevalence of lipping and exostoses. In regard to location of the pathology in the pelvis, arthritic lesions are noted frequently in the symphysis and acetabulum. Osteroarthritis is present on a rim of an acetabulum (Fig. 2). The acetabulum is enlarged and shallow with considerable osteoarthritis on the periphery of the joint. The arch of the curve corresponds to the curve of the anterior edge of the acetabular rim, and it seems somewhat likely that the surface of a femoral head is frequently articulated with the rim. The right humerus of one of these skeletons has periarticular cystic lesions between the joint surface and the greater tubercle of a humerus. (Note that the term "periarticular" in this paper refers to the anatomical area that is adjacent to but not part of, the joint surface. The term peripheral is used to denote a lesion on the edge of the joint surface.)

Periodontal disease is quite prevalent among the 13 mandibles uncovered at this site. Periodontal disease in these mandibles is recognized as a result of infection of the alveolar bone and adjacent tissues (personal communication with B. Giang). In many of the 13 mandibles, excessive recession of the alveolar bone in a horizontal lowering of the crest of the alveolar process and an irregular lowering of the process, with pockets and wells, expands into the cancellous bone of the lower jaw. The agents of infection are microorganisms, and the disease is usually due to the combined effects of large, mixed communities of bacteria (White 1991: 354). Dental calculus and furcae are visible in adult specimens. This mineralized plaque on a tooth surface is seen on 45 percent of the 11 mandibles that have remaining teeth attached to their respective alveolar sockets. An adult with excessive occlusial wear, exposed dentin, and insufficient alveolar bone height has a very worn down left coronoid process (Fig. 3). Frequencies of teeth missing antemortem represent only examples in which the alveolus is available for examination, and display remodelling, clearly suggesting that the tooth was lost before death. Alveolar abscess is seen in one of the three maxilla specimens. According to Ubelaker (1981), maxillary abscesses occur primarily in the incisors, followed by the canines and molars. The abscess over a canine and a premolar is seen in a young female. Some teeth are present, but are damaged in a manner that observations of calculus cannot be made. In mandibular teeth, calculus occurs with greater frequency on the buccal sides of the premolars and molars rather than the lingual surfaces of these teeth. Most of the



2. An enlarged, shallow left Acetabulum (note Lipping of the Rim; probably the Surface of the femoral Head frequently articulated with the Rim).



3. Periodontal Disease of Adult Male Mandible with Occlusial Wear, Exposed Dentin, and Insufficient Alveolar Bone Height. Left Coronoid Process Worn down. Second Molar is the only Tooth Present.

anterior teeth of the mandibles, however, have been lost postmortem.

The possibility of just the head of an infant being placed inside the tomb exists, reminding one of Ortner's (1981b:128) observations at the Early Bronze cemetery in Bāb adh-Dhrā'. Although the tombs of Bāb adh-Dhrā' are shaft tombs typologically different from the rock-cut chamber tomb in Wādī as-Sīr, the two cemeteries are worthy of further comparison in the future because of their contemporaneousness.

Discussion and Conclusion

At this stage of research we can offer only a few generalizations about the skeletal biology of the people who lived in the region of 'Irāq al-'Amīr during the transition from the Chalcolithic period to the Early Bronze I period. As mentioned above, a minimum of 27 individuals have been found at the tomb under consideration. Of the 20 identifiable adults and subadults, 14 individuals (70%) are 18 years old or older and six (30%) are 18 years old or younger. A very similar ratio between adult and subadult skeletons has been found at the Early Bronze IA shaft tombs at Bāb adh-Dhrā' (Ortner 1981; Ortner and Frohlich 1982). This ratio is also more or less true of the Early Bronze cemetery at Karatas in Turkey: Angel (1976: 389) reports on a skeletal sample of 583 individuals in which 33% are subadults and 67% are adults. It must be noted, however, that Angel uses a lower age limit, 14 years, for the subadult age range than is used in this report. Some may call attention to the study of Middle Bronze skeletal remains from Lerna, Greece, suggesting that a much higher infant mortality rate than that found at the rock-chamber tomb in 'Irāq al-'Amīr and the shaft tombs in Bāb adh-Dhrā' (cf. Angel 1971: 70). Ortner's study (1981a:132; cf. Walker, Johnson, and Lambert 1988) of the comparisons of infant mortality, however, notes that such comparisons are difficult, unless most infant skeletons are buried in the cemeteries at the time of death and are recovered at the time of excavation.

It is well known that in Jordan and Israel, many different burial traditions are found in the late Chalcolithic period and its transition to Early Bronze I. Such lack of standardization of burial forms may reflect the cultural and social diversity of the late Chalcolithic and Early Bronze I society (van den Brink 1998; Hanbury-Tenison 1986). As stated above, there are two sets of burial forms for the late Chalcolithic and Early Bronze I in the region of 'Irāq al-'Amīr. The ongoing 'Irāq al-'Amīr survey project has shown that in the region of Wādī as-Sīr and Wādī al-Kafrayn, dolmens are clustered in three regions, i.e., al-Qaṣabāt, al-Maṭṭala, and Tall Magbī (Ji 1997; 1998; Swauger 1965; 1966). It was previously proposed that in the 'Irāq al-'Amīr region, the people who made rock-cut chamber tombs and dolmens did not conduct any extensive building activity nor build permanent settlements. This proposition, however, may need to be revised according to new evidence. In 1998, the 'Irāq al-Amīr survey team identified about 15 Chalcolithic and Early Bronze I sites including at least four village settlements along Wādī al-Kafrayn and the Umm Haddar Plains (Ji and Lee 1999). For example, Tulaylāt Umm Haddar South and North are situated on gentle knolls overlooking the Wādī al-Kafrayn dam-lake, about 2 km northwest of Tall Magbī. Survey Sites 139 and 157 include architectural remains probably dated to the Chalcolithic and Early Bronze I periods. They are about 3 km south of the al-Maṭṭala dolmen field near 'Irāq al-'Amīr. Given the geographical proximity of these Chalcolithic and Early Bronze I village settlements to Tall Magbī and the al-Maṭṭala dolmen field, it is not improbable that Tall Magbī and the al-Maṭṭala dolmen field were the cemeteries for these nearby Chalcolithic and Early Bronze I villages, though at this stage, the available data cannot as yet prove such association. In

comparison to the dolmens, the relationship between the rock-cut chamber tombs and the Chalcolithic-Early Bronze I settlers along Wādī al-Kafrayn remains much more ambiguous, since no rock-cut chamber cemetery has been found in close association with Chalcolithic and Early Bronze I settlements along Wādī al-Kafrayn and the Umm Haddar Plains. Accordingly, the view that the rock-cut chamber users probably engaged in pastoral nomadism seems to still be tenable (Ji 1997).

In general, we lack archaeological evidence for the immigration of outside populations to the 'Irāq al-'Amīr region during the late Chalcolithic and Early Bronze I period (Ji 1997). Both burial forms of dolmens and rock-cut chamber tomb seem to be the concept of an indigenous population which was comprised of two cultural or social groups who used different burial forms in the same region, so long as the two burial forms were contemporaneous. However, if the main period of use of rock-cut chamber tombs is slightly earlier than dolmens, these two different burial forms may represent a radical change in cultural tradition during the transition from the late Chalcolithic to the Early Bronze I. In conjunction with this suggestion, note that the constant exchange of people, their diet, and their health beliefs and practices tend to present an influence on the overall mortality rate of the population. Ortner (1979) suggests that differences in burial in underground tombs and ground level charnel houses found at Bāb adh-Dhrā' reflect cultural change which took place during the Early Bronze I period, and this cultural change led to the alteration of mortality rates. Two different burial types (i.e., rock-cut chamber tombs and dolmens) in al-Qaṣabāt area may also indicate that a significant cultural change occurred in the 'Irāq al-'Amīr region during the transition from late Chalcolithic to the Early Bronze I period. It is as yet not clear, however, whether or not such cultural change had any significant impact on the human mortality in the 'Irāq al-'Amīr region.

In light of this preliminary analysis, the human remains from our rock-cut chamber tomb may posit that the people in the 'Irāq al-'Amīr region enjoyed relatively good health status during the transition from the late Chalcolithic and Early Bronze I, although they often suffered from arthritic lesions, porotic hyperostosis, periodontal diseases, and other pathological anomalies. This view is supported by the discovery of a large number of beads, rings, and bracelets in the rock-cut chamber tomb. This suggestion may not lend credence to the popular view that health status of Neolithic and Chalcolithic populations were generally better than that of Early Bronze I and II populations (Smith 1989). When taken together with material remains from the tomb, however, the present study may point to a relatively high living and health standard of the rock-cut chamber users who lived in the 'Irāq al-'Amīr region in the late Chalcolithic and Early Bronze I periods.

To summarize, the tomb excavation during the field season of 1996 has provided the human skeletal remains which may permit us to place Wādī as-Sīr people in the context of the broader biological and cultural history of the region. A more careful evaluation, however, is needed to examine the curious lack of congruence between the number of individuals represented in contrast to the post cranial skeletons found in the bone piles. Further analysis of the cultural practices may provide clues about whether or not all of our skeletal materials were placed in the tomb at the same time. In addition, some congruities between our rock-cut chamber tomb and Early Bronze IA shaft tombs at Bāb adh-Dhrā' deserve our attention: (1) the proportion of adults and subadults identified at both tombs is quite similar; (2) the remains of infants aged less than one are present at both tombs, although such remains are almost always missing from other

Early Bronze Age sites; and (3) both tombs are secondary, multiple burial tombs (cf. Lapp 1968; Smith 1989). In addition, note that the rock-chamber tomb is dated to the transition from the late Chalcolithic and Early Bronze I, roughly contemporaneous to the shaft tombs at Bāb adh-Dhrā', A comparative study of the two cemeteries may shed further light on the cultural and biological history of the people who lived in Jordan during the late Chalcolithic and Early Bronze I periods.

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