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SKELETAL REMAINS AND SOCIO-ECONOMIC IMPLICATIONS OF MORTUARY PRACTICES AT QSAR ES-SEGHIR, MOROCCO

by

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INTRODUCTION

Qsar Es-Seghir is a medieval Portuguese fortress located between Tangier and Ceuta, Morocco on the Straits of Gibraltar. (Lat. 35° 52' North, Long. 5° 34' West).

The site has been under investigation since 1974 as "an interdisciplinary research project concerned with general problems of history during the 12th to 16th centuries" (Redman 1976:1).

Information from historic documents and archaeological work done suggests that there were three major occupational phases at Qsar Es-Seghir, as follows (after Redman 1976:5-9):

Early Islamic	AD 700 - 1280
Late Islamic	AD 1280 - 1458
Portuguese	AD 1458 - 1550

In 1458, the beginning of the Portuguese period, the city of Qsar Es-Seghir underwent a massive rebuilding and modification period evidenced through the archaeological and historical records (Redman 1975, Schulman 1979). Consequently the large congregational mosque was purified, rededicated, and converted into a Christian church. During this time the church floor and an area northwest and adjacent to the church, 'the cemetery,' were used extensively by the Christian Portuguese for interment. These two areas, the church and the cemetery, and the skeletal remains within them, will be the focus of this thesis.

The skeletal remains from Qsar Es-Seghir are the first to be excavated from this period of Moroccan history and, because of the paucity of comparative Medieval skeletal material from the "Iberian States," the

first goal of this study is to present a description of the skeletal remains.

Secondly, an attempt will be made to demonstrate that the general morphology of the two skeletal groups, church and cemetery, differs in size and that this size difference is a direct result of socio-economic factors existing between the groups.

To test this hypothesis, a Student's t-test was employed, comparing the mean scores of skeletal measurements and selected indices derived from these measurements, that reflect size and shape (Bass 1971, Olivier 1969).

CHAPTER I

SITE HISTORY

The site of Qsar Es-Seghir lies in a valley beside an outlet of the river Oued Qsar Es-Seghir, which empties into a natural harbor. This natural harbor is located at the narrowest point of the Straits, only twenty-three kilometers from the coast of Spain and the modern city of Tarifa, making it a favorable spot for trade and other activities between Spain and Morocco. The modern village of Qsar Es-Seghir is located on the opposite bank of the river, overlooking the harbor.

The site of Qsar Es-Seghir is a small city enclosed by a large circular stone wall and moat, measuring approximately 200 meters in diameter. The moat and wall are connected to a large fortified area, the citadel, which surrounds an earlier Islamic city gate. From this fortress extends a walled corridor that runs along its river side onto the beach (Figure 1). The walls and Islamic city gate were constructed in 1289 while the moat, corridor, and other fortifications were built by the Portuguese after 1458 (Schulman 1979) (Figure 2).

Within the circular city walls are the remains of Islamic buildings constructed of brick and stone dating from about AD 700 to 1458. Portuguese cut stone and mortar structures dating from AD 1458 to 1550 are superimposed on the Islamic remains. The preservation of the city structures is excellent as the site was not reinhabited after the Portuguese abandoned it in 1550 (Redman 1976, Schulman 1979).

A large number of artifacts has been uncovered from the three levels

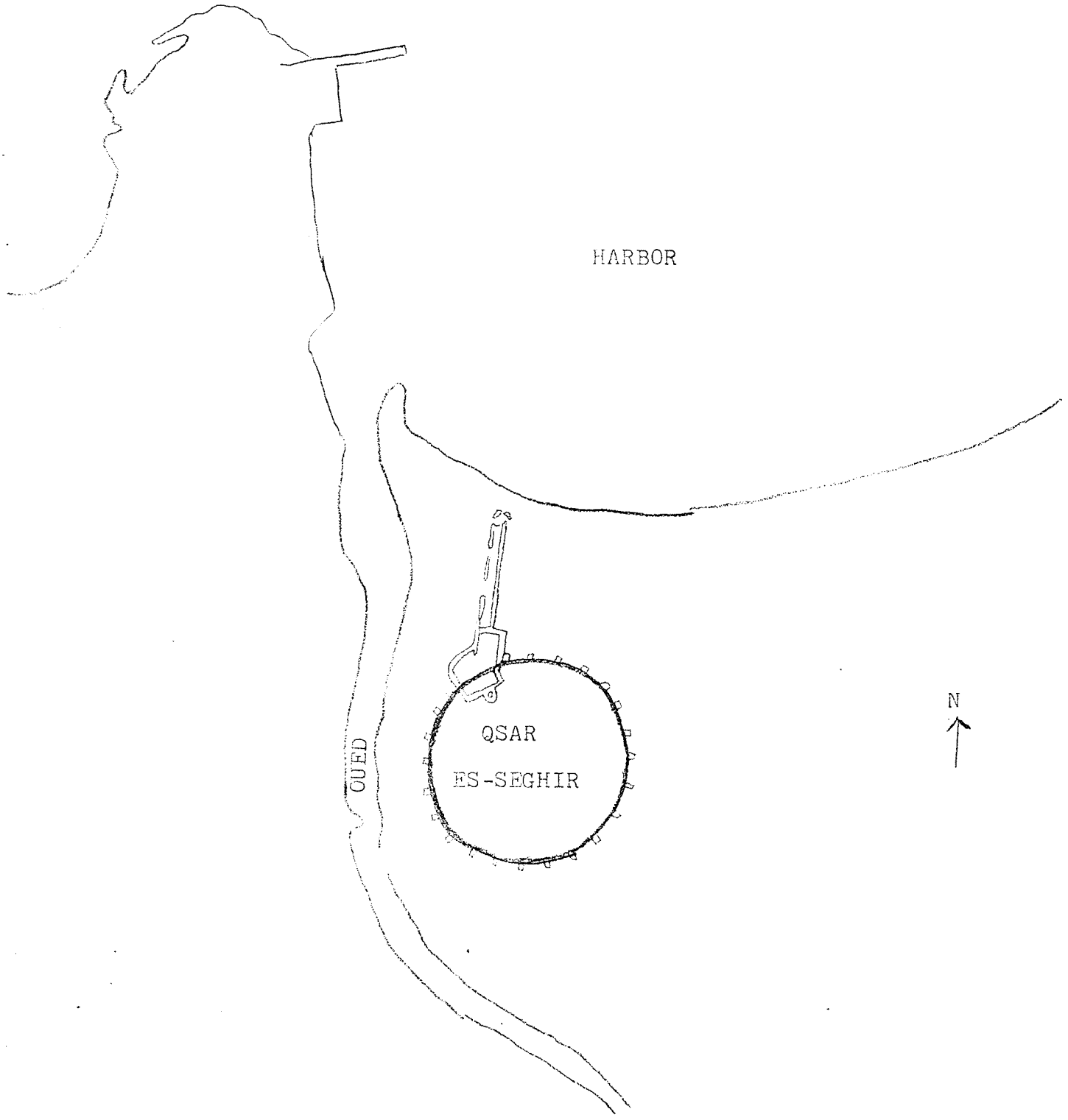

Fig. 1. Map showing the walled city of Qsar Es-Seghir
Scale 1/5000

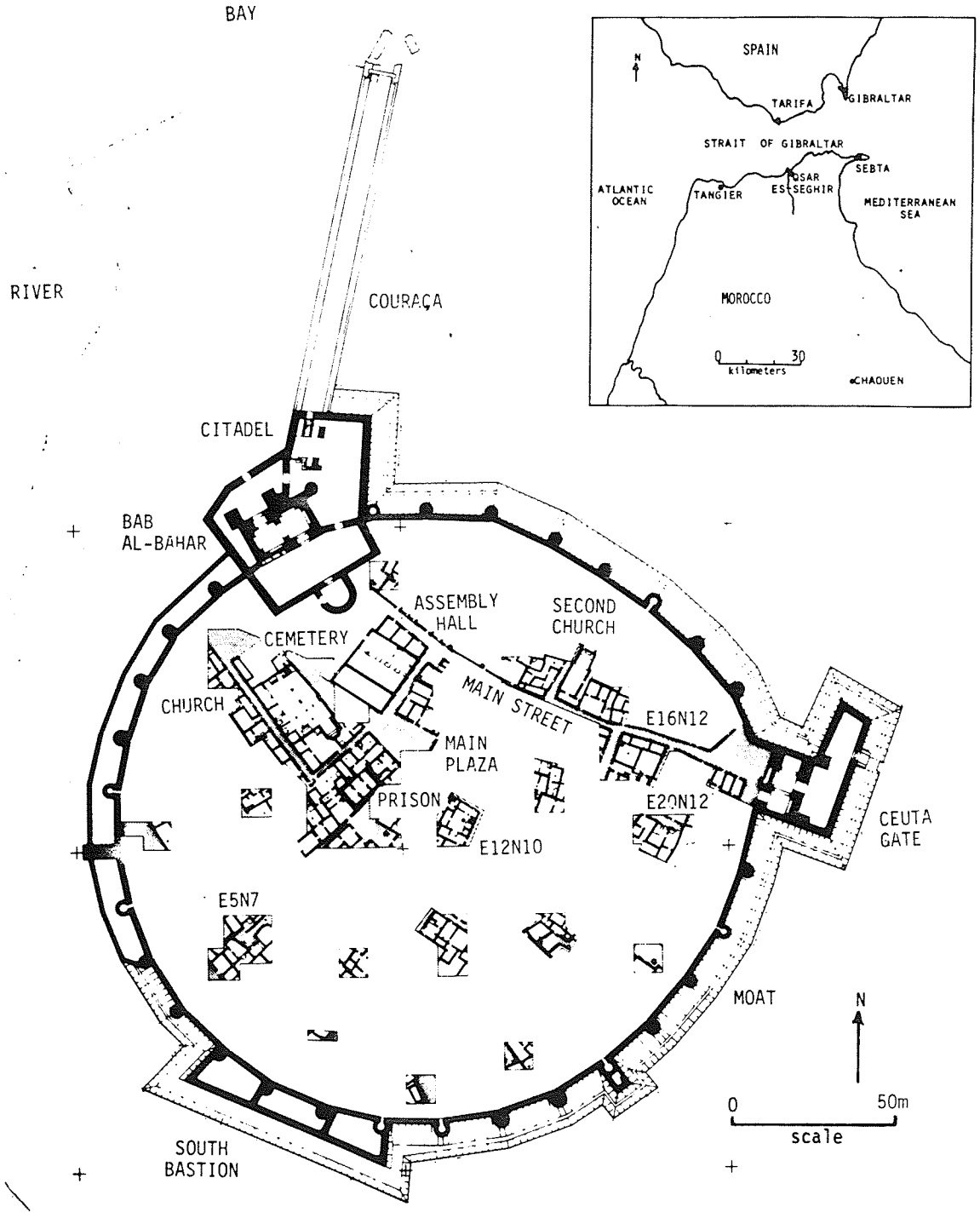

Figure 2. Walled city of Qsar Es-Seghir showing excavated areas.

of Islamic and Portuguese phases. These include pottery, glassware, coins, and various armaments. Domestic implements such as knives, scissors, shovels, axes, and nails have also been recovered in large quantities. The artifactual inventory is quite large and varies considerably between the Islamic and Portuguese occupations. Pottery from the Islamic levels was varied in style and was generally multicolored, having geometric patterns and designs. Portuguese pottery tended to be more standardized, with large quantities of plainware or, if glazed, with monochrome glazes. Coins were abundant in the Portuguese levels, occurring in small caches, but not so numerous in the Islamic ones. Large inventories of iron swords, daggers, armor and nails were recovered from the Portuguese levels not contained in the Islamic.

The most interesting difference between Islamic and Portuguese occupations was not in the artifacts but in the physical arrangements of houses and space dictated by the city's circular walls. Islamic levels were characterized by relatively few open public areas, small narrow streets with unpretentious house facades. Portuguese levels stressed open areas, streets were more uniform and generally cobbled, and houses were more decorative, having carved lintels and window borders.

EARLY ISLAMIC (AD 700 - 1280)

The earliest historical reference to the site is mentioned by the writer Al-Baki, who calls the city Qsar Al-Awwol, or "the first castle." This is one of several names given to the city throughout the Middle Ages.

Prior to AD 700 the city probably existed as a small relatively inactive port, participating in limited trade in the Mediterranean. It is possible that Phoenicians and Romans occupied the area before the

Muslims, but evidence of these earlier settlements within the city wall of Qsar Es-Seghir has not been substantiated by excavation.

In AD 711 Tariq Ibn Ziyad embarked from the port, which was then known as Qsar Masmuda, named after a tribe inhabiting the area, to begin the first Muslim conquests of southern Spain.

Between AD 1180 and 1280 the site became a prominent economic and military center. The Almoravid (1056 - 1147) and Almohad (1130 - 1269) dynasties of Morocco used the city as a departure point for their military invasions into Spain. Large Islamic armies passed through and occupied the city periodically, thus contributing to its economy and importance.

During the second half of the 13th century the Marinids (1296 - 1470) gained control over Morocco and used the city as an embarkation point for crossings into Spain. Abu Yusuf Yaqub (1286 - 1307), a Marinid ruler, crossed the Straits four times from Qsar Masumda between AD 1275 and 1285. At this time the site was renamed Qsar Al-Majaz, or "castle of the crossing." It was not until the 14th century, when it diminished in importance, that Qsar Al-Majaz was again renamed, and became known as Qsar Es-Seghir, or "small castle."

Throughout this early period of occupation, Qsar Es-Seghir was an active and prosperous town, busy supplying and trading with the Moroccan armies that passed through on their way to Spain to fight the "Reconquista." Its prosperity and importance fluctuated periodically with both the political and economic conditions of the ruling dynasties.

LATE ISLAMIC (AD 1280 - 1458)

In 1289 the monumental gates and city walls were built for the glorification of Allah and as a defense against Christian advances from Spain (Schulman 1979).

In 1291 the Christians captured the city of Tarifa located across the Straits opposite Qsar Es-Seghir, and discouraged any further Marinid invasions against the Reconquista. Thus began a period of military decline and loss of revenue for Qsar Es-Seghir. Despite this, the inhabitants of Qsar Es-Seghir adapted to other means of livelihood. Weaving became the major activity, bringing them fame as producers of fine linen (Schulman 1979). The site may also have served as a small trade and fishing center supplying products to southern Spain and Granada. More importantly, Qsar Es-Seghir became a stronghold for pirates who raided and disrupted shipping in the Straits (Schulman 1979).

PORTUGUESE (AD 1458 - 1550)

From the late 14th century to the early 15th century Portugal became actively involved in the Crusades against the "Infidels" of the Iberian Peninsula. This necessitated control of the Straits and the establishment of ports along the coast of Africa, and the beginning of their expansion and conquest to areas in northern and sub-saharan Africa.

Portugal organized several campaigns against North Africa, with varying degrees of success. The first of these began in 1415 with the capture of Ceuta, another port city along the coast to the east of Qsar Es-Seghir. After its capture, further Portuguese expansion in Morocco was halted for financial and political reasons, leaving Ceuta isolated and dependent on outside supplies and aid from Portugal for its existence.

It was not until twenty-two years later that Portuguese expansion into Africa was resumed. In 1437 Prince Henry and his brother Fernando, commanding a force of 6000 men, sailed from Portugal to capture the port city of Tangier (Schulman 1979). By gaining control of Tangier, Portugal hoped to monitor shipping within the Straits more effectively and at the

same time give much needed support to Ceuta. It was also hoped that the crown's wealth, at this time very much depleted, would be increased with the capture of Tangier.

The assault on Tangier took place on September 13, 1437 (Schulman 1979), and was a failure. Fernando was taken hostage and the defeated Portuguese army returned home. It was not until 1453, with the fall of Constantinople, that Portugal again became involved with expansion into Morocco. In response to Constantinople's fall, the reigning King of Portugal, Alfonso V, ordered preparations for a crusade against the Turks. This plan was abandoned in favor of an expedition closer to home. Tangier was considered, but put aside in favor of Qsar Es-Seghir, which would provide a military base for future expansion in Africa and increase Portugal's security on the Straits.

Qsar Es-Seghir, the closest port to Ceuta, was directly involved in the numerous attacks made against Ceuta by Salah Ibn Salah, who ruled the coastal region. The location of Qsar Es-Seghir being at the narrowest point of the Straits, made it a convenient place from which to attack Portuguese vessels travelling to and from Ceuta.

King Alfonso set sail from Setubal on Saturday, September 30, 1458 (Schulman 1979), stopping at various ports along the way to collect other troops, expanding his army to a force of some 25,000 men.

On the following Monday, October 2, they arrived at Qsar Es-Seghir, where they were met by Muslim cavalry and foot soldiers. Following a bloody battle and heavy bombardment of the city, the Muslims were forced to surrender.

The inhabitants were allowed two days to evacuate the city. On Wednesday, October 18, 1458, Alfonso and his army entered the city. The

King went directly to the central mosque, purified it, and converted it into a Christian church. The church was dedicated as the Church of Santa Maria da Misericordia, and placed under the parish of Santa Maria D'Africa, which in turn was in the charge of the military 'Order of Christ' in Portugal. This military order was headed by Prince Henry the Navigator (Schulman 1979). On September 19, 1460, Lopo Alfonso was appointed the first vicar to head the congregation.

A few days after the capture of Qsar Es-Seghir, King Alfonso departed for Ceuta, leaving a garrison of troops behind to rebuild and fortify the city. Before his departure he appointed Dom Durarte de Meneses as the first military governor of the city. The actual number of men left is disputed but, based on later evidence and the size of the fortress, the garrison probably numbered no more than 400 men (Schulman 1979).

The Sultan of Morocco, hearing of Qsar Es-Seghir's fall, sent an army of 2000 men to recapture it on November 8, 1458. The Portuguese, being better armed and trained in warfare, took a heavy toll of the Muslim forces. The Muslim army consisted of untrained volunteers, many without weapons, coming to participate in the 'Holy War.' Once their supplies ran out they deserted and returned home, thus ending the siege.

A second siege was launched in early July of 1459. The Muslims, running short of supplies, ended the siege on August 24, 1459. The Portuguese, having just completed the walled corridor to protect transportation of outside supplies coming from the beach, were able to withstand the second siege.

The city was not seriously threatened again and the Portuguese continued their occupation for another ninety-two years until abandonment in 1550.

During the Portuguese occupation the city was rebuilt and greatly modified. Islamic houses were knocked down and the debris used for remodeling of structures according to traditional Portuguese tastes. Housing units were subdivided and walls reconstructed with coarse, irregular rocks held together with poor quality mortar. Fragments of bricks, roofing tiles, and pottery were often used for chinking. The larger and more important buildings and walls were constructed from cut stone, which was sometimes also used as cornerstones for houses. Stone door jambs and lintels of important buildings and the wealthier houses were occasionally carved with decorative designs.

Larger areas of the residential part of the city were paved over with flagstones and cobbles, emphasizing public space to a greater degree than did the Muslim layout of the town. The center of the town remained the same as in the Islamic occupation, focussing around the mosque, now a church, and hamman (public bath).

The main effort of reconstruction concentrated initially on the fortifications. A moat was built around the city and the Islamic gates were filled in and surrounded by thicker defense walls. A sloping glacis was constructed against the outer city wall. The walled corridor was also built at this time to facilitate movement of incoming supplies from the beach to the city.

The Islamic community was divided into quarters, each centered around one activity, with most commercial business taking place in the central market area. Archaeological evidence shows that the Portuguese settlement was composed of numerous residential areas centered around open cobbled plazas connected by paved streets. Within these plazas were commercial centers for production and sale of everyday items such as

household goods, pottery, bread, etc., while the central market dealt with imported food and manufactured goods (Redman 1979).

Portuguese colonies, especially those in Morocco, were initially primarily military garrisons, later becoming more diversified as communities. They were organized along both civil and military lines. The military included soldiers and higher ranking officials appointed by the king or by the captain of the garrison. Only these ranking military positions were generally given to members of the upper class, who also held important civil positions as judges, notaries, accountants, scribes, and doctors. Likewise church officials were generally from the upper class. Those of more humble origins were relegated to domestic positions as maids, servants, farmers, and tradesmen.

Civil servants and soldiers were paid in cash and by a food allowance. Compensations varied in amount and type of food according to the position held. For the captain of Tangier in the year 1472, the following amounts were provided:

> 68,568 reais (an old Portuguese coin equal to about one cent) in cash plus a food allowance of 62,920 reais which broke down as follows: 15 reais per alquiere (1 - 13 dry liters of wheat); 1000 reais for each cask of wine equal to 52 almudes (approximately 215 liters); 27.5 reais per arroba (approximately 32 pounds of meat; 4 reais and 7 pretos (a smaller copper coin) per fish;.....
> .....
> The captain also received one-fifth of the booty captured by his men (Schulman 1979:149).

These payments diminished with decrease in rank.

> The combatants, both on horse and on foot, received 100 reais per month: crossbowmen on horse received 70 reais, while those on foot, 50: Artillery-men and musketeers, 300; spies, 200; and sentinels, 100. All received four alquieres of wheat, 17 liters of wine, one arroba of meat, and 2.5 of fish (Schulman 1979:151).

The majority of the population of Qsar Es-Seghir consisted of moradores

or inhabitants who doubled as combatants when needed. When not engaged in combat they generally filled the following occupations:

Pharmacist	-	4000 reais
Blacksmith	-	2000 reais
Carpenter	-	2000 reais
Mason	-	2000 reais
Town Crier	-	3600 reais
Foreman	-	2000 reais
Shipwright	-	2000 reais

(Schulman 1979:151).

CHAPTER II

EXCAVATION SAMPLE

CHURCH

One hundred and ninety-six burials were uncovered between 1976 and 1978, fifty-two from within the precincts of the church and one hundred and forty-four from the cemetery.

In 1975 excavation of the church was completed. The church was one of the largest buildings contained within the city wall, measuring 20m x 15m square. Contained within it were several chapels, one large ceramic tiled chapel at the front of the church and three smaller side chapels running along the west wall (Figure 3). Two of the smaller side chapels were decorated with religious paintings. The main chamber of the church was partially paved with large, cut stone slabs, used as a floor surface and as gravemarkers for burials.

The stone slabs vary in size from 25cm square to several of more substantial dimensions, measuring 1m x 2m. Six of these larger markers were inscribed, some with names and dates (see Appendix II, Plates 4, 5, 6 and 7), and one with a raised carved 'death mask.'

Because of the limited time for excavation and the large number of grave markers contained within the church, it was necessary to divide the church into four quadrants and from each quadrant randomly select stones to be lifted (Figure 3). Two markers were raised in 1977, a blank one from quadrant 1 and the other an inscribed one from quadrant 4. A total of ten such tombstones were lifted and excavated, five inscribed and five blank.

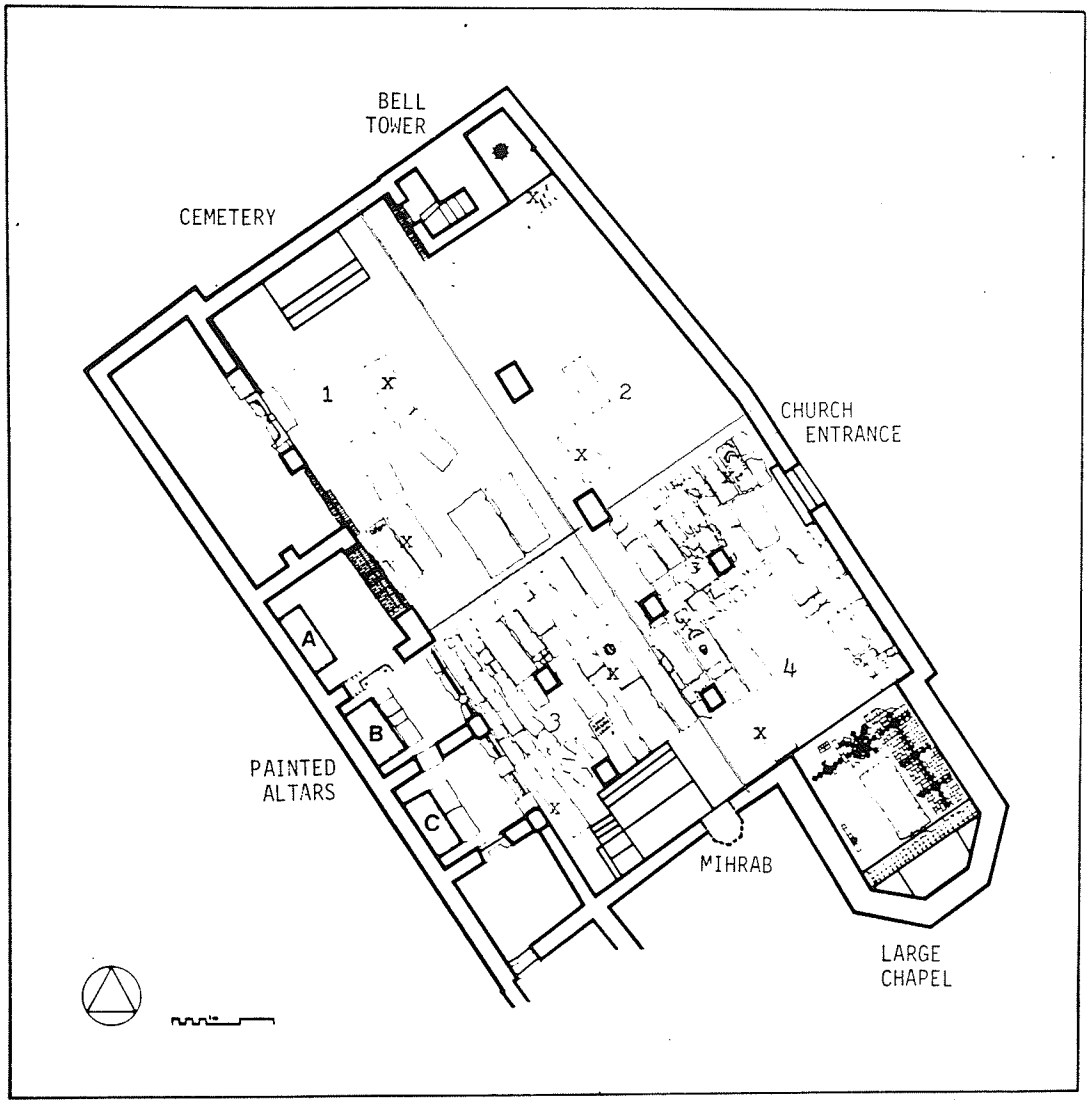

Figure 3. Interior of church.

In 1978, eight additional stones were selected, two from each of the four quadrants, one inscribed and one blank. Blank stones were randomly selected (Redman 1974), one per quadrant. All inscribed stones were evenly distributed, one per quadrant, with the exception of two occurring in quadrant 3, of which one was lifted. In quadrants 1 and 4, where stones had been previously lifted in 1977, two additional ones were selected. Thus, these quadrants contained three lifted stones rather than two as in quadrants 3 and 2.

CEMETERY

Outside the church, extending from its back wall for approximately twenty meters toward the northwest, is the cemetery containing dense interments. This area was also examined and partially excavated. The density of interments and the time involved in their excavation did not permit investigation of the entire 400 square meter area. Only 50 square meters were actually dug, all to sterile soil. Because of cobbled streets and a plaza on the remaining sides of the church, and problems arising out of their excavation, the cemetery was the only exterior area examined, although burials did extend under these surfaces.

EXCAVATION TECHNIQUES AND PROBLEMS

The cemetery and church were both used for interment over a period of 92 years, with the cemetery being more extensively used than the church. Burials occurring in the cemetery were more numerous and dense, with later graves repeatedly cutting into earlier ones. The interments uncovered beneath the church tombs were not quite as numerous nor as dense as those in the cemetery. Burials under church tombstones contained layers of soil between most skeletons. This made the approach to and

interpretation of stratigraphy easier in the church than in the cemetery, where burials were more dense.

When burials were excavated within each section of the cemetery care was taken to expose only the uppermost skeletons. This was often difficult due to the merging of lower burials with upper ones. Once the upper skeletons were recorded and photographed, they were removed and the next level exposed until the section was completed.

The problems of stratigraphy were intensified by the fact that the depth to which burials could extend was limited by sea level, which was only two to three meters below ground level. Burials next to the church were even more restricted by a large brick floor extending out from the wall (part of the older mosque) occurring only one meter from the surface. Skeletons were placed directly on the floor and then stacked one upon the other. No attempt was made to go beyond this brick floor either by the Portuguese or myself.

Within the church, burials were concentrated beneath each tombstone but with intervening levels of soil, making the stratigraphy easier to interpret.

FIELD METHODS

The methods employed in the excavation of the burials were as follows:

1) The burials were exposed, cleaned, photographed, labelled, and removed to the laboratory.

2) Stratigraphic controls were used whenever the admixture of the soil was not extreme and the intrusion of later graves into earlier ones had not occurred with great frequency.

3) All loose and unassociated bones were collected from each level and section and brought to the laboratory.

4) All grave fill was separated and screened through a 0.5 cm mesh screen.

5) Excavations were supplemented by photographic and written records.

LABORATORY METHODS

Once burials were removed from the ground and brought to the laboratory, thirty-seven cranial and twenty-nine post-cranial measurements were taken. Measurements used are listed in Tables 1 and 2 and are described by Bass in Human Osteology, (1971). Those marked by an asterisk are outlined by Olivier in Practical Anthropology, (1969). These measurements were chosen as they are the most generally accepted and frequently used. All measurements were taken by sliding and spreading calipers, osteometric board, mandibulometer, and tapes.

The twenty-one indices computed from the above measurements are listed in Table 3, (Bass 1971, Olivier 1969). Stature was assessed using Trotter and Gleser's 1958 regression formulae for white males and females.

Loose and unassociated bones were examined for pathologies and measurements taken when possible, but these data will not be included in this report.

TABLE 1

CRANIAL METRICS

1. Maximum Cranial Length
2. Maximum Cranial Breadth
3. Basion-Bregma Height
4. Basion-Prosthion Length
5. Minimum Frontal Breadth
6. Basion-Nasion Length
7. Total Facial Height
8. Nasion-Prosthion Height
9. Bizygomatic Breadth
10. Nasal Height
11. Nasal Breadth
12. Left Orbital Height
13. Left Orbital Breadth
14. Biorbital Diameter*
15. Maxillo-Alveolar Length
16. Maxillo-Alveolar Breadth
17. Internal Palatal Length
18. Internal Palatal Breadth
19. Biasterionic Breadth
20. Nasion-Bregma Chord
21. Bregma-Lambda Chord
22. Lambda-Opisthion Chord
23. Frontal Arc
24. Parietal Arc
25. Occipital Arc
26. Foraminal Length*
27. Foraminal Breadth*
28. Maximum Cranial Circumference

MANDIBLE

1. Bicondylar Breadth
2. Minimum Ramus Breadth
3. Bigonial Breadth
4. Symphyseal Height
5. Body Length
6. Ramus Height (vertical)
7. Ramus Height (angular)
8. Mandibular Angle
9. Mandibular Length

TABLE 2

POST-CRANIAL METRICS

HUMERUS

1. Maximum Length
2. Physiological Length
3. Maximum Shaft Diameter
4. Minimum Shaft Diameter
5. Maximum Head Diameter
6. Mid-Shaft Circumference*
7. Bicondylar Breadth

ULNA

1. Maximum Length
2. Physiological Length
3. Mid-Shaft Circumference*

RADIUS

1. Maximum Length
2. Physiological Length
3. Head Diameter
4. Mid-Shaft Circumference*

CLAVICLE

1. Maximum Length
2. Mid-Shaft Circumference*

FEMUR

1. Maximum Length
2. Physiological Length
3. Maximum Head Diameter
4. Mid-Shaft Anterior-Posterior Diameter
5. Mid-Shaft Medial-Lateral Diameter
6. Mid-Shaft Circumference*

TIBIA

1. Maximum Length
2. Physiological Length
3. Condylar Breadth
4. Maximum Mid-Shaft Diameter
5. Minimum Mid-Shaft Diameter
6. Mid-Shaft Circumference*

FIBULA

1. Maximum Length

TABLE 3

INDICES COMPUTED

1. Cranial Index - $\frac{\text{Maximum Cranial Breadth} \times 100}{\text{Maximum Cranial Length}}$

2. Height-Breadth Index - $\frac{\text{Basion-Bregma Height} \times 100}{\text{Maximum Cranial Breadth}}$

3. Height-Length Index - $\frac{\text{Basion-Bregma Height} \times 100}{\text{Maximum Cranial Length}}$

4. Mean Basion-Height Index - $\frac{\text{Basion-Bregma Height} \times 100}{\frac{\text{Cranial Length + Breadth}}{2}}$

5. Total Facial Index - $\frac{\text{Total Facial Height} \times 100}{\text{Bizygomatic Breadth}}$

6. Upper Facial Height - $\frac{\text{Upper Facial Height} \times 100}{\text{Bizygomatic Breadth}}$

7. Nasal Index - $\frac{\text{Nasal Breadth} \times 100}{\text{Nasal Height}}$

8. Orbital Index - $\frac{\text{Orbital Height} \times 100}{\text{Orbital Breadth}}$

9. Fronto-Parietal Index - $\frac{\text{Minimum Frontal Breadth} \times 100}{\text{Maximum Cranial Breadth}}$

10. Palatal Index - $\frac{\text{Maximum Palatal Breadth} \times 100}{\text{Maximum Palatal Length}}$

11. Maxillo-Alveolar Index - $\frac{\text{Maxillo-Alveolar Breadth} \times 100}{\text{Maxillo-Alveolar Length}}$

12. Mandibular Index* - $\frac{\text{Total Length} \times 100}{\text{Bicondylar Breadth}}$

13. Fronto-Goniac Index* - $\frac{\text{Bigonial Breadth} \times 100}{\text{Minimum Frontal Breadth}}$

14. Gonio-Condylar Index* - $\frac{\text{Bigonial Breadth} \times 100}{\text{Bicondylar Breadth}}$

15. Ramus Index* - $\frac{\text{Ramus Breadth} \times 100}{\text{Ramus Height}}$

INDICES (cont'd)

16. Clavicle Robustness Index - $\frac{\text{Mid-Clavicle Circumference} \times 100}{\text{Maximum Clavicle Length}}$

17. Radio-Humeral Index - $\frac{\text{Maximum Length of Radius} \times 100}{\text{Maximum Length of Humerus}}$

18. Crural Index* - $\frac{\text{Maximum Length of Tibia} \times 100}{\text{Maximum Length of Femur}}$

19. Humero-Femoral Index* - $\frac{\text{Maximum Length of Humerus} \times 100}{\text{Maximum Length of Femur}}$

20. Male Stature_1 - (3.08 Humerus) + 70.45 ± 4.05

Stature_2 - (2.38 Femur) + 61.41 ± 3.37

21. Female Stature_1 - (2.47 Femur) + 54.10 ± 3.72

Stature_2 - (2.90 Tibia) + 61.53 ± 3.66

CHAPTER III

BURIAL PRACTICES

Historically, Medieval burial customs and treatment of the body after death depended mainly upon the social and economic status of the individual (Lacroix 1874, Seward 1972, and Desmond 1978). Oliviera Marques states:

> ...the fate of the corpse depended upon the social class to which the dead man belonged. Within the churches were buried only the churchmen, the mighty lords, or those who by their last wills or by a donation in life had 'bought' a sepulcher in a holy place (1971:272).

This also held true for the religious military orders of Medieval Portugal, and in particular to the 'Order of Christ' which was established at Qsar Es-Seghir (Schulman 1979). Other members of the community, lacking monetary wealth and status, were generally buried outside, in the churchyards and cemeteries.

CHURCH

Burials excavated from the church interior included both primary and secondary, as well as single and multiple, interments.

In all primary burials the body was laid out in an extended position, on the back, with the arms folded and crossed over the chest or abdomen. The legs and feet were usually extended straight and in some cases crossed at the ankles. All burials were oriented in a southeasterly direction, which was the custom (Aries 1976), facing the main altar of the church.

Secondary burials usually consisted of scattered and unassociated

bones occurring with irregularity between the levels of primary burials. These scattered bones were probably the remains of earlier burials pushed aside to accommodate newer ones.

The church tombs revealed a number of skeletal remains varying in age and sex, suggesting family tombs popular during the Middle Ages (Lacroix 1874, Marques 1971). Tomb two contained eleven individuals of various ages and sexes. Other tombs displayed similar distributions of remains which varied in age and sex.

During interment it was apparent that some care was taken to ensure that all the remains within one tomb did not extend or cut into adjacent ones. If the body was of great length, the head and shoulders were generally propped up so that the feet would not exceed the length of the grave dimensions as determined by the size of its tombstone.

There was no evidence of coffins or stone structures to protect the bodies, with the exception of tomb six, which contained a crudely formed border of mortar surrounding the two skeletons found in it. All other burials were directly placed in the ground and covered with dirt.

Grave goods were rare in both the church and cemetery. This was not an uncommon practice among the upper classes (Marques 1971). Burial without funerary items was an expression of religious devotion and humility. The threat of grave robbers prevalent at this time could also have been a factor in the absence of such goods.

A belt buckle found in situ on one burial and pieces of white cloth with others, suggest that the bodies were probably dressed or shrouded before being buried. Coins, straight pins, pieces of broken pottery, and fragments of animal bone were found in the screened grave fill, but not in direct association with the skeletons themselves.

CEMETERY

The cemetery also included primary and secondary burials. Mass or multiple interments were the rule rather than the exception, with no single primary burials occurring as in the church.

Intrusion of later graves into earlier ones occurred with great frequency, making excavation difficult. Burials were generally placed side by side and one upon another in successive layers.

The orientation and treatment of the bodies were identical to those found in the church. Primary burials were extended, on the back, with the arms folded over the chest. Secondary interments consisted of scattered bones and articulated portions interspersed among the primary burials. Skeletons of all ages and sexes were found at all levels.

Funerary items were again rare, with the exception of an iron necklace found on one burial (see Appendix II, Plate 24) and four glass bracelets on another (see Appendix II, Plate 13). Other small items were found in the screened fill but, again, not in direct association with the skeletons.

Only one blank tombstone, identical to those in the church, was uncovered, revealing a single primary burial of a small child. All other cemetery interments were unmarked.

The social and economic differences between the two groups are clearly evidenced by placement of the body, either inside or outside, and by the presence or absence of a tombstone, inscribed or not. On the basis of these archaeological data one can see clear social and economic differences emerging within the community.

CHAPTER IV

AGE AND SEX DISTRIBUTION

AGE

Age estimation for pre-adults was based on tooth eruption and epiphyseal growth centers (Krogman 1973, Bass 1971). Adult age, being more difficult to assess, was estimated by the use of pubic symphyseal faces as developed by Todd (1920) and on general observation of tooth loss, dental attrition, extent of resorption of the alveolar bone, and advanced arthritic conditions of the joints. The results are presented in Tables 4 and 5.

The age distribution of all individuals ranged from newborn to old age (55+) with the majority, 56% of the population, male and female, falling in the 25 to 35 year range. Mean age at death for children occurred between 6 and 10 years of age. The relatively few older adults (5%) seems to reflect the city's military nature. At a military outpost one would expect to find the majority of adults to be young because of the rigors of military service.

SEX

Sex determination of the skeletons was based primarily on the pelvis and cranium (Bass 1971, Anderson 1969, Krogman 1973). Long bones were used in cases where the pelvis and cranium, or both, were too fragmentary or absent. No attempt was made to determine the sex of pre-adult remains because of the uncertainty of methods and their accuracy.

Males tended to be more robust, exhibiting massive supraorbital

TABLE 4

AGE AND SEX DISTRIBUTION OF CHURCH BURIALS

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	TOTAL
MALES											
11 - 15	-	-	-	-	-	-	-	-	-	-	-
16 - 20	-	-	-	-	-	1	-	-	-	-	1
21 - 25	-	1	1	-	-	-	1	-	-	-	3
26 - 30	2	-	-	1	-	1	-	-	-	-	4
31 - 35	1	2	-	-	1	-	-	1	-	-	5
36 - 40	-	-	-	2	-	-	-	-	-	-	2
Adult	2	4	-	-	-	-	3	1	1	-	11
Young Adult	-	-	-	-	-	-	-	-	-	-	-
Old Adult	-	1	-	-	-	1	-	-	-	2	4
										Total	30
FEMALES											
11 - 15	-	-	-	-	-	-	-	-	1	-	1
16 - 20	1	1	1	-	1	-	-	-	-	-	4
21 - 25	-	-	-	-	1	-	1	-	1	-	3
26 - 30	1	-	-	-	-	-	1	-	-	-	2
31 - 35	-	-	-	-	-	-	-	-	-	-	-
36 - 40	-	-	-	-	-	-	-	-	-	-	-
Adult	-	1	-	-	1	-	1	1	-	-	4
Young Adult	-	-	-	-	-	-	1	-	-	-	1
Old Adult	-	-	-	-	1	-	-	-	-	-	1
										Total	16
SEX UNKNOWN											
0 - 4	-	1	-	-	-	-	-	-	1	-	2
5 - 9	-	-	-	-	-	1	-	-	-	-	1
10 - 14	-	-	-	-	-	-	-	-	-	-	0
?	-	-	-	-	-	-	-	3	-	-	3
										Total	6
TOTAL											52

TABLE 5

AGE AND SEX DISTRIBUTION OF CEMETERY BURIALS

	E5N16	E5N15				E6N16				E6N15	E7N14	E7N15	E5N16		TOTAL
	3-4	3-4	4-3	4-4	5-3	3-2	5-1	5-2	6-2	3-6	6-1	4-3	Tomb 1	Cem	
MALES															
11 - 15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16 - 20	2	-	3	1	-	-	1	-	-	2	-	-	-	-	9
21 - 15	2	-	2	1	-	-	-	-	-	-	-	-	-	-	5
26 - 30	2	5	1	1	-	-	3	-	-	2	-	-	-	-	14
31 - 35	2	1	1	3	1	-	1	-	1	-	-	-	-	-	10
36 - 40	-	-	1	2	1	1	-	-	2	-	-	-	-	-	7
Adult	1	5	3	5	3	-	-	1	2	-	1	1	-	-	22
Young Adult	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Old Adult	1	1	-	-	-	-	-	-	-	1	-	-	-	-	3
														Total	71
FEMALES															
11 - 15	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
16 - 20	1	1	2	2	-	-	-	-	-	1	-	-	-	-	7
21 - 25	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
26 - 30	2	3	4	-	-	-	1	-	-	1	-	1	-	-	12
31 - 35	-	-	1	-	-	-	-	-	-	1	-	-	-	-	2
36 - 40	-	-	-	-	1	-	1	-	-	-	-	-	-	-	2
Adult	1	1	1	-	-	1	-	1	-	1	-	-	-	-	6
Young Adult	-	-	2	-	2	-	1	-	-	-	-	-	-	-	5
Old Adult	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
														Total	36
SEX UNKNOWN															
0 - 4	-	2	1	2	-	1	-	-	-	-	-	-	-	-	6
5 - 9	-	-	-	5	1	1	-	1	-	2	-	-	1	-	11
10 - 14	-	-	1	-	-	-	-	-	-	1	-	-	-	-	2
?	1	2	3	6	2	-	3	-	-	1	-	-	-	-	18
														Total	37
TOTAL															144

ridges, large mastoid processes, and prominent nuchal crests. The more gracile females exhibited no brow ridges, small mastoid processes, and, in some cases, extreme temporal bossing.

All the church tombs contained some mixture of sexes with the exception of tombs 4 and 10, which contained only males.

In the cemetery some segregation of the sexes was evidenced. In squares E5N15 and E6N16, four to five males were placed side by side followed by either two or three females. This pattern was evidenced at all levels.

The distribution of sexes is presented in Tables 4 and 5. In the total combined population of the church and cemetery, excluding indeterminates, 58% were male, 30% female and 12% children. The relatively high proportion of males to females again reflects the military nature of the community.

CHAPTER V

NUTRITION AND MORPHOLOGY

Anthropometric measurements have been collected by physical anthropologists for many years to assess variation in size and shape in populations from various geographic areas.

These measurements have provided information on structure, evolution, culture and, to some degree, have provided insights into environmental conditions in which populations lived.

The morphological traits of a population are not only determined by genetic factors but are also influenced and shaped by environmental elements. Throughout an individual's growth and development he is constantly interacting with and responding to such environmental pressures as disease, nutrition, and culture, all of which influence rates of growth, development, and, ultimately, his general morphology.

Most morphological differences that do occur between populations have genetic and environmental components contributing to the final expression of these physical traits.

Many studies have been conducted to determine the influence of environmental factors on the inheritance of anthropometric features (Osborne and De George 1959, Newman and Freeman 1938, Hiernaux 1954).

A person does not inherit genes that specify he is to be five feet two inches in stature as an adult, but rather he inherits genes that determine his 'potential' for development. How well he develops to his full genetic potential is influenced by environmental factors (Harrison, Weiner, Tanner and Bornicot 1977).

Not all individuals have the same developmental potential. For example, one could not change the morphology of a pygmy into that of a Nuer or Tutsi simply by altering his environment. Each group, pygmy and Nuer, have different developmental potentials which are determined by genetics, and how they achieve their respective genetic potentials is limited by environmental factors.

Continuous traits such as size and shape are a result of complex interactions between hereditary and environment stimuli.

Nutrition seems to be one of the major factors limiting size, especially if chronically inadequate during early stages of growth (Tanner 1963). The human body shows great plasticity in response to nutritional stress. If starvation occurs for short periods of time, the body responds by a slow-down in growth, and, when adequate food is re-introduced, growth resumes, but at a much faster rate until it has attained, or 'caught up' to, normal growth rates (Tanner 1962).

However, chronic malnutrition over a long period of time does limit final body size, resulting in smaller adults (Tanner 1966, Hoffman and Hoffman 1966, Acheson 1960, Garn 1966).

Twin studies have also shown diet and disease to have a measurable effect on size (Tanner 1966, Harrison 1977). One twin when malnourished or having a chronic disease was always smaller than the healthy one.

Greulich's study (1957) comparing Japanese children raised in Japan under adverse environmental conditions (low nutrition) and Japanese children brought up in more favorable conditions in California, showed that the children in California were larger than those in Japan at all stages of growth and development. Higher and better nutritional levels were the main contributors, influencing size.

The stature of populations within developing countries have shown a secular trend of increasing over the last hundred years, which has generally been attributed to better nutrition levels and the lower incidence of disease conditions (Acheson and Fowler 1964).

The effects of nutrition on body size are complex and cannot always be isolated from other factors affecting size and growth. Although nutrition is a major factor contributing to size, other environmental conditions do affect morphology. These include disease, altitude, exercise, psychosocial stress, and culture, to name but a few.

Studies have also been conducted along socio-economic lines in Europe (Schreider 1964, Prokopec 1970, Tanner and Eveleth 1976) comparing children drawn from both higher and lower socio-economic classes, to determine effects on growth, development, and overall adult size. The results of these studies show those belonging to the upper classes to be larger (Tanner 1976, Schreider 1964), with differences again being attributed to better nutrition, health care, exercise, and in some cases, selective mating.

Weiner states:

> When the bodily size of one group is found to be larger than that of another group of similar genetic constitution living in the same general locality and the diet of the former is superior, there can be little doubt dietetic factors are involved (1977:418).

Hiernaux demonstrated this in his study (1963) of two subgroups of Hutu people of Rwanda. Both subgroups were assumed to be genetically similar and lived under the same environmental conditions, with the exception being differences in diet and incidences of disease. These dietary differences of one subgroup corresponded to higher mean values of physical measurements when compared to the other. Again the higher mean scores

of the measurements taken between subgroups were attributed to better nutrition and lower incidence of disease. The higher values of measurements taken also corresponded to the same physical differences found in twin studies done by Osborne and DeGeorge (1959) that were shown to have high levels of environmental sensitivity.

From historic records we know that all individuals buried at Qsar Es-Seghir came from the same population, therefore sharing basic genetic traits and culture. Other environmental factors of disease, exercise, and altitude were the same for individuals in both Portugal and Qsar Es-Seghir. By eliminating the above variables and making use of historic documentation available from the time period, the two burial populations of the church and cemetery lend themselves well to investigation of differences along socio-economic lines.

Classes were for the most part well defined in Medieval society. Upper class individuals held high positions of command in military and civil institutions, and also controlled the majority of monetary and material wealth (Marques 1971). Economic wealth enabled the upper classes to procure greater abundance and variety of food, especially in terms of animal protein essential for proper growth (Hoffman and Hoffman 1966).

The lower orders did not have the wealth to buy either the quantity or the variety of food, especially meats. Referring to Portugal, Marques (1971) states that:

> ...the base of Medieval nutrition, particularly for the commoners, lay in the cereals--flour and bread, made of wheat, millet, or rye, and also of barley and oats--and wine (p.26).

Protein that was consumed by the lower classes was usually obtained by hunting, providing the catch was not used for rent payments to the landlords. The nobles received such a vast majority of their meat in this

manner that a law was passed in 1340 in Portugal stating that nobles were no longer permitted to purchase meat in the markets (Marques 1971). Prices of beef (this being the highest), pork, mutton, and goat were out of the reach of most commoners for daily consumption.

The lower classes were more drastically affected in times of famine, caused by drought and war. With the shortage of food during these times, meat was unobtainable and prices became even higher.

This difference in food amount and type between classes is evidenced by pay scales and food allowances distributed among the military and civil positions at Qsar Es-Seghir and Tangier (see Chapter I, p. The Captain's pay was probably used to help feed the garrison, with food and money in varying amounts filtering down the chain of command, the lower classes receiving the least.

In all stratigraphic levels of excavation, Islamic and Portuguese, animal remains of cow, pig, goat, sheep, horse, fish, and wild game were uncovered (Wattenmaker 1977). These large quantities of animal bone show that the Portuguese population had access to and were consuming animal protein. However, the distribution and quantity of these animals between socio-economic classes has not been adequately established. The historic records available give only general evidence of varying amounts and differences between the classes. Granted that these are only indicators, they seem to support the assumption that differences of access and consumption of protein did exist between classes.

With these insights into the socio-economic differences between classes at Qsar Es-Seghir, one would expect to find the mean size of the higher status individuals buried within the church to be, on the average, larger than that in individuals of lower socio-economic status found

outside in the cemetery.

t-TEST

To test this hypothesis a Student's t-test was employed to determine from the mean scores of various skeletal measurements whether significant differences existed between the two groups. A t-test of independent samples was performed on the Qsar Es-Seghir data, comparing individuals from the church to those from the cemetery.

A t-test of independent samples makes the following assumptions: 1) the samples are independent and randomly drawn from a normally distributed population; and 2) the samples have equal variances. Thirty-nine individuals from the church and ninety-eight individuals from the cemetery were appropriate for the t-test. All children and pre-adult (those with unfused epiphyses) remains were excluded, because of their immaturity and lack of comparability to adults. Also excluded were adults whose sex could not be determined.

All raw data were punched on IBM cards and the Statistical Package for Social Sciences (SPSS 1975) format was used to perform the test. The results of the tests are tabulated in Tables 6, 7, 8 and 9.

t-TEST RESULTS

The results of the male t-tests show only eight variables out of a possible sixty-six to be significant below the five percent level (Table 6). These variables are basion-nasion, left orbital breadth, maxillo-alveolar breadth, biasterionic breadth, nasion-bregma chord, frontal arc, and minimum ramus breadth. The female t-test results show nine variables to be significant below the five percent level. These are basion-nasion, nasal breadth, left orbital breadth, biorbital diameter,

TABLE 6

T-TEST RESULTS, COMPARING ADULT MALES FROM CHURCH TO ADULT MALES FROM CEMETERY

Total N of adult males from church = 25
Total N of adult males from cemetery = 64

Measurement	N	Mean	t	P
Maximum Cranial Length	20 49	188.4 ± 6.37 186.2 ± 6.00	1.34	0.19
Maximum Cranial Breadth	19 46	138.1 ± 3.74 137.2 ± 5.39	0.64	0.53
Basion-Bregma Height	14 35	137.3 ± 5.98 137.7 ± 5.24	-0.26	0.79
Basion-Prosthion Height	13 18	94.4 ± 4.33 98.0 ± 6.24	-1.80	0.08
Minimum Frontal Cranial Breadth	21 42	96.8 ± 3.72 96.8 ± 3.95	-0.07	0.95
Basion-Nasion Length	17 31	100.4 ± 6.16 104.0 ± 4.45	-2.35	0.02*
Total Facial Height	6 10	109.7 ± 9.16 116.8 ± 5.18	-2.01	0.06
Nasion-Prosthion Height	12 22	66.2 ± 4.99 66.5 ± 5.62	-0.20	0.85
Bizygomatic Breadth	8 14	130.1 ± 5.06 131.6 ± 6.53	-0.54	0.60
Nasal Height	15 27	51.1 ± 4.17 49.9 ± 3.45	1.02	0.32
Nasal Breadth	13 25	23.5 ± 1.20 23.9 ± 2.76	-0.62	0.54
Left Orbital Height	15 30	32.3 ± 2.15 32.5 ± 2.47	-0.31	0.54
Left Orbital Breadth	15 29	36.7 ± 2.29 39.0 ± 3.30	-2.45	0.02*

TABLE 6 (Cont'd)

Measurement	N	Mean	t	P
Biorbital Diameter	15 23	96.1 ± 2.41 99.3 ± 4.56	-2.47	0.02*
Maxillo-alveolar Length (external)	13 26	53.8 ± 2.94 55.0 ± 4.47	-0.87	0.39
Maxillo-Alveolar Breadth (external)	14 27	60.6 ± 3.30 63.7 ± 4.03	-2.47	0.02*
Palatal Length	13 26	41.8 ± 2.26 43.1 ± 4.87	-0.90	0.37
Palatal Breadth	13 25	38.2 ± 2.73 37.4 ± 3.78	0.60	0.55
Biasterionic Breadth	15 37	114.1 ± 7.44 109.3 ± 7.32	2.13	0.04*
Nasion-Bregma Chord	16 33	115.2 ± 4.37 111.9 ± 5.30	2.12	0.04*
Bregma-Lambda Chord	16 39	118.4 ± 5.71 116.1 ± 4.99	1.49	0.14
Lambda-Opisthion Chord	13 36	100.0 ± 6.58 98.5 ± 6.77	0.70	0.49
Frontal Arc	16 33	130.5 ± 5.49 127.0 ± 6.00	1.98	0.05*
Parietal Arc	16 40	133.1 ± 6.96 129.9 ± 5.56	1.77	0.08
Occipital Arc	14 36	119.3 ± 9.15 119.1 ± 7.38	0.06	0.95
Foraminal Length	17 41	36.4 ± 2.37 35.8 ± 2.56	0.91	0.37
Foraminal Breadth	17 41	30.4 ± 2.35 30.1 ± 2.50	0.48	0.63
Maximum Cranial Circumference	19 42	526.3 ± 12.25 522.2 ± 15.0	1.04	0.30
Maximum Humerus Length (L)	10 32	316.2 ± 18.50 318.3 ± 15.84	-0.35	0.73

TABLE 6 (Cont'd)

Measurement	N	Mean	t	P
Maximum Humerus Length (R)	10 31	320.7 ± 18.58 316.8 ± 13.89	0.71	0.48
Humerus Physiological Length (L)	10 31	310.2 ± 17.78 312.3 ± 14.80	-0.36	0.72
Humerus Physiological Length (R)	10 31	312.7 ± 17.23 310.4 ± 12.60	0.46	0.64
Humerus Maximum Shaft Diameter (L)	9 32	22.2 ± 0.97 22.5 ± 1.48	-0.53	0.60
Humerus Maximum Shaft Diameter (R)	9 32	22.4 ± 1.33 22.9 ± 1.59	-0.79	0.43
Humerus Minimum Shaft Diameter (L)	9 32	17.8 ± 1.56 18.6 ± 2.08	-1.13	0.26
Humerus Minimum Shaft Diameter (R)	9 32	19.2 ± 1.79 19.2 ± 2.05	0.09	0.93
Humerus Maximum Head Diameter (L)	10 33	46.6 ± 4.50 45.1 ± 2.51	1.37	0.18
Humerus Maximum Head Diameter (R)	9 33	47.4 ± 4.50 45.7 ± 2.80	1.47	0.15
Humerus Mid-Shaft Circumference (L)	9 32	65.6 ± 3.67 67.3 ± 4.46	-1.03	0.31
Humerus Mid-Shaft Circumference (R)	9 32	68.6 ± 3.97 69.5 ± 5.00	-0.44	0.66
Humerus Bicondylar Breadth (L)	10 33	63.2 ± 4.73 62.5 ± 4.45	0.41	0.68
Humerus Bicondylar Breadth (R)	10 36	63.3 ± 5.12 63.1 ± 4.18	0.14	0.89
Ulna Maximum Length (L)	4 19	258.5 ± 12.66 261.0 ± 12.97	-0.35	0.73
Ulna Maximum Length (R)	5 23	264.0 ± 14.77 266.1 ± 12.05	-0.34	0.74
Ulna Physiological Length (L)	6 21	233.2 ± 11.44 232.1 ± 12.43	0.18	0.86

TABLE 6 (Cont'd)

Measurement	N	Mean	t	P
Ulna Physiological Length (R)	5 25	231.2 ± 11.17 232.3 ± 12.55	-0.18	0.86
Ulna Mid-Shaft Circumference (L)	4 20	49.3 ± 3.30 50.9 ± 5.20	-0.62	0.54
Ulna Mid-Shaft Circumference (R)	5 24	50.8 ± 2.59 52.0 ± 4.27	-0.62	0.54
Radius Maximum Length (L)	7 26	244.1 ± 13.48 242.6 ± 13.64	0.27	0.79
Radius Maximum Length (R)	10 23	241.1 ± 13.76 247.5 ± 12.71	-1.30	0.20
Radius Physiological Length (L)	7 26	230.4 ± 12.69 229.0 ± 12.87	0.25	0.80
Radius Physiological Length (R)	10 23	228.2 ± 12.28 233.7 ± 11.98	-1.19	0.24
Radius Mid-Shaft Circumference (L)	7 26	45.0 ± 2.77 45.2 ± 3.72	-0.10	0.92
Radius Mid-Shaft Circumference (R)	9 25	46.6 ± 2.74 46.2 ± 3.43	0.34	0.74
Radius Maximum Head Diameter (L)	7 31	23.4 ± 1.90 22.7 ± 1.29	1.16	0.25
Radius Maximum Head Diameter (R)	9 27	23.4 ± 1.81 22.7 ± 1.56	1.18	0.25
Femur Maximum Length (L)	7 32	446.4 ± 23.23 448.5 ± 21.79	-0.22	0.83
Femur Maximum Length (R)	9 32	445.9 ± 23.60 444.5 ± 19.37	0.18	0.85
Femur Physiological Length (L)	7 31	443.3 ± 21.51 444.2 ± 22.30	-0.10	0.92
Femur Physiological Length (R)	9 31	442.0 ± 22.60 440.4 ± 19.81	0.21	0.84
Femur Maximum Head Diameter (L)	8 34	47.9 ± 4.02 47.5 ± 2.37	0.35	0.73

TABLE 6 (Cont'd)

Measurement	N	Mean	t	P
Femur Maximum Head Diameter (R)	9 32	47.9 ± 3.48 47.8 ± 2.46	0.08	0.94
Femur Mid-Shaft A-P Diameter (L)	7 32	29.7 ± 2.92 30.6 ± 3.33	-0.62	0.54
Femur Mid-Shaft A-P Diameter (R)	8 32	29.5 ± 2.07 30.0 ± 3.04	-0.44	0.66
Femur Mid-Shaft M-L Diameter (L)	7 32	27.1 ± 2.67 26.4 ± 1.90	0.83	0.41
Femur Mid-Shaft M-L Diameter (R)	8 32	26.4 ± 2.20 26.9 ± 2.02	-0.65	0.52
Femur Mid-Shaft Circumference (L)	6 32	87.7 ± 2.07 90.5 ± 5.91	-1.15	0.26
Femur Mid-Shaft Circumference (R)	8 32	89.5 ± 4.04 90.6 ± 5.44	-0.53	0.60
Tibia Maximum Length (L)	8 25	365.6 ± 17.23 369.9 ± 22.60	-0.49	0.63
Tibia Maximum Length (R)	6 24	362.0 ± 11.21 368.2 ± 20.88	-0.70	0.49
Tibia Physiological Length (L)	8 25	359.5 ± 17.86 362.3 ± 21.69	-0.33	0.75
Tibia Physiological Length (R)	5 24	359.4 ± 10.74 360.1 ± 19.20	-0.08	0.94
Tibia Condylar Breadth (L)	7 27	75.3 ± 2.22 75.5 ± 3.65	-0.19	0.85
Tibia Condylar Breadth (R)	5 23	75.0 ± 2.55 75.6 ± 3.14	-0.37	0.71
Tibia Maximum Mid-Shaft Diameter (L)	7 25	29.5 ± 2.99 30.8 ± 3.00	-0.93	0.36
Tibia Maximum Mid-Shaft Diameter (R)	5 24	30.0 ± 2.00 30.3 ± 2.56	-0.24	0.81
Tibia Minimum Mid-Shaft Diameter (L)	7 25	21.7 ± 2.14 22.5 ± 2.57	-0.72	0.48

TABLE 6 (Cont'd)

Measurement	N	Mean	t	P
Tibia Minimum Mid-Shaft Diameter (R)	5 24	21.8 ± 0.84 21.9 ± 1.73	-0.20	0.85
Tibia Mid-Shaft Circumference (L)	4 25	84.3 ± 4.50 84.6 ± 5.98	-0.12	0.90
Tibia Mid-Shaft Circumference (R)	6 25	81.3 ± 4.88 85.6 ± 6.61	-1.46	0.15
Clavicle Maximum Length (L)	6 26	148.8 ± 12.30 143.3 ± 11.96	1.02	0.32
Clavicle Maximum Length (R)	8 26	145.3 ± 9.75 142.9 ± 9.53	0.59	0.56
Clavicle Mid-Shaft Circumference (L)	6 26	41.0 ± 3.35 38.9 ± 4.53	1.05	0.30
Clavicle Mid-Shaft Circumference (R)	8 26	39.4 ± 3.66 38.8 ± 3.63	0.41	0.68
Mandible Bicondylar Breadth	7 25	120.7 ± 6.55 121.1 ± 6.20	-0.15	0.88
Minimum Ramus Breadth	11 34	31.4 ± 3.11 33.7 ± 3.49	-1.98	0.05*
Bigonial Breadth	10 29	101.5 ± 4.72 101.2 ± 8.09	0.11	0.92
Symphyseal Height	9 32	29.8 ± 3.15 32.2 ± 3.81	-1.75	0.09
Body Length (Vertical)	9 30	105.9 ± 5.35 106.9 ± 6.39	-0.43	0.67
Ramus Height (Vertical)	9 30	54.7 ± 6.10 58.4 ± 6.49	-1.47	0.15
Ramus Height (Angular)	9 30	60.3 ± 5.12 62.4 ± 5.42	-1.00	0.33
Mandibular Angle	9 30	34.1 ± 5.93 31.6 ± 6.96	0.98	0.33
Mandibular Body Length	9 28	75.4 ± 4.07 79.6 ± 6.05	-1.91	0.06

TABLE 7

T-TEST RESULTS, COMPARING ADULT FEMALES FROM CHURCH TO ADULT FEMALES FROM CEMETERY

Total N of adult females from church = 14
Total N of adult females from cemetery = 33

Measurement	N	Mean	t	P
Maximum Cranial Length	12 27	178.6 ± 4.66 176.9 ± 7.75	0.70	0.49
Maximum Cranial Breadth	12 24	134.8 ± 4.79 134.5 ± 5.26	0.16	0.87
Basion-Bregma Height	10 16	129.0 ± 3.86 130.8 ± 5.47	-0.88	0.39
Minimal Frontal Cranial Breadth	10 23	92.6 ± 2.76 93.4 ± 5.55	-0.45	0.66
Basion-Nasion Length	8 16	92.9 ± 4.12 99.9 ± 7.81	-2.38	0.03*
Total Facial Height	3 5	107.3 ± 9.07 107.6 ± 6.42	-0.05	0.96
Nasion-Prosthion Height	8 13	61.9 ± 4.70 62.3 ± 5.38	-0.19	0.85
Bizygomatic Breadth	2 5	124.5 ± 4.95 127.8 ± 2.68	-1.21	0.28
Nasal Height	8 12	46.8 ± 4.35 46.0 ± 3.98	0.46	0.65
Nasal Breadth	8 13	21.5 ± 1.07 25.3 ± 1.55	-6.09	<0.01*
Left Orbital Height	7 15	32.4 ± 1.27 33.2 ± 2.51	-0.76	0.46
Left Orbital Breadth	8 15	35.1 ± 2.41 38.7 ± 3.12	-2.83	0.01*
Biorbital Diameter	6 12	91.7 ± 2.73 97.8 ± 4.95	-2.82	0.01*

TABLE 7 (Cont'd)

Measurement	N	Mean	t	P
Maxillo-Alveolar Length (E)	8 15	50.8 ± 4.37 55.1 ± 6.19	-1.77	0.09
Maxillo-Alveolar Breadth	8 14	61.1 ± 2.99 62.7 ± 4.36	-0.91	0.37
Palatal Length	8 14	39.9 ± 2.17 43.2 ± 3.33	-2.53	0.02*
Palatal Breadth	8 14	34.5 ± 3.12 35.8 ± 3.97	-0.79	0.44
Biasterionic Breadth	9 19	104.7 ± 4.33 104.3 ± 6.32	0.15	0.88
Nasion-Bregma Chord	9 17	106.2 ± 4.02 108.4 ± 6.06	-0.97	0.34
Bregma-Lambda Chord	12 21	116.8 ± 7.51 110.4 ± 7.27	2.42	0.02*
Lambda-Opisthion Chord	11 21	95.1 ± 4.74 94.8 ± 6.72	0.14	0.89
Frontal Arc	9 17	123.0 ± 7.48 125.4 ± 8.38	-0.72	0.47
Parietal Arc	12 20	130.0 ± 8.15 125.0 ± 9.87	1.50	0.14
Occipital Arc	11 21	113.9 ± 5.52 113.0 ± 8.86	0.31	0.76
Foraminal Length	10 22	33.2 ± 2.35 33.7 ± 2.99	-0.45	0.66
Foraminal Breadth	10 22	30.3 ± 1.94 27.0 ± 1.97	4.36	0.00*
Maximum Cranial Circumference	11 23	506.3 ± 11.6 501.9 ± 15.9	0.81	0.43
Maximum Humerus Length (L)	3 8	294.0 ± 22.0 296.4 ± 13.1	0.73	0.49
Maximum Humerus Length (R)	1 6	270.0 - 294.6 ± 10.8	-	-

TABLE 7 (Cont'd)

Measurement	N	Mean	t	P
Humerus Physiological Length (L)	3 8	289.0 ± 25.0 282.9 ± 12.9	0.55	0.59
Humerus Physiological Length (R)	1 6	264.0 - 290.8 ± 9.34	-	-
Humerus Maximum Shaft Diameter (L)	3 8	20.3 ± 1.53 20.3 ± 2.77	0.05	0.96
Humerus Maximum Shaft Diameter (R)	1 6	13.0 - 22.0 ± 3.03	-	-
Humerus Minimum Shaft Diameter (L)	3 8	17.0 ± 1.73 15.8 ± 1.75	1.06	0.32
Humerus Minimum Shaft Diameter (R)	1 6	12.0 - 17.1 ± 2.92	-	-
Humerus Maximum Head Diameter (L)	3 8	41.3 ± 4.04 37.5 ± 3.42	1.59	0.15
Humerus Maximum Head Diameter (R)	2 6	40.5 ± 2.12 38.7 ± 3.67	0.65	0.54
Humerus Mid-Shaft Circumference (L)	3 8	58.3 ± 3.51 59.5 ± 7.87	-0.24	0.82
Humerus Mid-Shaft Circumference (R)	1 6	55.0 - 63.6 ± 8.45	-	-
Humerus Bicondylar Breadth (L)	3 8	55.3 ± 5.13 55.1 ± 4.94	0.06	0.95
Humerus Bicondylar Breadth (R)	3 6	56.6 ± 6.42 53.8 ± 2.79	0.96	0.36
Ulna Maximum Length (L)	1 2	236.0 - 241.5 ± 21.9	-	-
Ulna Maximum Length (R)	1 5	240.0 - 254.6 ± 10.4	-	-
Ulna Physiological Length (L)	1 2	207.0 - 213.5 ± 21.9	-	-
Ulna Physiological Length (R)	1 5	210.0 - 222.8 ± 8.59	-	

TABLE 7 (Cont'd)

Measurement	N	Mean	t	P
Ulna Mid-Shaft Circumference (L)	1 2	40.0 - 43.0 ± 2.83	-	-
Ulna Mid-Shaft Circumference (R)	1 5	40.0 - 47.2 ± 4.44	-	-
Radius Maximum Length (L)	1 4	216.0 - 228.3 ± 12.8	-	-
Radius Maximum Length (R)	1 5	217.0 - 230.2 ± 6.02	-	-
Radius Physiological Length (L)	1 4	203.0 - 213.8 ± 13.57	-	-
Radius Physiological Length (R)	1 5	205.0 - 217.8 ± 6.83	-	-
Radius Maximum Head Diameter (L)	1 4	20.0 - 20.5 ± 1.29	-	-
Radius Maximum Head Diameter (R)	1 4	20.0 - 20.0 ± 0.82	-	-
Radius Mid-Shaft Circumference (L)	1 4	36.0 - 41.0 ± 4.24	-	-
Radius Mid-Shaft Circumference (R)	1 5	35.0 - 40.4 ± 5.86	-	-
Femur Maximum Length (L)	2 7	395.5 ± 3.53 405.4 ± 14.63	-0.91	0.39
Femur Maximum Length (R)	2 7	395.5 ± 6.36 400.4 ± 16.64	-0.87	0.41
Femur Physiological Length (L)	2 7	392.5 ± 4.95 402.3 ± 15.67	-0.83	0.43
Femur Physiological Length (R)	2 7	393.5 ± 4.95 402.6 ± 17.44	-0.70	0.51
Femur Maximum Head Diameter (L)	2 9	40.5 ± 0.70 40.0 ± 2.00	0.34	0.74
Femur Maximum Head Diameter (R)	2 9	40.5 ± 0.70 40.5 ± 1.42	-0.05	0.96

TABLE 7 (Cont'd)

Measurement	N	Mean	t	P
Femur Anterior-Posterior (L)	2 7	23.0 ± 1.41 25.0 ± 1.83	-1.41	0.20
Femur Anterior-Posterior (R)	2 8	22.0 ± 1.41 25.9 ± 1.46	-3.37	0.01*
Femur Medial-Lateral (L)	2 7	24.0 ± 0.00 24.1 ± 2.54	-0.08	0.94
Femur Medial-Lateral (R)	2 8	24.0 ± 1.41 25.0 ± 1.60	-0.80	0.45
Femur Mid-Shaft Circumference (L)	2 7	75.0 ± 2.83 78.3 ± 4.34	-0.98	0.36
Femur Mid-Shaft Circumference (R)	2 8	74.0 ± 4.24 80.9 ± 3.22	-2.58	0.03*
Tibia Maximum Length (L)	2 4	318.5 ± 4.95 329.5 ± 13.62	-1.05	0.35
Tibia Maximum Length (R)	1 5	312.0 - 338.2 ± 13.57	-	-
Tibia Physiological Length (L)	2 4	312.0 ± 7.07 325.3 ± 11.33	-1.47	0.22
Tibia Physiological Length (R)	1 5	306.0 - 332.2 ± 13.65	-	-
Tibia Condylar Breadth (L)	2 5	68.5 ± 2.12 66.6 ± 3.36	0.72	0.50
Tibia Condylar Breadth (R)	1 6	67.0 - 66.6 ± 2.66	-	-
Tibia Maximum Mid-Shaft Diameter (L)	2 4	25.0 ± 1.41 25.8 ± 2.50	-0.38	0.72
Tibia Maximum Mid-Shaft Diameter (R)	1 6	26.0 - 26.5 ± 1.38	-	-
Tibia Minimum Mid-Shaft Diameter (L)	2 4	18.0 ± 0.00 19.8 ± 2.23	-1.05	0.35
Tibia Minimum Mid-Shaft Diameter (R)	1 6	18.0 - 21.3 ± 0.82	-	-

TABLE 7 (Cont'd)

Measurement	N	Mean	t	P
Tibia Shaft Circumference (L)	2 4	68.5 ± 2.12 73.0 ± 5.94	-0.99	0.38
Tibia Shaft Circumference (R)	1 6	71.0 - 75.5 ± 3.02	-	-
Fibula Maximum Length (L)	1 1	284.0 - 318.0 -	-	-
Fibula Maximum Length (R)	1 0	305.0 - - -	-	-
Clavicle Maximum Length (L)	3 3	131.7 ± 13.05 131.3 ± 11.02	0.03	0.98
Clavicle Maximum Length (R)	1 6	118.0 - 129.0 ± 5.80	-	-
Clavicle Mid-Shaft Circumference (L)	3 3	30.3 ± 1.15 33.7 ± 5.68	-1.00	0.38
Clavicle Mid-Shaft Circumference (R)	1 6	31.0 - 34.2 ± 5.31	-	-
Mandible Bicondylar Breadth	6 5	115.0 ± 7.43 116.0 ± 6.12	-0.24	0.82
Minimum Ramus Breadth	6 9	30.8 ± 1.47 34.4 ± 2.83	-2.85	0.01
Bigonial Breadth	6 7	92.8 ± 3.55 89.3 ± 6.63	1.17	0.27
Symphyseal Height	6 7	26.7 ± 5.47 29.1 ± 4.45	-0.90	0.39
Vertical Body Length	6 6	98.3 ± 5.50 101.5 ± 3.39	-1.20	0.26
Vertical Ramus Height	6 6	48.2 ± 7.86 52.0 ± 8.37	-0.82	0.43
Ramus Height (angular)	6 6	54.2 ± 6.11 55.5 ± 6.35	-0.37	0.72
Mandibular Angle	6 6	36.3 ± 4.13 31.5 ± 5.36	1.75	0.11

TABLE 7 (Cont'd)

Measurement	N	Mean	t	P
Mandibular Body Length (angular)	6 6	70.0 ± 5.80 76.6 ± 3.07	-2.49	0.03

TABLE 8

T-TEST RESULTS OF MALE INDICES

Total N of adult males from church = 25
Total N of adult males from cemetery = 65

Index	N	Mean	t	P
Cranial Index	18 44	73.9 ± 2.54 73.8 ± 3.73	0.14	0.89
Height-Breadth Index	13 34	98.5 ± 3.79 101.1 ± 3.58	-2.22	0.03*
Height-Length Index	14 34	72.9 ± 2.32 73.8 ± 2.66	-1.05	0.30
Mean Basion-Height Index	14 35	88.2 ± 16.7 90.5 ± 22.7	-0.34	0.74
Total Facial Index	3 7	84.6 ± 10.4 87.9 ± 5.51	-0.68	0.52
Upper Facial Index	6 13	53.0 ± 3.29 50.5 ± 6.59	0.88	0.39
Nasal Index	13 25	46.5 ± 5.44 48.3 ± 7.56	-0.82	0.42
Orbital Index	15 28	88.2 ± 6.37 83.1 ± 7.56	2.18	0.04*
Fronto-Parietal Index	18 37	69.6 ± 2.85 71.1 ± 3.14	-1.74	0.09
Palatal Index	13 22	91.7 ± 9.09 87.1 ± 10.5	1.33	0.19
Maxillo-Alveolar Index	13 25	112.6 ± 7.01 115.6 ± 10.2	-0.94	0.35
Mandibular Index	7 25	87.9 ± 7.49 88.2 ± 6.32	-0.09	0.93
Fronto-Goniac Index	9 22	105.9 ± 4.56 106.2 ± 7.05	-0.12	0.91
Gonio-Condylar Index	7 24	84.4 ± 4.07 83.4 ± 6.39	0.38	0.71

TABLE 8 (Cont'd)

Index	N	Mean	t	P
Ramus Index	9 29	52.7 ± 6.44 53.6 ± 6.81	-0.34	0.74
Clavicle Robustness Index	5 26	26.2 ± 1.65 27.3 ± 3.66	-0.64	0.53
Radial-Humeral Index	6 21	76.5 ± 3.08 76.2 ± 2.78	0.26	0.79
Crural Index	6 23	82.5 ± 2.36 82.7 ± 2.73	-0.13	0.90
Humero-Femoral Index	7 27	70.1 ± 2.20 71.5 ± 2.41	-1.45	0.16
$Stature_1$	10 32	167.9 ± 5.70 168.5 ± 4.89	-0.35	0.73
$Stature_2$	7 32	167.7 ± 5.53 168.1 ± 5.20	-0.22	0.83

TABLE 9

T-TEST RESULTS OF FEMALE INDICES

Total N of adult females from church = 14
Total N of adult females from cemetery = 33

Index	N	Mean	t	P
Cranial Index	12 24	75.4 ± 2.31 76.4 ± 4.45	-0.67	0.51
Height-Breadth Index	10 16	96.2 ± 4.80 97.4 ± 5.08	-0.63	0.54
Height-Length Index	10 16	72.4 ± 2.53 74.3 ± 2.34	-1.99	0.06
Mean Basion-Height Index	10 16	82.6 ± 3.28 84.2 ± 2.34	-1.51	0.15
Total Facial Index	1 4	86.7 - 86.7 ± 3.87	-	-
Upper Facial Index	2 5	49.4 ± 2.01 49.3 ± 3.27	0.02	0.97
Nasal Index	8 12	46.1 ± 3.67 54.9 ± 6.26	-3.58	.002*
Orbital Index	7 15	90.5 ± 3.25 86.1 ± 8.34	1.32	0.20
Fronto-Parietal Index	10 22	69.4 ± 1.90 69.6 ± 4.03	-0.14	0.89
Palatal Index	8 14	86.7 ± 8.69 83.2 ± 10.6	0.79	0.44
Maxillo-Alveolar Index	8 14	121.1 ± 10.88 112.9 ± 11.10	1.68	0.11
Mandibular Index	6 5	85.7 ± 6.45 87.2 ± 2.92	-0.45	0.66
Fronto-Goniac Index	4 5	102.3 ± 6.38 96.9 ± 10.0	0.94	0.38
Gonio-Condylar Index	6 5	80.8 ± 2.47 76.2 ± 4.56	2.17	0.06

TABLE 9 (Cont'd)

Index	N	Mean	t	P
Ramus Index	6	57.5 ± 7.15	-0.89	0.39
	6	62.2 ± 10.5		
Clavicle Robustness Index	3	23.1 ± 1.53	-1.54	0.20
	3	25.5 ± 2.19		
Radial-Humeral Index	1	73.5 -	-	-
	4	77.9 ± 2.98		
Crural Index	2	80.5 ± 0.53	-2.29	0.12
	3	83.1 ± 1.47		
Humero-Femoral Index	1	73.9 -	-	-
	6	69.7 ± 2.17		
$Stature_1$	2	151.8 ± 0.91	-0.91	0.39
	7	154.2 ± 3.62		
$Stature_2$	2	153.9 ± 1.45	-1.05	0.35
	4	157.1 ± 3.95		

palatal length, bregma-lambda chord, foraminal breadth, femur anterio-posterior diameter, and femur mid-shaft circumference (Table 7). Both male and female groups show basion-nasion and orbital breadths to be significantly different. Males show no post-cranial differences, while the females show two post-cranial variables to be significantly different between groups.

T-tests were performed on the indices computed from the cranial and post-cranial measurements (Tables 8 and 9) with significance below the five percent level occurring for the nasal index for females and for males in the orbital and height-breadth indices.

Nasal index for church females was 46.1 with a range of 40-52. Cemetery females averaged 54 with a larger range of 40-70. This wide spread of scores could account for the significant differences.

All other indices for both male and female showed no differences significant below the five percent level.

Cranial indices show male skulls to be dolichocranic and high vaulted, while the females tended to be more mesocranic with average cranial vaults.

Facial indices were average in skull height relative to skull breadth in both males and females.

Nasal apertures were narrow for all males and church females, while the nasal index for cemetery females tended to be broader.

Cemetery females and all males had medium orbital indices with the church females showing orbital indices to be on the average four millimeters greater.

Maxillo-alveolar indices for both sexes were average to broad, with

mandibular indices being medium for both sexes.

Other post-cranial indices showed both sexes to be average in robusticity and in long bone ratios.

STATURE

Stature was calculated from Trotter and Gleser's regression formulae (1958) for white males and females. The four formulae used (Table 3) had the largest sample sizes of corresponding bones and the least standard error relative to other choices, with the exception of stature (1) for males which uses humeral measurements for calculations.

Stature did not show any significant differences between the church or cemetery for either sex.

Mean male stature was approximately 168cm and females were on the average 13.8cm shorter with a mean stature of 154cm.

Male stature tended to be higher than expected by four cm, when compared to Mendes-Correa's findings (1932) of Portuguese stature using Manouvier's data (see Krogman 1973:175), in which mean male stature was 164cm. The taller mean stature for males seems to reflect a possible selection process of filling military positions with taller and larger males.

Female stature corresponded well with results obtained by Mendes-Correa (1932).

CONCLUSIONS

The results of the t-tests performed indicate that some significant differences did occur between church and cemetery groups. These differences primarily occurred in individual cranial measurements and in three out of twenty-one indices derived from them. Only two post-cranial

variables, all within the female group were significant at the five percent level. Despite an increase in bone size, body proportions remained about the same. This is evidenced by the index results with the exception of three indices, nasal index for females and orbital and height-breadth indices for males which differed significantly (Tables 8 and 9). The ranges of scores were much greater in the cemetery groups, male and female, than those occurring in the church groups. Whether this is just a more accurate reflection of variability found within the Portuguese population or evidence of inclusion of other indigenous people of the immediate area within the lower socio-economic strata is unknown.

Despite historical evidence of nutritional differences existing between socio-economic groups, the results of the t-tests indicate that nutritional differences thought to exist between groups were not severe enough to produce a large number of biologically significant differences and if, in fact, these differences did exist they probably occurred for relatively short periods of time, thus not affecting size significantly. A reduction of adult size is proportional to the degree and length of time it occurred (Malcolm 1966).

The lower socio-economic classes possibly consumed more protein than previously thought in the form of fish and poultry. Poultry is easier to raise and less expensive than other meats, and fish is readily accessible to anyone from the sea in Portugal and Qsar Es-Seghir.

Other environmental and genetic factors not dealt with here could have been operative at the time, exerting more pressure than nutrition on size. Disease conditions for the most part affected both groups equally (see Appendix I), and perhaps cancelled out any nutritional advantages the upper socio-economic class may have had during their growth and

development.

Although the hypothesis of higher socio-economic groups of Qsar Es-Seghir being on the average larger than lower socio-economic groups due to nutritional differences has not been proven conclusively, the results observed do support the fact that some significant differences did exist between groups. Whether these differences were a direct result of nutritional factors alone remains speculative. This study has encountered many questions other studies have raised concerning interrelations, past and present, between environment and genetics of populations.

Much has yet to be learned about nutrition and other external factors, their interreactions, and influence on genetic components, of living populations and the consequences of such influences on skeletal biology, before any progress can be made in trying to understand these in past cultures.

This report is an attempt to identify and interpret differences in the general size of a skeletal population. It has also attempted to present a morphological description of the skeletal population excavated at Qsar Es-Seghir and to provide a basis upon which future comparative work can be done.

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APPENDIX I

PATHOLOGY

A number of pathologies were encountered in the Qsar Es-Seghir population. These ranged from dental caries to chronic infections affecting the entire skeleton. Because of the lack of established standards, or mutually agreed upon references in assessing pathological conditions in skeletal populations, all pathologies uncovered at Qsar Es-Seghir were tentatively diagnosed based on criteria outlined by Brothwell and Sandison (1967), Steinbock (1976), Hackett (1976), Jarcho (1965), and Janssens (1970). Specimens were separated into five major categories. These are: 1) trauma; 2) degeneration; 3) infection; 4) dental; and 5) other. A number of burials displayed more than one type of bone pathology and these cases were recorded in all the applicable categories.

Loose and unassociated bone found with burials did display some pathologies, but these are not included here.

TRAUMA

Healed fractures were the most numerous of possible traumatic conditions. Four of the five cases of healed fractures (Table A) were cranial similar to that shown in Plate 14 from burial #77. The fifth case of a healed fracture was of a humerus from burial #181.

Wounds and operations occurring were all cranial (see Appendix II, Plate 15). Non-specific cranial and post-cranial indentations, possible developmental cranial deformities and nutritional deficiencies were all placed in the category 'other.' Twelve percent of the total adult population showed traumatic pathologies.

TABLE A

TRAUMA

Burial Number	Healed Fractures	Wounds	Operations	Dislocations	Cribra Orbitalia	Other
Males (Church)						
8	X					
23			X			
Males (Cemetery)						
160						X
103		X				
127				X		
135						X
187						X
181	X					
180	X					
101		X				
80	X					
66						X
77	X					
155					X	
174					X	
Female (Cemetery)						
95						X
66						X
Total	5	2	1	1	2	6

Total = 17

DEGENERATIVE CHANGES

The most numerous degenerative change occurring in this population was osteoarthritis, which affected in various degrees twenty-two percent of the adult population. This was generally centered most extensively in the vertebral column and in varying degrees in post-cranial joints.

Males showed the highest incidence of arthritic lipping. Twenty-two males, nineteen from the cemetery and three from the church, all had moderate to extreme lipping of the vertebral column and post-cranial joints. Seven females from the cemetery and one from the church displayed similar conditions (see Appendix II, Plate 21).

INFECTION

Infectious conditions were evidenced in all areas of the body. some were very localized affecting one or two bones and others were very extensive involving all or most bones of the skeleton. Infections of bone were sub-divided into three general categories as follows:

1) Osteitis - general infections of bone

2) Osteomyelitis - infections perforating the bone

3) Treponemal infection

Ten percent of the adult population showed extensive signs of infection. Infectious conditions seemed to be evenly distributed within the church and cemetery (Table B).

DENTAL

Dental caries were the most prominent disorder of the oral cavity. Forty-seven percent of the entire adult population had caries. The remaining fifty-three percent either showed no signs of caries or had extensive tooth loss prior to death.

TABLE B

INFECTION

Burial Number	Osteitis	Osteomyelitis	Treponemal Infection
Males (Church)			
24	X		
49		X	
51			X
36	X		
38	X		
Males (Cemetery)			
128	X		
109		X	
144	X		
110	X		
88	X		
83	X		
Females (Church)			
39	X		
42	X		
Females (Cemetery)			
136	X		
Total	11	2	1

Total = 14

Of thirty-nine adults from the church sixty-one percent had caries and, of ninety-eight adults from the cemetery, forty-two percent had caries.

Periodontal disease occurred frequently producing porous and resorbed alveolar margins, with considerable calculus deposits on the teeth (see Appendix II, Plate 23).

Other disorders such as crowding, abscesses, and abnormal tooth eruptions also occurred (see Appendix II, Plate 22).

A more detailed dental analysis is presently being done by Lane Mann at the University of Massachusetts.

OTHER PATHOLOGIES

Only one burial (#182) had small button osteomas on the frontal and parietal bones. All other burials showed no evidence of tumors. Burial #182) from the cemetery had a lateral curvature of the spine due to three thoracic vertebral bodies that were collapsed on the right side.

SUMMARY

Pathologies occurred with equal frequency in both groups church and cemetery, with the exception of incidence of dental caries which was higher in the church group.

The most frequent pathological condition was osteoarthritis followed by trauma which seems to reflect the military aspect of the site and the harsh life-style led by some of its members.

APPENDIX II

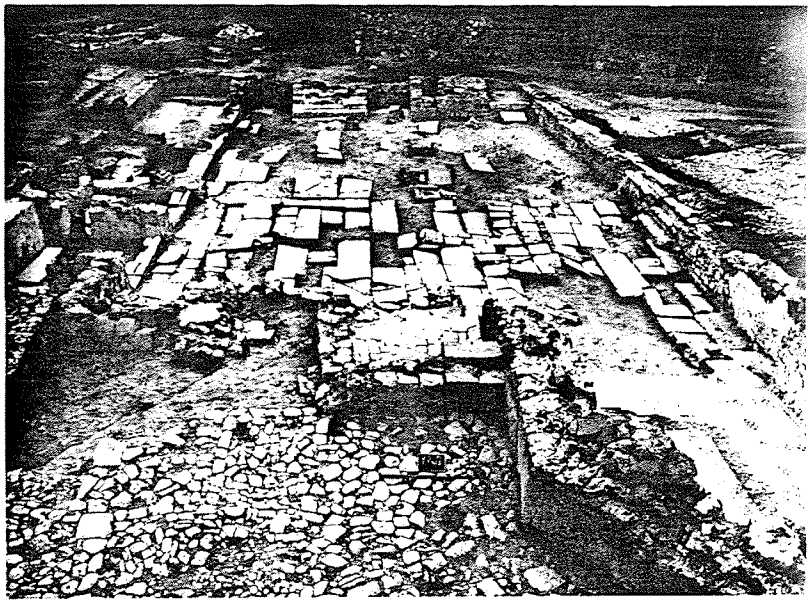


Plate 1. Interior of church looking Northwest.

Plate 2. Interior of church facing West showing side chapels.

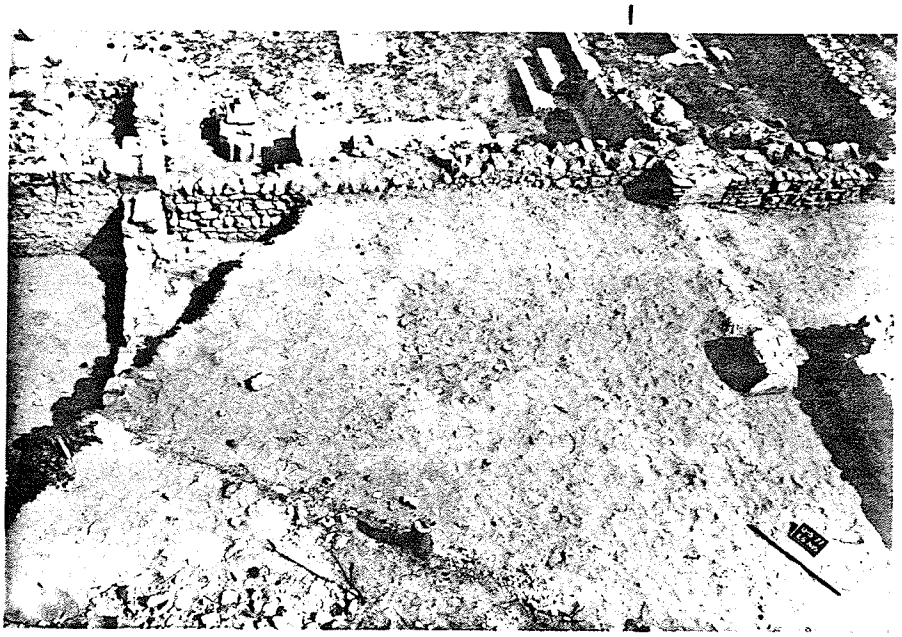


Plate 3. Exterior cemetery area.

Plate 4. Tombstone #1

	Translated:
Line 1) Sepultura	Tomb
2. Debrouca	Double possible name (?)
3) Dacosta M	Dacosta W
4) Ollier q Foi	Wife who (abb.) was
5) Dariq de	of Enrique (abb.) de
6) Sousa	Sousa

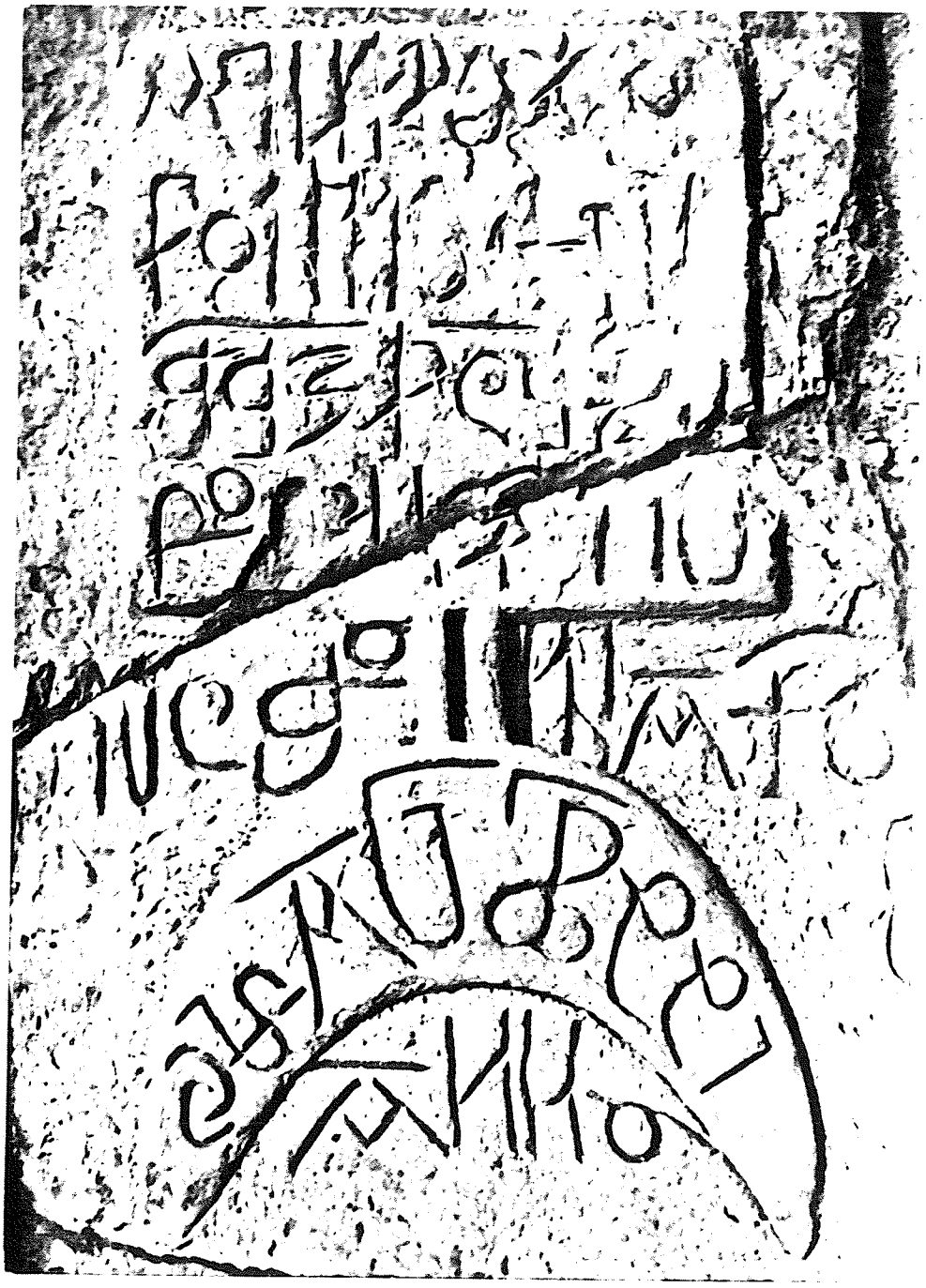


Plate 5. Tombstone #6

Line 1) Aqui Jas--
2) Foi Mate(us)?
3) gg3 P eg--
4) (?)
5) ?ego ll Mato (?)
6) (in crescent)
--AG D 1544
7) Anito

Translated:
Here lies??
Was Mateus - (name)
(?)
(?)
name? ll died
the year of our
gracious Lord
year

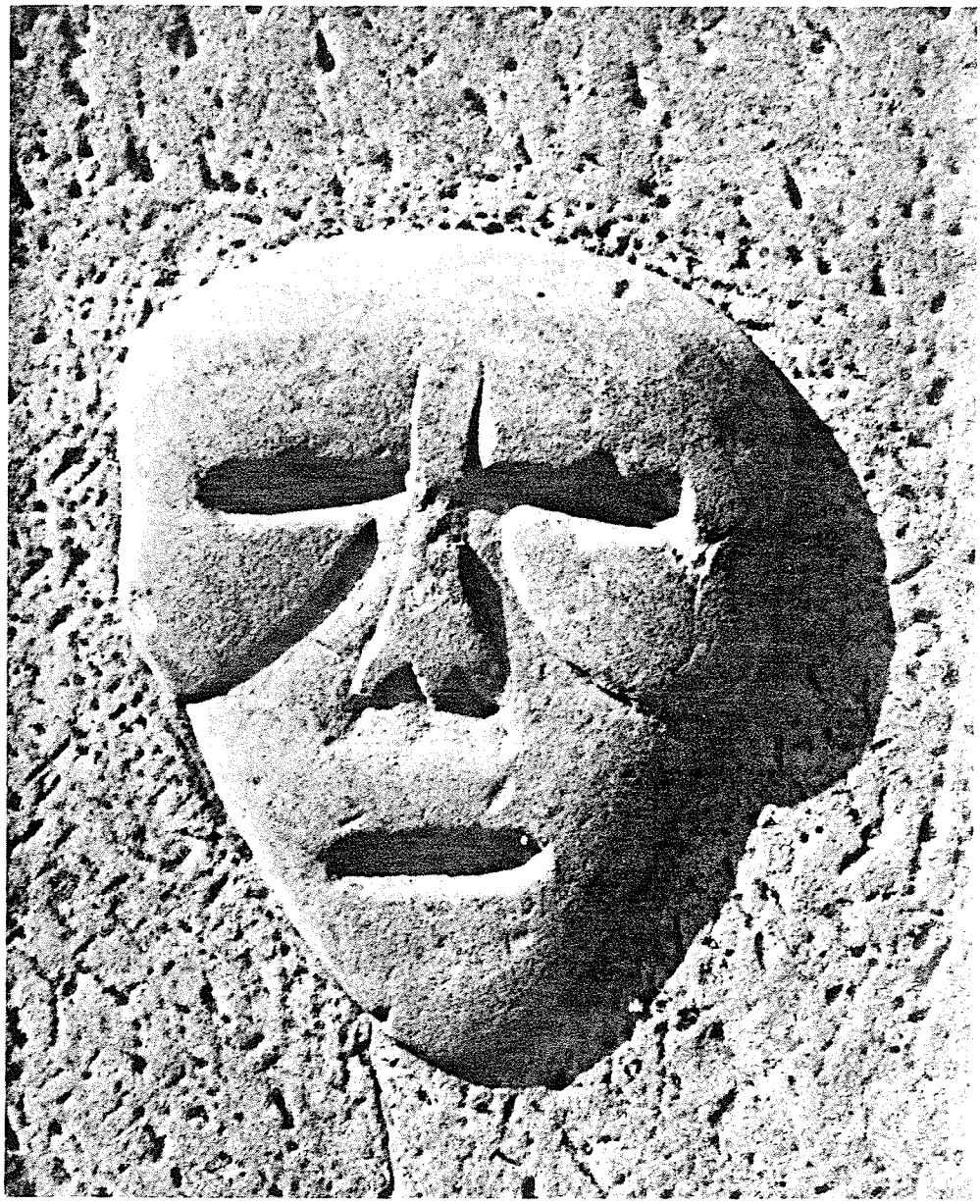


Plate 6. 'Death Mask' carved on tombstone #6 under inscription (Plate 5).

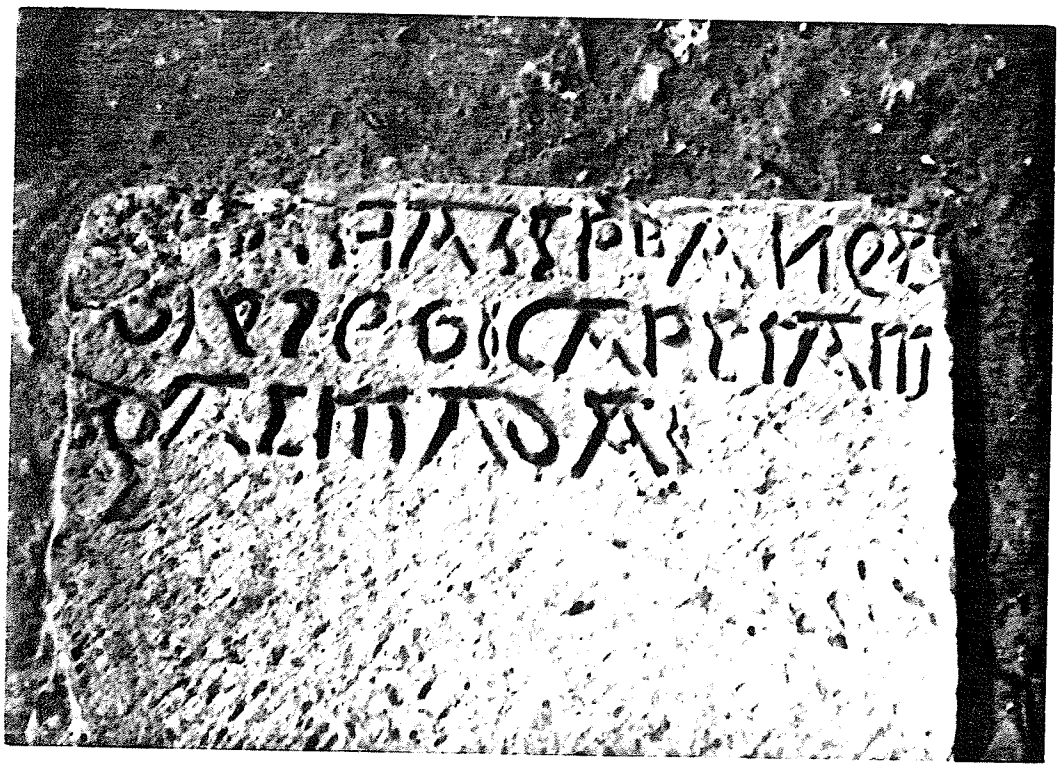


Plate 7. Tombstone #7

Line 1) Aquy Jas
2) Don AF-DE
3) Olanda--
4) -AG-AG-

5) 1544

Translated:
Here lies
Don Affonso (Abb.) De
Olanda??
abbreviations - perhaps
Anno Gracia Domini
1544

Plate 8. Tomb #10, containing burials probably buried at the same time.

Plate 9. Tomb #6, remains of a burial surrounded by a mortar border.

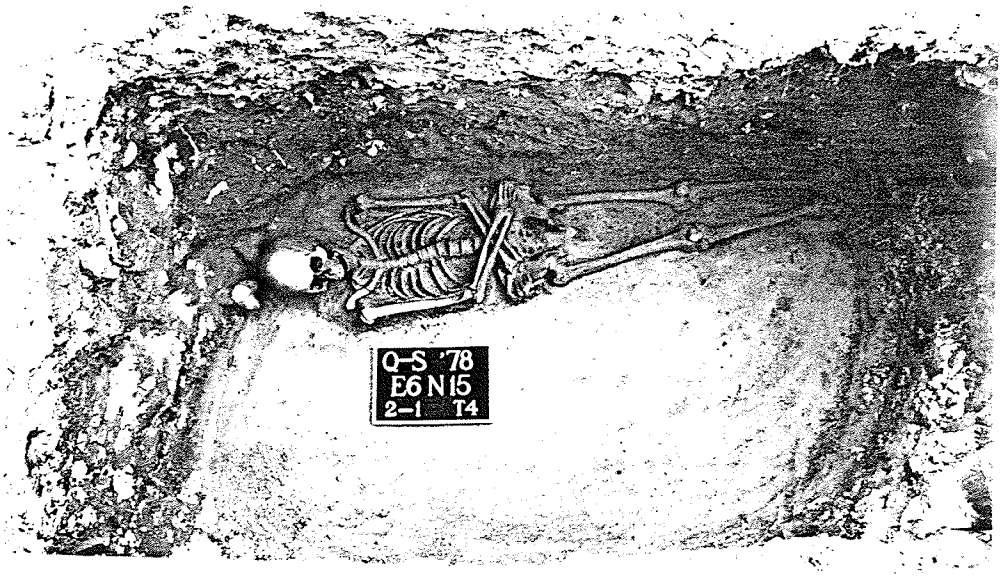


Plate 10. Primary burial from Tomb #4.

Plate 11. Simultaneous burials from Tomb #4.

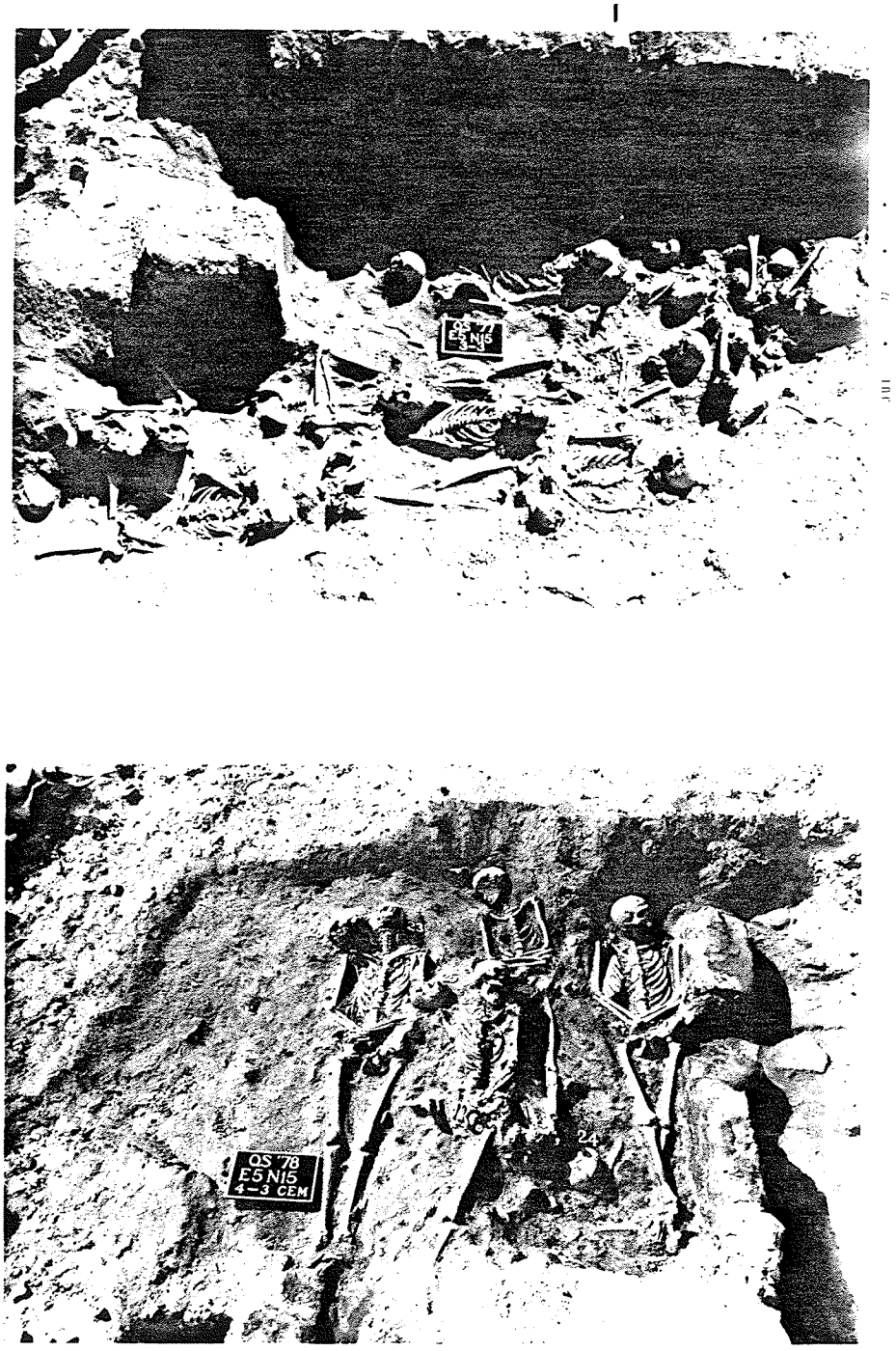


Plate 12. Mass primary burials uncovered in the cemetery.

Plate 13. Burial of child from cemetery with four glass bracelets.

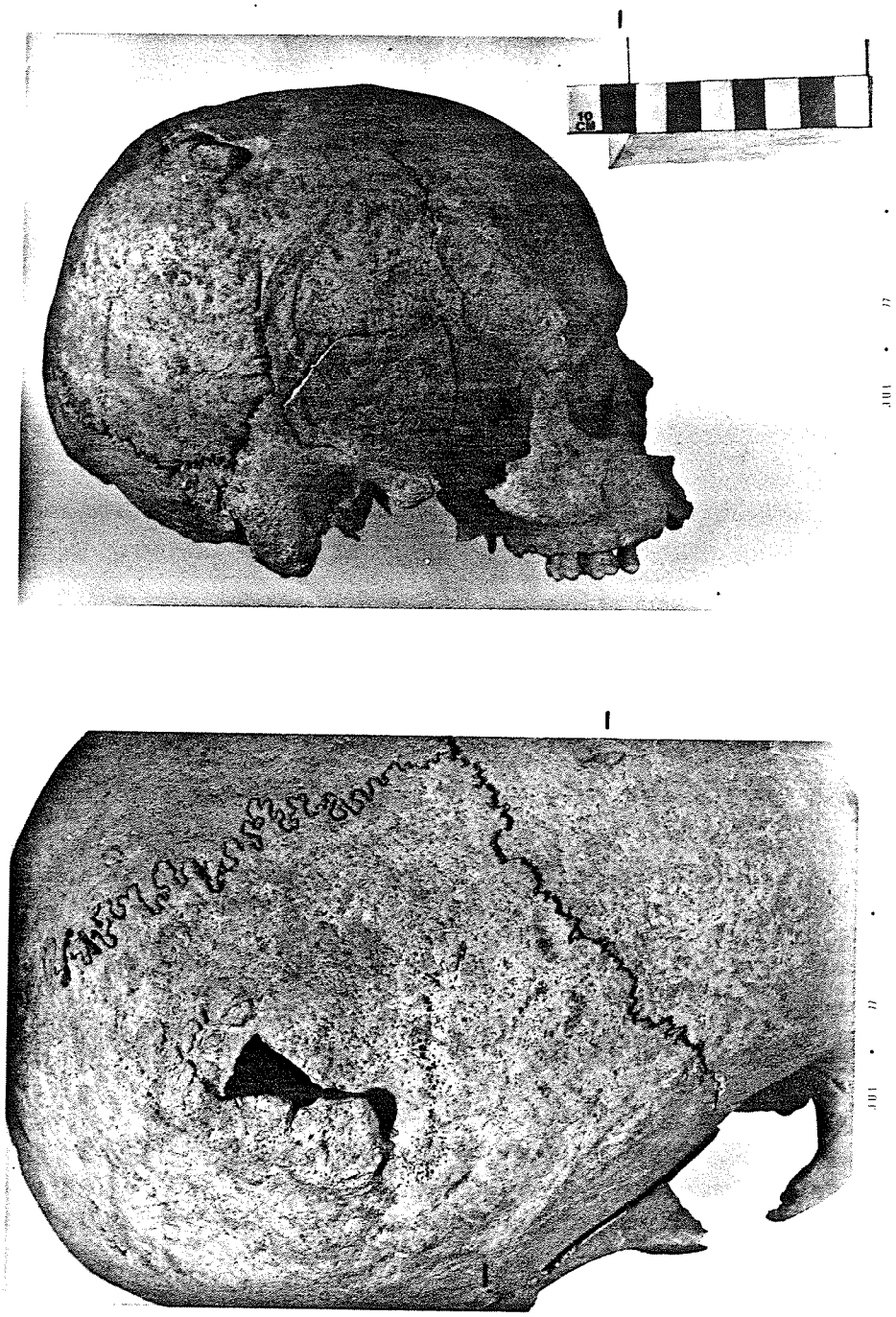


Plate 14. Burial #77 displaying a healed skull fracture of the right parietal.

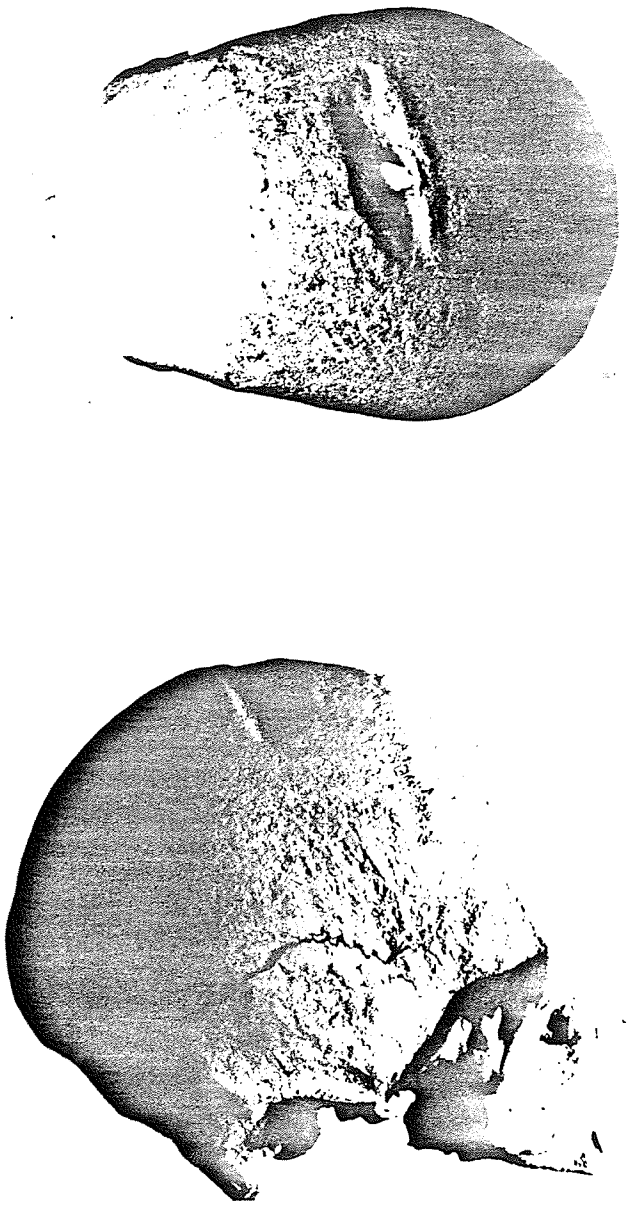


Plate 15. Burial #23 with trephined skull.

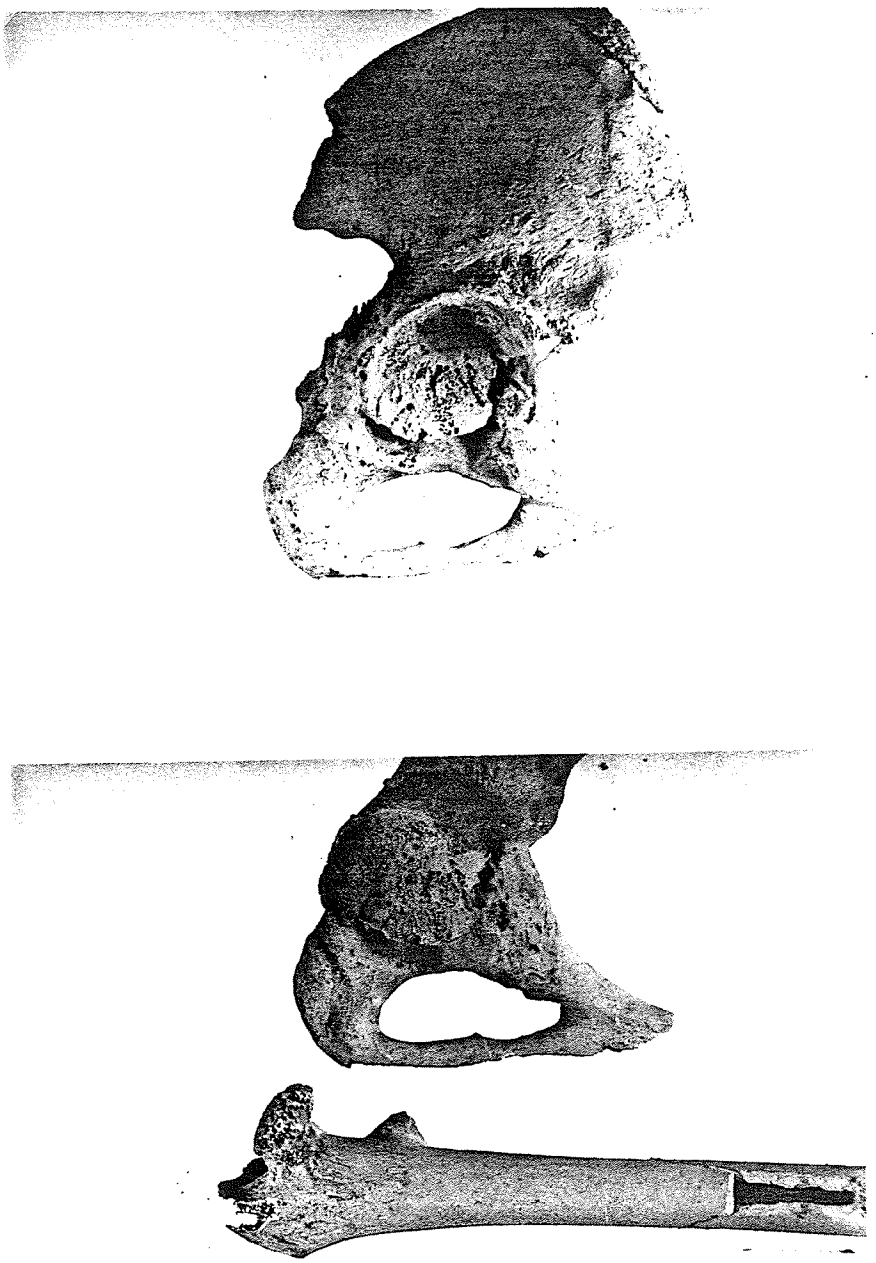


Plate 16. Burial #237 with dislocated right hip.

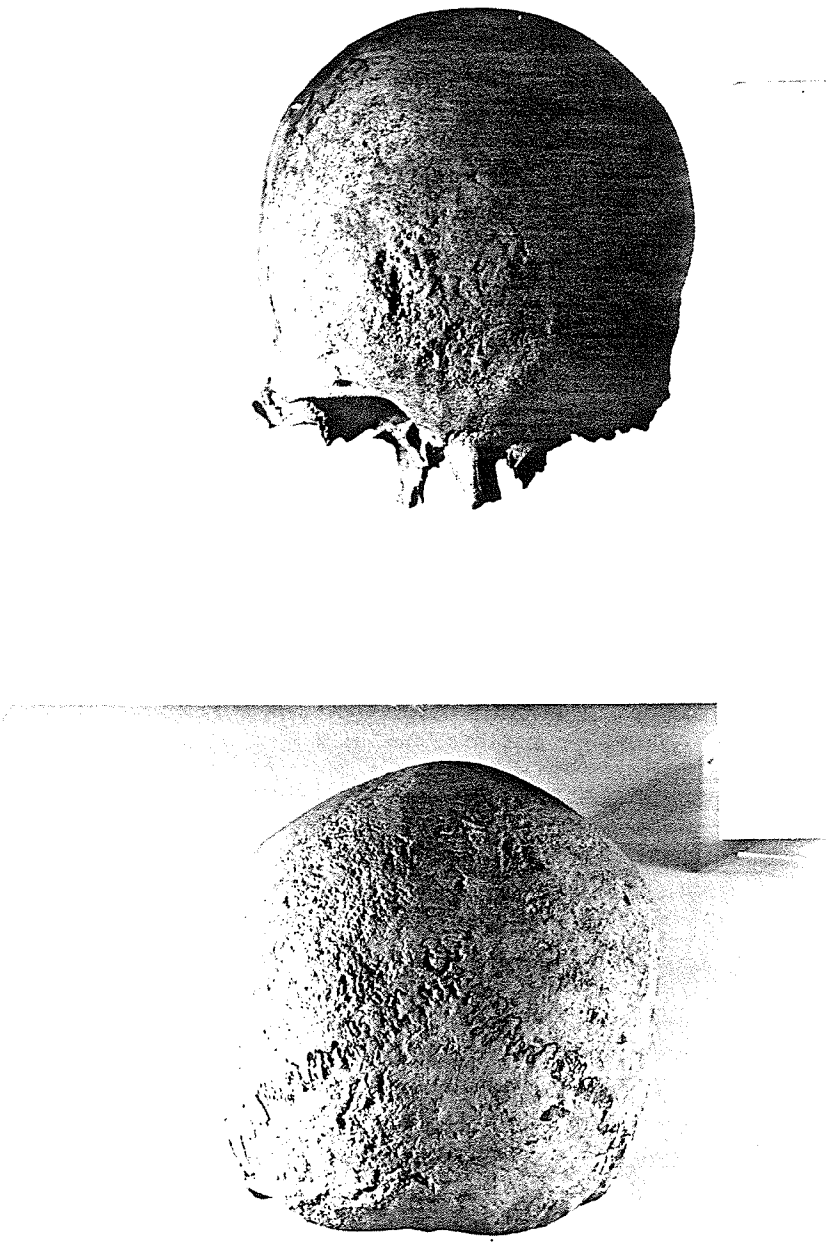


Plate 17. Burials showing general infections of frontal and occipital bones.

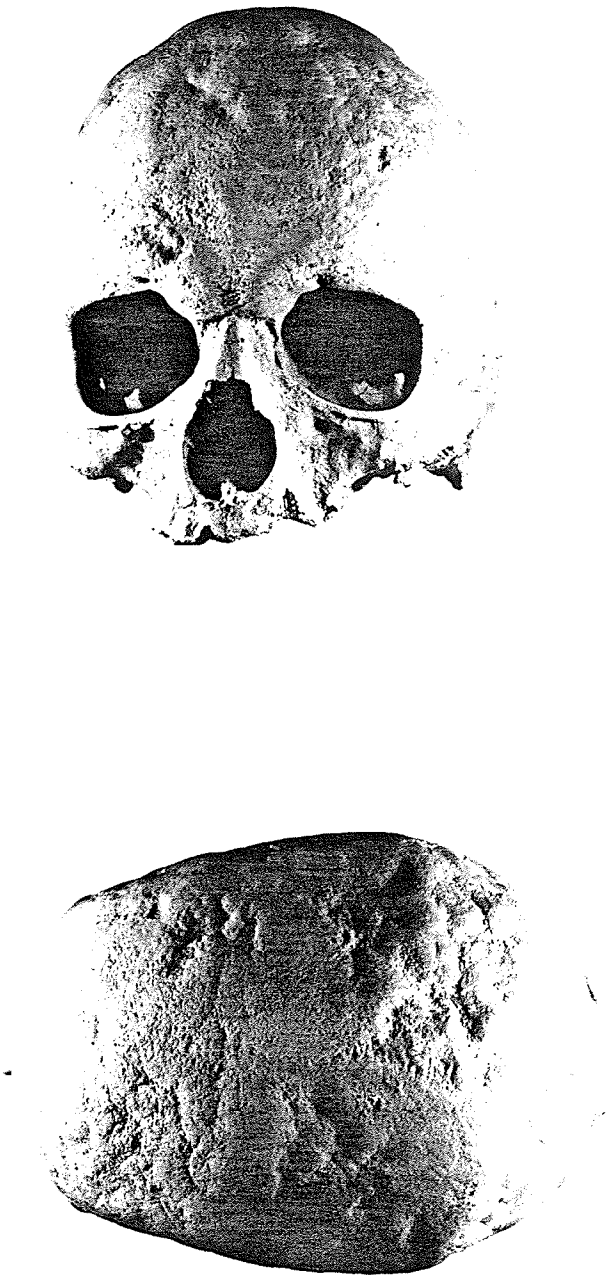
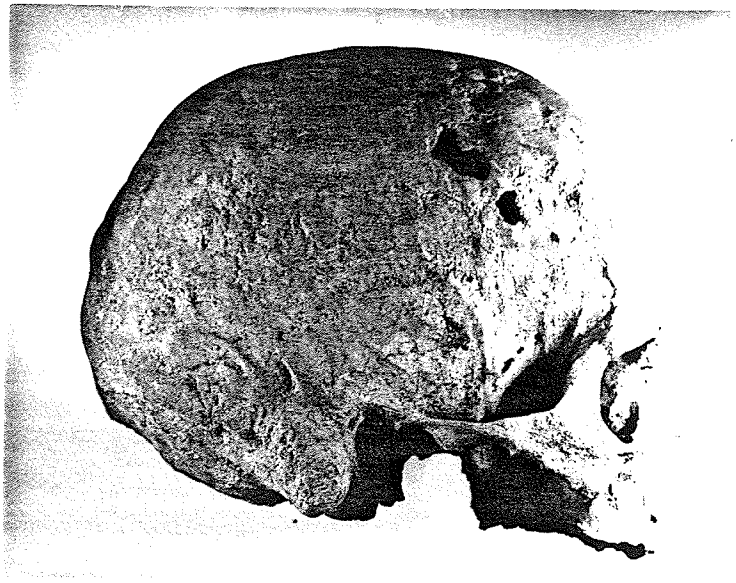


Plate 18. Burial #51 displaying a treponemal infection.



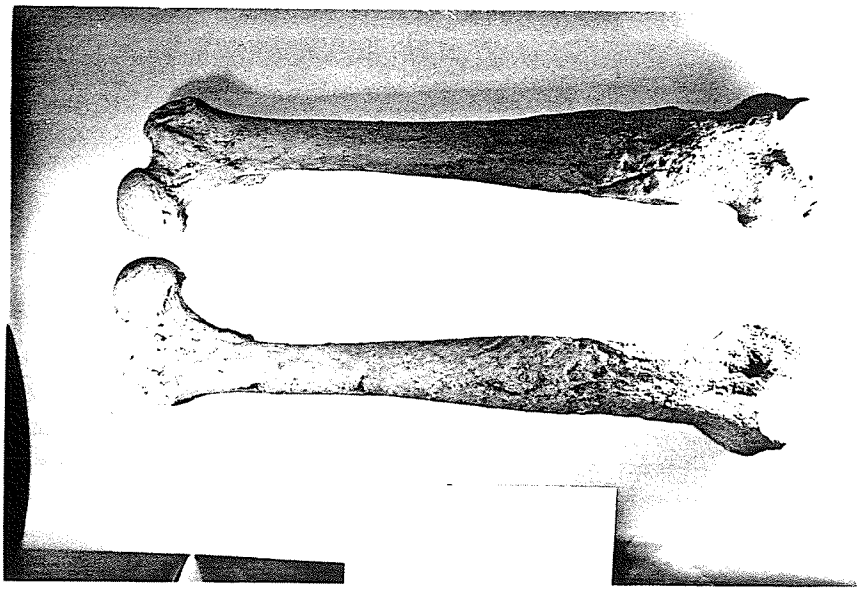


Plate 19. Continuation of Plate #18.

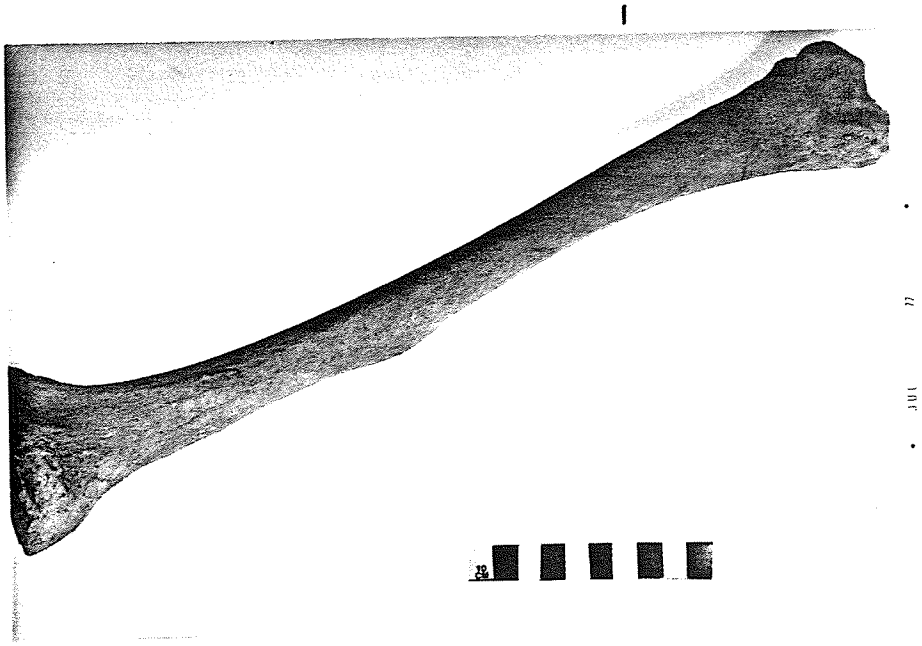


Plate 20. Rehealed fracture of tibia.

Plate 21. Case of extreme osteoarthritis of vertebral column.

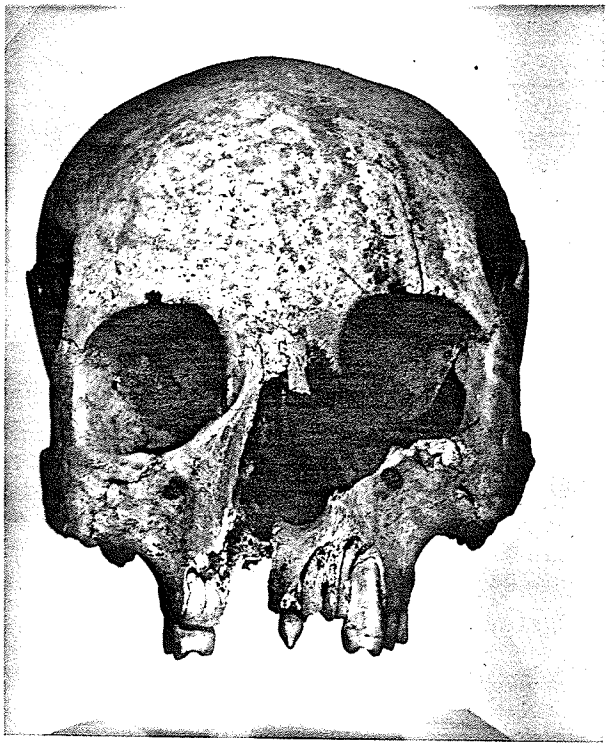


Plate 22. Burial #71, pegged shaped incisor, possibly due to cultural factors.

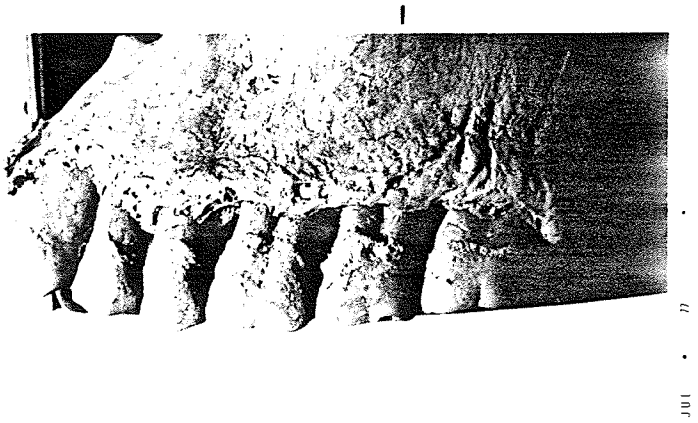


Plate 23. Example of alveolar resorption with medium degree of calculus.

Plate 24. Iron necklace found on Burial #177.

APPENDIX III

CRANIAL DATA

BURIAL NUMBER	2	3	4	5	6	7
AGE	A	25+	A	30+	25+	13-20
SEX	M	M	M	M	F	F
1. Cranial Length	183	183	195	188	175	180
2. Cranial Breadth	138	131	139	140	129	142
3. Basion-Bregma Height	-	133	-	135	134	125
4. Basion-Prosthion Length	-	96	-	100	90	-
5. Minimum Frontal Breadth	94	96	96	97	91	-
6. Basion-Nasion Length	-	96	-	100	93	86
7. Total Facial Height	-	-	-	108	-	-
8. Nasion-Prosthion Height	-	65	-	59	62	-
9. Bizygomatic Breadth	-	-	-	-	-	-
10. Nasal Height	50	47	-	48	42	-
11. Nasal Breadth	-	25	-	26	21	-
12. L. Orbital Height	32	36	-	33	32	-
13. L. Orbital Breadth	36	36	-	38	35	-
14. Biorbital Diameter	94	92	-	95	91	-
15. Maxillo-Alveolar Length	-	54	-	54	42	-
16. Maxillo-Alveolar Breadth	61	61	-	60	61	-
17. Palatal Length	-	36	-	43	37	-
18. Palatal Breadth	-	34	-	39	36	-
19. Biasterionic Breadth	114	111	-	118	106	-
20. Nasion-Bregma Chord	111	108	-	115	111	109
21. Bregma-Lambda Chord	117	113	-	109	121	105
22. Lambda-Opisthion Chord	-	99	-	106	94	90
23. Frontal Arc	125	127	-	129	129	135
24. Parietal Arc	133	126	-	131	136	132
25. Occipital Arc	-	121	-	118	108	108
26. Foraminal Length	-	37	-	37	33	34
27. Foraminal Breadth	-	33	-	32	32	30
28. Cranial Circumference	514	516	514	530	496	521
MANDIBLE						
1. Bicondylar Breadth	-	-	-	128	-	-
2. Minimum Ramus Breadth	-	-	-	35	-	-
3. Bigonial Breadth	-	-	-	101	-	-
4. Symphyseal Height	-	26	-	32	-	-
5. Body Length	-	-	-	111	-	-
6. Ramus Height (vertical)	-	-	-	45	-	-
7. Ramus Height (angular)	-	-	-	54	-	-
8. Mandibular Angle	-	-	-	42°	-	-
9. Mandibular Length	-	-	-	78	-	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	8	11	15	16	18	19	20	21
AGE	25+	A	30+	A	30+	A	25+	A
SEX	M	M	M	F	M	M	M	F
1.	179	-	195	179	-	182	186	-
2.	140	131	-	141	-	132	135	-
3.	131	-	142	-	-	133	132	-
4.	89	-	88	-	-	92	96	-
5.	93	93	101	-	100	93	96	-
6.	93	-	102	-	-	97	96	-
7.	107	-	-	-	-	97	121	-
8.	63	-	-	-	-	62	72	-
9.	130	-	137	-	-	124	126	-
10.	52	-	54	-	-	56	51	-
11.	24	-	-	-	-	23	23	-
12.	33	-	36	-	-	32	31	-
13.	38	-	38	-	-	41	38	-
14.	95	-	97	-	-	97	96	-
15.	54	-	54	-	-	57	58	-
16.	61	-	64	-	-	55	63	-
17.	38	-	38	-	-	41	42	-
18.	40	-	39	-	-	38	36	-
19.	106	108	125	100	-	108	108	-
20.	111	-	124	-	-	114	111	-
21.	121	121	123	117	-	116	117	-
22.	95	-	101	102	-	98	110	-
23.	123	-	138	-	-	128	127	-
24.	126	136	137	132	-	128	133	-
25.	112	-	122	122	-	116	125	-
26.	40	-	41	-	-	38	33	-
27.	30	-	34	-	-	32	26	-
28.	511	523	544	-	-	509	518	-
MANDIBLE								
1.	-	-	-	-	126	124	112	103
2.	27	-	-	-	37	32	34	30
3.	93	-	-	-	107	106	95	88
4.	27	-	-	-	33	-	33	29
5.	102	-	-	-	107	103	113	99
6.	58	-	-	-	66	48	55	43
7.	58	-	-	-	70	55	59	54
8.	27°	-	-	-	30°	35°	35°	42°
9.	73	-	-	-	77	76	84	65

CRANIAL DATA (Cont'd)

BURIAL NUMBER	22	23	24	25	26	27	29	32
AGE	25+	35+	35+	12-15	30+	17-25	A	A
SEX	M	M	M	F	M	F	F	M
1.	180	191	194	-	-	190	184	192
2.	140	136	144	-	-	142	132	142
3.	133	-	135	-	-	135	127	147
4.	93	95	91	-	-	90	-	103
5.	95	96	94	-	101	96	94	100
6.	93	105	98	-	-	94	-	111
7.	119	-	-	-	-	-	-	-
8.	66	63	64	58	-	58	-	73
9.	-	-	-	-	-	121	-	138
10.	47	48	53	43	-	46	-	56
11.	23	23	23	20	-	21	-	23
12.	36	33	34	-	-	31	-	34
13.	36	38	37	30	-	35	-	35
14.	97	99	96	-	-	90	-	101
15.	54	50	52	52	-	51	-	48
16.	59	57	57	60	-	62	-	56
17.	43	43	39	39	-	39	-	39
18.	34	35	35	34	-	40	-	42
19.	107	111	-	-	-	97	104	112
20.	108	-	117	103	-	113	-	118
21.	116	-	-	-	-	134	123	126
22.	96	-	-	-	-	98	95	100
23.	121	-	133	122	-	132	-	133
24.	130	-	-	-	-	145	131	141
25.	119	-	-	-	-	117	115	117
26.	36	36	35	-	-	36	32	36
27.	33	31	26	-	-	31	28	30
28.	516	532	537	-	-	530	508	543
MANDIBLE								
1.	112	-	119	116	-	-	119	-
2.	29	33	29	32	-	-	30	-
3.	103	104	99	94	-	-	95	-
4.	31	28	28	26	-	-	17	-
5.	103	110	108	89	-	-	101	-
6.	52	56	58	40	-	-	51	-
7.	60	64	65	45	-	-	57	-
8.	37°	38°	39°	39°	-	-	36°	-
9.	70	75	72	62	-	-	72	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	33	35	36	37	38	39	41	42
AGE	25+	A	20-30	A	A	A	20-25	25+
SEX	M	F	M	M	M	F	F	F
1.	181	174	191	197	187	177	175	175
2.	143	133	135	-	137	131	135	130
3.	138	126	130	-	139	128	128	128
4.	98	90	-	-	-	-	88	92
5.	92	95	97	-	106	90	95	87
6.	99	96	103	-	108	-	95	99
7.	-	-	-	-	-	-	-	111
8.	71	65	-	-	-	-	67	65
9.	128	-	-	-	-	-	-	128
10.	59	52	-	-	-	-	51	52
11.	23	21	-	-	-	-	23	23
12.	30	33	-	-	-	-	34	34
13.	34	36	-	-	-	-	36	37
14.	91	90	-	-	-	-	94	96
15.	56	51	-	-	-	-	53	55
16.	63	57	-	-	-	-	60	63
17.	46	41	-	-	-	-	40	41
18.	43	33	-	-	-	-	32	34
19.	119	103	115	-	111	105	107	111
20.	118	105	111	120	113	-	102	107
21.	123	108	115	119	106	110	111	109
22.	87	93	99	94	99	90	93	93
23.	135	120	125	139	130	-	115	121
24.	141	121	127	130	117	123	123	122
25.	103	110	125	127	119	114	111	112
26.	36	31	34	-	36	32	33	33
27.	31	34	32	-	27	28	32	29
28.	521	497	527	-	521	503	497	492
MANDIBLE								
1.	-	-	-	-	-	-	-	124
2.	-	-	-	-	-	-	-	33
3.	-	-	-	-	-	-	-	97
4.	-	-	-	-	-	-	-	31
5.	-	-	-	-	-	-	-	102
6.	-	-	-	-	-	-	-	57
7.	-	-	-	-	-	-	-	60
8.	-	-	-	-	-	-	-	30°
9.	-	-	-	-	-	-	-	77

CRANIAL DATA (Cont'd)

BURIAL NUMBER	44	45	46	48	49	50	51	52
AGE	A	30+	A	12-15	A	25+	A	A
SEX	F	M	M	F	M	F	M	M
1.	181	191	187	177	181	176	185	202
2.	133	136	140	138	137	131	135	144
3.	-	141	136	125	-	134	-	150
4.	-	95	96	82	91	87	-	-
5.	92	93	99	92	95	94	-	102
6.	-	105	97	91	92	89	96	112
7.	-	-	-	97	107	114	96	-
8.	-	71	70	54	60	66	-	-
9.	-	131	-	-	-	-	127	-
10.	-	49	53	42	45	47	45	-
11.	-	25	21	22	24	21	24	-
12.	-	30	30	31	29	32	31	-
13.	-	32	36	34	34	38	39	-
14.	-	95	94	89	96	-	99	-
15.	-	51	55	47	57	55	-	-
16.	-	65	64	59	63	67	-	-
17.	-	42	45	38	44	44	-	-
18.	-	40	38	30	37	37	-	-
19.	-	-	117	109	-	-	-	133
20.	-	114	117	104	-	102	-	121
21.	114	127	123	123	-	117	-	115
22.	-	95	93	93	-	105	-	115
23.	-	130	137	120	-	113	-	135
24.	123	142	142	143	-	130	-	125
25.	-	115	110	111	-	125	-	142
26.	-	38	36	30	34	38	33	40
27.	-	29	32	29	29	30	31	32
28.	511	533	527	512	-	502	525	555
MANDIBLE								
1.	-	-	-	110	-	118	124	-
2.	-	-	31	29	-	31	29	29
3.	-	-	106	89	-	94	101	-
4.	-	-	24	25	32	32	-	-
5.	-	-	-	95	-	104	96	-
6.	-	-	-	41	-	57	55	-
7.	-	-	-	49	-	60	58	-
8.	-	-	-	37°	-	34°	24°	-
9.	-	-	-	69	-	75	74	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	53	55	58	59	60	61	64	66
AGE	A	30-35	A	A	A	A	25+	A
SEX	M	M	F	M	M	F	M	F
1.	-	-	179	198	190	179	188	156
2.	-	-	135	143	141	-	134	144
3.	-	-	130	142	135	-	137	123
4.	-	-	102	97	99	-	90	-
5.	-	-	96	-	101	-	102	95
6.	-	-	102	107	102	-	98	88
7.	-	-	-	-	-	-	-	-
8.	-	-	68	66	66	-	70	-
9.	-	-	-	134	-	-	138	-
10.	-	-	49	51	52	-	48	44
11.	-	-	26	24	23	-	26	22
12.	-	-	31	33	32	-	35	40
13.	-	-	39	41	41	-	45	41
14.	-	-	99	103	100	-	105	-
15.	65	-	61	54	61	-	56	44
16.	67	-	62	63	64	-	71	57
17.	50	-	47	43	43	-	46	34
18.	37	-	30	38	33	-	40	33
19.	-	-	111	-	-	-	115	121
20.	-	-	109	116	118	-	118	99
21.	-	-	103	-	117	-	122	90
22.	97	-	97	-	98	100	98	99
23.	-	-	123	130	135	-	135	108
24.	-	-	121	-	130	121	136	100
25.	118	-	117	-	122	117	112	113
26.	36	-	36	38	-	36	40	31
27.	28	-	27	29	-	30	32	28
28.	-	-	510	555	-	-	520	468
MANDIBLE								
1.	-	109	-	-	-	-	-	-
2.	-	37	-	-	-	-	-	-
3.	-	84	-	-	-	-	-	-
4.	-	32	-	-	-	-	-	-
5.	-	103	-	-	-	-	-	-
6.	-	56	-	-	-	-	-	-
7.	-	59	-	-	-	-	-	-
8.	-	24°	-	-	-	-	-	-
9.	-	87	-	-	-	-	-	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	67	68	69	71	72	73	74	75
AGE	55+	25+	A	A	30+	25+	15-20	A
SEX	M	F	M	M	F	F	F	F
1.	-	180	192	181	185	175	-	180
2.	-	139	136	136	135	132	-	136
3.	-	134	-	131	130	128	-	-
4.	-	99	-	-	-	101	-	-
5.	-	102	91	99	92	96	90	100
6.	-	101	-	109	100	100	-	101
7.	-	112	-	116	-	106	-	-
8.	-	62	-	-	-	65	-	63
9.	-	124	-	127	-	130	-	-
10.	-	45	-	47	-	47	-	46
11.	-	27	-	-	-	27	-	23
12.	-	36	-	36	-	34	-	30
13.	-	41	-	41	-	43	-	42
14.	-	98	-	-	-	105	-	99
15.	-	54	-	-	-	59	54	49
16.	-	62	-	-	-	72	61	56
17.	-	43	-	-	-	46	-	38
18.	-	34	-	-	-	43	-	38
19.	-	110	-	106	-	94	-	-
20.	-	107	-	109	110	105	-	-
21.	-	98	-	114	117	108	-	-
22.	-	111	-	98	96	92	-	-
23.	-	125	-	123	127	120	-	-
24.	-	104	-	128	128	120	-	-
25.	-	138	-	113	115	109	-	-
26.	-	30	-	39	37	33	-	32
27.	-	26	-	33	26	28	-	29
28.	-	515	-	501	517	494	-	505
MANDIBLE								
1.	-	116	119	113	116	-	-	-
2.	28	31	34	38	30	34	-	-
3.	102	88	102	103	93	-	-	-
4.	20	31	34	35	26	-	-	-
5.	111	105	107	105	101	-	-	-
6.	45	50	61	62	68	-	-	-
7.	55	53	64	66	68	-	-	-
8.	35°	41°	26°	30°	27°	-	-	-
9.	-	74	81	78	78	-	-	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	76	77	79	80	81	82	83	84
AGE	25+	15-20	19-22	45-50	45-50	35+	35+	30+
SEX	M	M	F	M	M	M	M	M
1.	187	187	182	192	180	182	182	188
2.	130	135	-	139	130	137	131	139
3.	123	140	-	-	134	-	138	140
4.	-	102	-	-	-	-	102	-
5.	94	93	-	98	90	99	97	99
6.	100	106	-	-	108	-	105	104
7.	-	-	-	-	118	-	-	-
8.	-	59	-	-	-	-	67	-
9.	-	128	-	-	-	-	-	-
10.	-	46	-	-	49	-	48	-
11.	-	24	-	-	28	-	23	-
12.	35	30	-	-	36	-	32	-
13.	42	40	-	-	47	-	39	-
14.	-	94	-	-	104	-	96	-
15.	-	58	-	-	-	-	52	-
16.	-	64	-	-	71	-	55	-
17.	-	37	-	-	-	-	38	-
18.	-	40	-	-	-	-	33	-
19.	101	108	-	-	109	103	110	120
20.	107	109	-	-	105	-	111	115
21.	110	116	-	-	-	-	114	123
22.	100	96	-	-	-	-	98	98
23.	121	124	-	-	113	-	124	128
24.	125	130	-	-	-	-	124	136
25.	120	118	-	-	-	-	115	123
26.	35	41	-	-	39	38	33	35
27.	30	32	-	-	30	28	28	31
28.	513	515	-	535	490	520	510	534
MANDIBLE								
1.	-	-	-	121	133	-	127	-
2.	-	-	38	32	41	-	32	-
3.	-	-	82	113	100	-	94	-
4.	-	-	33	29	30	-	28	-
5.	-	-	-	108	113	-	103	-
6.	-	-	-	60	68	-	62	-
7.	-	-	-	59	69	-	59	-
8.	-	-	-	35°	22°	-	36°	-
9.	-	-	-	80	90	-	77	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	86	87	91	93	94	95	96	101
AGE	A	A	25-30	25-30	30-40	A	25-30	35+
SEX	F	M	M	M	F	F	M	M
1.	179	180	-	-	186	175	195	179
2.	140	147	-	-	129	130	141	-
3.	-	138	-	-	138	132	-	-
4.	-	-	-	-	108	-	-	-
5.	101	98	-	-	103	87	-	99
6.	-	99	-	-	97	-	102	-
7.	-	-	-	-	-	-	116	-
8.	-	-	-	-	57	-	64	79
9.	-	-	-	-	130	-	-	-
10.	-	-	-	-	37	-	52	57
11.	-	-	-	-	26	-	26	24
12.	-	-	-	-	34	-	31	32
13.	-	-	-	-	42	-	42	38
14.	-	-	-	-	106	-	-	96
15.	-	-	-	-	63	-	47	53
16.	-	-	-	-	62	-	68	65
17.	-	-	-	-	43	-	36	42
18.	-	-	-	-	31	-	38	40
19.	105	115	-	-	109	103	114	-
20.	-	121	-	-	117	-	-	117
21.	-	108	-	-	115	111	-	107
22.	-	100	-	-	107	98	-	-
23.	-	133	-	-	135	-	-	130
24.	-	120	-	-	125	125	-	121
25.	-	112	-	-	129	111	-	-
26.	-	39	-	-	38	35	37	-
27.	-	33	-	-	30	30	29	-
28.	-	533	-	-	527	490	535	-
MANDIBLE								
1.	-	-	124	127	-	-	-	-
2.	-	-	33	34	-	-	31	32
3.	-	-	107	113	-	-	98	112
4.	-	-	34	34	-	-	29	37
5.	-	-	111	107	-	-	119	103
6.	-	-	58	80	-	-	62	74
7.	-	-	60	76	-	-	64	83
8.	-	-	36°	36°	-	-	26°	26°
9.	-	-	82	80	-	-	92	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	102	103	105	107	108	109	110	112
AGE	A	35+	40+	30+	A	A	20-25	30+
SEX	F	M	M	M	M	M	M	M
1.	194	183	180	182	-	184	184	188
2.	139	136	124	133	-	137	138	143
3.	141	-	127	134	-	-	138	136
4.	-	-	-	-	-	-	-	-
5.	97	97	93	96	-	-	95	-
6.	-	103	97	108	-	-	105	106
7.	-	-	-	-	-	-	-	-
8.	-	-	-	-	-	-	-	-
9.	-	-	-	-	-	-	-	-
10.	-	-	-	48	-	-	-	-
11.	-	-	-	29	-	-	-	-
12.	-	-	-	32	-	-	-	-
13.	-	-	-	39	-	-	-	-
14.	-	-	-	102	-	-	-	-
15.	55	-	-	-	-	-	-	-
16.	71	-	-	68	-	-	-	-
17.	44	-	-	-	-	-	-	-
18.	37	-	-	33	-	-	-	-
19.	113	111	98	103	-	104	105	110
20.	-	-	99	106	-	-	116	112
21.	122	-	114	114	-	-	113	114
22.	93	-	99	95	-	-	100	102
23.	-	-	114	120	-	-	128	125
24.	140	-	126	128	-	-	130	125
25.	108	-	122	112	-	-	118	118
26.	39	-	32	32	-	-	32	37
27.	28	-	30	28	-	-	31	34
28.	515	-	493	516	-	-	513	-
MANDIBLE								
1.	-	126	-	-	124	-	122	-
2.	-	26	25	-	31	-	34	-
3.	-	102	-	-	-	-	113	-
4.	-	35	25	-	30	-	35	-
5.	-	114	-	-	91	-	108	-
6.	-	53	-	-	58	-	56	-
7.	-	61	-	-	59	-	64	-
8.	-	48°	-	-	29°	-	34°	-
9.	-	73	-	-	71	-	76	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	114	115	116	127	128	132	134	135
AGE	A	30+	17+	17-21	40+	17-21	17-21	20-25
SEX	M	M	M	M	M	M	M	M
1.	-	173	-	187	186	191	-	185
2.	136	152	-	132	133	-	-	135
3.	-	-	-	137	137	-	-	145
4.	-	-	-	98	-	-	-	102
5.	-	-	-	96	95	-	-	92
6.	-	-	-	102	102	-	-	107
7.	-	-	-	110	-	-	-	-
8.	-	61	-	64	-	-	-	70
9.	-	-	-	132	-	-	-	-
10.	-	48	-	49	-	52	-	49
11.	-	18	-	22	-	20	-	22
12.	-	29	-	33	-	31	-	32
13.	-	33	-	37	-	32	-	40
14.	-	-	-	97	-	-	-	94
15.	-	53	-	53	-	57	-	56
16.	-	63	-	65	-	62	-	63
17.	-	41	-	41	-	48	-	44
18.	-	39	-	34	-	36	-	34
19.	-	-	-	109	106	-	-	-
20.	-	110	-	108	107	113	-	115
21.	114	105	-	117	-	118	-	109
22.	99	-	-	98	-	97	-	100
23.	-	128	-	123	125	128	-	128
24.	131	115	-	130	-	128	-	125
25.	119	-	-	118	-	132	-	122
26.	-	-	-	36	37	-	-	37
27.	-	-	-	29	28	-	-	34
28.	-	519	-	516	514	-	-	520
MANDIBLE								
1.	-	126	114	127	-	-	116	-
2.	-	32	31	32	-	34	37	36
3.	-	108	81	109	-	-	106	-
4.	-	30	27	30	-	28	35	35
5.	-	103	91	110	-	-	109	-
6.	-	57	53	45	-	-	51	-
7.	-	60	55	61	-	-	55	-
8.	-	34°	22°	45°	-	-	32°	-
9.	-	74	72	71	-	-	84	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	136	140	143	144	146	148	149	151
AGE	15-20	A	30+	35+	15+	25+	20-25	25+
SEX	F	M	M	M	F	F	M	M
1.	181	203	181	185	-	181	-	183
2.	130	144	138	145	-	132	141	-
3.	132	150	138	-	-	106	146	-
4.	108	-	96	-	-	104	-	-
5.	90	99	102	101	-	95	-	96
6.	100	110	99	102	-	100	-	-
7.	-	-	-	-	-	-	-	-
8.	58	-	67	-	-	69	-	62
9.	-	-	131	-	-	-	-	-
10.	42	-	46	49	-	-	-	49
11.	25	-	24	24	-	-	-	24
12.	29	-	34	34	-	35	-	31
13.	36	-	37	44	-	36	-	36
14.	94	-	102	105	-	99	-	94
15.	58	-	54	52	-	56	-	51
16.	63	-	63	58	-	61	-	59
17.	48	-	41	42	-	42	-	41
18.	35	-	36	-	-	35	-	36
19.	91	115	104	129	-	100	119	-
20.	109	122	109	-	-	107	-	105
21.	105	127	115	-	-	117	-	119
22.	103	111	100	97	91	95	124	-
23.	130	140	128	-	-	122	-	121
24.	115	138	132	-	-	140	138	132
25.	125	136	118	124	112	111	129	-
26.	30	36	33	38	37	33	35	-
27.	22	29	26	33	29	26	31	-
28.	510	554	524	535	-	507	-	520
MANDIBLE								
1.	-	-	-	127	-	-	-	119
2.	-	-	38	31	-	-	-	32
3.	-	-	-	99	-	-	-	97
4.	-	-	33	25	-	-	-	32
5.	-	-	-	112	-	-	-	100
6.	-	-	-	56	-	-	-	65
7.	-	-	-	59	-	-	-	65
8.	-	-	-	35°	-	-	-	37°
9.	-	-	-	87	-	-	-	70

CRANIAL DATA (Cont'd)

BURIAL NUMBER	152	153	154	156	157	158	160	161
AGE	30+	25-30	25+	A	A	25+	25+	A
SEX	F	F	M	F	M	F	M	M
1.	183	166	183	177	187	182	194	179
2.	-	128	138	137	133	140	135	141
3.	-	126	132	133	138	-	146	-
4.	-	-	-	-	-	-	104	-
5.	-	-	-	89	92	-	98	90
6.	-	-	-	96	102	-	-	-
7.	-	-	-	-	-	-	-	-
8.	-	-	-	-	-	-	-	63
9.	-	-	-	-	-	-	-	129
10.	-	-	-	-	-	-	-	45
11.	-	-	-	-	-	-	-	22
12.	-	30	-	-	-	33	-	33
13.	-	36	-	-	-	39	-	36
14.	-	-	-	-	-	-	-	97
15.	-	-	-	-	-	-	-	53
16.	-	-	-	-	-	-	-	61
17.	-	-	-	-	-	-	-	38
18.	-	-	-	-	-	-	-	38
19.	-	102	102	106	-	117	108	115
20.	-	-	-	107	114	122	-	106
21.	112	109	117	110	118	119	125	117
22.	96	89	96	88	98	89	97	-
23.	-	-	-	124	132	145	-	120
24.	135	125	131	124	132	133	138	134
25.	124	103	119	110	121	112	119	-
26.	-	28	34	33	35	31	31	-
27.	-	25	29	28	31	25	27	-
28.	-	475	512	508	510	-	532	515
MANDIBLE								
1.	-	111	-	-	-	-	-	-
2.	-	36	-	-	-	-	37	-
3.	-	89	-	-	-	-	98	-
4.	-	27	-	-	-	-	31	-
5.	-	98	-	-	-	-	102	-
6.	-	46	-	-	-	-	64	-
7.	-	52	-	-	-	-	66	-
8.	-	33°	-	-	-	-	21°	-
9.	-	73	-	-	-	-	83	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	162	163	164	166	167	168	169	170
AGE	21-27	25+	30+	40+	30-40	25+	40+	40+
SEX	M	M	M	M	M	M	F	M
1.	177	-	184	191	-	179	179	194
2.	146	-	134	141	-	138	131	-
3.	140	-	139	-	-	139	134	-
4.	89	-	89	98	-	88	59	-
5.	95	-	89	95	93	102	91	100
6.	99	-	97	102	-	-	99	-
7.	119	-	117	118	-	-	112	-
8.	68	-	65	67	-	-	63	-
9.	130	-	127	135	-	-	126	-
10.	47	-	51	52	-	-	49	-
11.	24	-	-	21	-	-	26	-
12.	31	-	30	32	-	35	34	-
13.	37	-	38	38	-	-	39	-
14.	96	-	90	97	-	-	94	-
15.	48	-	-	52	-	50	60	-
16.	63	-	67	62	-	61	61	-
17.	36	-	-	40	-	38	45	-
18.	35	-	38	39	-	32	35	-
19.	-	-	109	111	-	113	104	-
20.	114	-	116	-	-	-	113	-
21.	111	-	120	-	-	117	114	-
22.	-	-	96	-	-	93	98	-
23.	132	-	132	-	-	-	130	-
24.	123	-	136	-	-	128	129	-
25.	-	-	117	-	-	111	114	-
26.	-	-	38	35	37	35	32	-
27.	-	-	33	30	30	31	24	-
28.	522	-	513	538	-	522	510	-
MANDIBLE								
1.	118	-	106	119	119	-	-	128
2.	30	28	29	33	33	-	38	38
3.	105	-	90	101	99	-	102	99
4.	37	27	-	30	37	-	35	-
5.	102	106	111	110	115	-	104	111
6.	53	57	64	61	49	-	47	61
7.	58	63	67	67	58	-	53	61
8.	34°	27°	36°	32°	42°	-	31°	25°
9.	73	74	81	80	79	-	80	91

CRANIAL DATA (Cont'd)

BURIAL NUMBER	172	174	175	176	177	179	180	181
AGE	25+	15-21	25+	25+	50+	21-25	30+	17-18
SEX	M	F	F	F	M	M	M	M
1.	188	167	185	170	187	187	183	189
2.	-	133	140	134	134	138	134	128
3.	136	126	-	121	140	138	-	131
4.	-	-	-	87	99	112	-	-
5.	-	91	100	90	99	104	94	93
6.	-	90	-	95	112	107	-	-
7.	-	-	-	97	-	128	117	-
8.	-	-	68	51	61	74	65	-
9.	-	-	-	-	137	139	-	-
10.	-	-	50	45	50	53	48	-
11.	-	-	25	24	25	28	26	-
12.	33	36	33	33	32	36	24	-
13.	-	38	42	38	40	39	38	36
14.	-	-	103	93	101	108	102	96
15.	-	-	60	44	53	62	58	-
16.	-	-	64	-	56	67	63	-
17.	-	-	42	38	-	50	45	-
18.	-	-	33	33	-	39	35	-
19.	-	104	-	101	-	106	106	108
20.	-	103	114	102	113	113	108	-
21.	109	110	114	109	121	112	120	119
22.	107	86	-	86	92	102	83	92
23.	-	119	133	121	126	127	125	-
24.	121	124	125	122	137	127	133	132
25.	134	106	-	102	110	121	103	113
26.	38	32	-	36	39	34	33	32
27.	29	26	-	28	32	29	31	21
28.	541	487	523	492	523	523	515	514
MANDIBLE								
1.	-	-	-	111	126	122	121	123
2.	-	-	-	33	33	42	33	36
3.	-	-	-	84	117	98	100	94
4.	-	-	-	22	26	41	34	37
5.	-	-	-	97	107	114	100	108
6.	-	-	-	54	60	53	67	60
7.	-	-	-	56	63	61	67	63
8.	-	-	-	26°	30°	40°	22°	27°
9.	-	-	-	75	80	79	80	83

CRANIAL DATA (Cont'd)

BURIAL NUMBER	182	183	184	185	186	187	188	189
AGE	20-25	A	25+	30+	25+	17-22	A	A
SEX	M	F	F	M	M	M	M	F
1.	188	166	169	-	201	181	186	173
2.	132	119	138	-	145	135	140	133
3.	135	-	-	-	143	138	142	-
4.	95	-	-	-	104	-	-	-
5.	100	88	93	96	103	-	101	81
6.	101	-	-	-	114	-	-	101
7.	109	-	-	-	-	-	-	-
8.	58	-	-	-	80	-	-	-
9.	140	-	-	-	115	-	-	-
10.	47	-	-	-	61	-	-	-
11.	29	-	-	-	21	-	-	-
12.	32	-	-	-	35	-	-	-
13.	40	-	-	-	35	-	-	-
14.	104	-	-	-	101	-	-	-
15.	56	-	-	-	62	-	61	-
16.	72	-	-	-	67	-	62	-
17.	45	-	-	-	47	-	58	-
18.	42	-	-	-	48	-	38	-
19.	100	-	104	-	114	97	106	108
20.	116	-	100	-	119	-	-	-
21.	118	-	117	120	119	115	124	-
22.	88	-	97	-	110	93	101	-
23.	133	-	117	-	135	-	-	-
24.	132	-	134	132	132	133	140	-
25.	110	-	112	-	133	113	128	-
26.	37	31	-	-	38	35	32	37
27.	30	28	-	-	34	29	28	28
28.	532	470	503	-	557	494	532	496
MANDIBLE								
1.	-	-	-	-	-	-	-	-
2.	36	-	-	-	-	-	-	-
3.	104	-	-	-	-	-	-	-
4.	34	-	-	-	-	-	-	-
5.	-	-	-	-	-	-	-	-
6.	-	-	-	-	-	-	-	-
7.	-	-	-	-	-	-	-	-
8.	-	-	-	-	-	-	-	-
9.	-	-	-	-	-	-	-	-

CRANIAL DATA (Cont'd)

BURIAL NUMBER	190	192	193
AGE	25+	30+	15-20
SEX	F	M	F
1.	173	189	173
2.	138	135	135
3.	137	138	127
4.	101	100	90
5.	95	103	87
6.	100	110	91
7.	111	-	-
8.	68	68	59
9.	129	-	-
10.	52	52	46
11.	24	22	25
12.	33	34	32
13.	32	40	36
14.	92	-	92
15.	60	54	52
16.	62	-	64
17.	48	44	41
18.	42	-	34
19.	98	106	102
20.	113	107	106
21.	109	115	107
22.	86	95	93
23.	132	125	121
24.	125	128	121
25.	99	116	111
26.	34	35	36
27.	28	31	26
28.	501	533	-
MANDIBLE			
1.	126	-	-
2.	36	-	34
3.	87	-	-
4.	30	-	-
5.	104	-	-
6.	47	-	-
7.	51	-	-
8.	31°	-	-
9.	80	-	-

POST-CRANIAL DATA

BURIAL NUMBER	8		17		18		19	
AGE	25+		21+		30+		A	
SEX	M		M		M		M	
	L	R	L	R	L	R	L	R
HUMERUS								
1. Maximum Length	345	345	324	-	338	336	304	308
2. Physiological Length	338	337	318	-	328	326	297	302
3. Maximum Shaft Diameter	22	20	21	-	24	24	23	23
4. Minimum Shaft Diameter	17	21	16	-	18	18	17	18
5. Maximum Head Diameter	45	45	49	-	50	51	39	41
6. Mid-Shaft Circumference	64	66	62	-	73	74	64	66
7. Bicondylar Breadth	64	66	63	-	61	62	58	58
ULNA								
1. Maximum Length	-	280	-	-	265	-	-	-
2. Physiological Length	243	242	-	-	228	-	-	-
3. Mid-Shaft Circumference	-	50	-	-	49	-	-	-
RADIUS								
1. Maximum Length	257	259	-	-	250	251	228	231
2. Physiological Length	243	244	-	-	232	235	216	216
3. Head Diameter	23	23	-	-	26	26	21	22
4. Mid-Shaft Circumference	43	46	-	-	46	52	41	44
CLAVICLE								
1. Maximum Length	162	154	154	-	161	160	-	139
2. Mid-Shaft Circumference	40	41	40	-	42	44	-	36
FEMUR								
1. Maximum Length	-	-	-	-	490	490	448	446
2. Physiological Length	-	-	-	-	484	484	444	444
3. Maximum Head Diameter	-	-	-	-	53	53	43	43
4. Mid-Shaft A-P Diameter	-	-	-	-	30	28	29	29
5. Mid-Shaft M-L Diameter	-	-	-	-	25	24	24	26
6. Mid-Shaft Circumference	-	-	-	-	88	88	85	89
TIBIA								
1. Maximum Length	-	-	292	-	-	-	372	-
2. Physiological Length	-	-	367	-	-	-	351	-
3. Condylar Breadth	-	-	76	-	-	-	72	72
4. Maximum Shaft Diameter	-	-	30	-	-	-	26	-
5. Minimum Shaft Diameter	-	-	24	-	-	-	22	-
6. Mid-Shaft Circumference	-	-	87	-	-	-	75	-
FIBULA								
1. Maximum Length	-	-	-	-	-	-	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	21		22		23		24		29		31	
AGE	A		25+		35+		35+		A		17-18	
SEX	F		M		M		M		F		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	272	-	317	325	321	328	293	296	316	-	-	-
2.	264	-	310	311	313	319	287	289	314	-	-	-
3.	19	-	22	23	21	21	23	23	22	-	-	-
4.	16	-	20	19	16	18	20	20	19	-	-	-
5.	37	-	-	46	45	46	43	43	45	-	-	-
6.	55	-	67	69	61	65	69	70	62	-	-	-
7.	51	-	63	64	66	62	62	62	61	64	-	58
ULNA												
1.	-	-	-	254	-	-	258	268	-	-	-	-
2.	-	-	-	221	246	-	227	234	-	-	-	-
3.	-	-	-	52	-	-	47	51	-	-	-	-
RADIUS												
1.	-	-	-	230	258	258	236	241	-	-	-	-
2.	-	-	-	222	245	244	224	229	-	-	-	-
3.	-	-	22	22	23	23	-	22	-	-	-	-
4.	-	-	-	45	45	48	45	45	-	-	-	-
CLAVICLE												
1.	-	-	138	136	-	140	-	-	144	-	-	136
2.	-	-	40	41	-	37	-	-	31	-	-	33
FEMUR												
1.	-	-	449	454	450	448	433	-	-	-	-	-
2.	-	-	444	447	449	448	432	-	-	-	-	-
3.	-	-	50	50	47	47	45	-	-	-	-	-
4.	-	-	29	29	29	30	28	-	-	-	-	-
5.	-	-	26	24	29	29	27	-	-	-	-	-
6.	-	-	86	86	91	91	88	-	-	-	-	-
TIBIA												
1.	-	-	355	355	387	383	362	360	-	-	-	-
2.	-	-	348	350	380	377	354	357	-	-	-	-
3.	-	-	75	-	79	77	74	73	-	-	-	-
4.	-	-	29	31	33	31	34	29	-	-	-	-
5.	-	-	21	21	22	22	25	23	-	-	-	-
6.	-	-	81	84	88	88	-	83	-	-	-	-
FIBULA												
1.	284	-	-	-	-	-	-	-	-	-	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	33		42		46		49		50		51	
AGE	25+		25+		A		A		25+		A	
SEX	M		F		M		M		F		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	-	-	294	-	327	329	304	305	-	270	289	294
2.	-	-	289	-	325	316	302	300	-	264	284	291
3.	-	-	20	-	22	22	22	22	-	13	-	-
4.	-	-	16	-	17	18	19	18	-	12	-	-
5.	-	-	42	42	50	52	44	-	-	39	46	48
6.	-	-	58	-	66	66	65	66	-	55	-	-
7.	-	-	54	54	60	64	60	61	-	52	-	-
ULNA												
1.	-	-	236	240	-	-	241	244	-	-	-	-
2.	-	-	207	210	-	-	216	218	-	-	-	-
3.	-	-	40	40	-	-	47	47	-	-	-	-
RADIUS												
1.	-	-	216	217	-	239	227	227	-	-	-	221
2.	-	-	203	205	-	226	214	216	-	-	-	210
3.	-	-	20	20	-	23	23	23	-	-	-	-
4.	-	-	36	35	-	45	45	45	-	-	-	-
CLAVICLE												
1.	-	-	133	-	146	141	132	-	118	118	-	131
2.	-	-	31	-	37	41	47	-	29	31	-	-
FEMUR												
1.	-	418	398	400	442	442	-	435	393	391	413	413
2.	-	412	396	397	437	437	-	435	389	390	413	411
3.	-	45	40	40	46	46	-	48	41	41	45	46
4.	-	28	24	23	27	27	-	33	22	21	-	-
5.	-	26	24	25	27	27	-	25	24	23	-	-
6.	-	85	77	77	88	88	-	91	73	71	-	-
TIBIA												
1.	-	-	322	-	358	359	359	364	315	312	340	351
2.	-	-	317	-	351	352	353	361	307	306	334	-
3.	-	-	70	-	77	78	75	75	67	67	75	-
4.	-	-	24	-	27	27	30	32	26	26	28	-
5.	-	-	18	-	21	22	18	21	18	18	23	-
6.	-	-	67	-	78	78	80	87	70	71	86	-
FIBULA												
1.	-	-	-	-	-	-	-	-	-	305	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	52		53		54		55		63		67	
AGE	A		A		35+		30-35		35+		55+	
SEX	M		M		M		M		F		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	-	341	-	-	317	323	289	-	307	311	302	303
2.	-	336	-	-	314	317	288	-	305	304	300	300
3.	-	24	-	-	23	24	21	-	24	24	21	22
4.	-	23	-	-	16	18	15	-	18	22	16	16
5.	55	55	-	-	46	46	38	-	45	46	42	43
6.	-	76	-	-	65	71	59	-	71	72	63	62
7.	75	76	-	-	61	65	51	52	65	-	60	61
ULNA												
1.	270	274	-	-	-	272	251	253	-	266	-	-
2.	239	241	-	-	-	239	223	225	-	233	-	-
3.	54	54	-	-	-	50	42	44	-	52	-	-
RADIUS												
1.	253	254	-	-	-	250	231	234	246	-	235	237
2.	239	240	-	-	-	236	223	225	232	-	220	220
3.	26	27	-	-	23	23	20	19	22	-	22	22
4.	50	50	-	-	-	47	38	38	41	-	45	46
CLAVICLE												
1.	-	156	163	154	144	-	128	-	144	-	135	132
2.	-	46	37	39	35	-	31	-	40	-	45	46
FEMUR												
1.	-	467	501	499	462	458	419	-	-	429	431	425
2.	-	460	497	496	455	455	413	-	-	425	412	407
3.	54	53	49	50	49	49	41	-	41	41	46	45
4.	36	32	37	36	32	32	30	-	-	26	31	22
5.	32	30	29	30	27	27	23	-	-	27	22	29
6.	105	98	104	102	97	95	85	-	-	84	88	87
TIBIA												
1.	-	-	421	-	-	377	-	-	-	-	353	356
2.	-	-	417	-	-	369	-	-	-	-	346	350
3.	-	-	82	80	71	79	-	-	71	71	71	71
4.	-	-	35	-	-	30	-	-	-	-	34	34
5.	-	-	23	-	-	22	-	-	-	-	19	19
6.	-	-	94	-	-	88	-	-	-	-	86	86
FIBULA												
1.	-	-	-	-	-	-	-	-	-	-	340	340

POST-CRANIAL DATA (Cont'd)

BURIAL	71		80		81		83		84		91	
AGE	A		45-50		45-50		35+		30+		25-30	
SEX	M		M		M		M		M		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	318	321	326	325	-	343	-	302	335	335	324	326
2.	309	311	313	308	-	338	-	299	321	320	-	319
3.	21	21	26	27	-	22	-	22	23	23	22	23
4.	16	17	18	18	-	18	-	18	18	19	21	22
5.	41	41	48	47	-	50	-	40	47	47	45	46
6.	62	65	74	76	-	70	-	65	70	75	68	72
7.	-	-	70	70	-	64	-	59	67	67	-	64
ULNA												
1.	-	-	278	-	-	294	-	254	-	270	-	-
2.	-	-	245	245	261	261	-	219	-	236	-	-
3.	-	43	67	60	51	52	-	52	-	56	-	-
RADIUS												
1.	-	-	254	254	272	277	219	-	-	249	242	-
2.	-	-	240	239	254	263	205	-	-	235	230	-
3.	-	-	23	24	25	24	22	-	-	23	25	24
4.	-	-	54	50	48	50	42	-	-	45	48	-
CLAVICLE												
1.	-	-	153	-	105	-	-	140	152	-	-	144
2.	-	-	50	-	40	-	-	36	42	-	-	38
FEMUR												
1.	474	472	450	446	488	492	-	425	464	458	461	454
2.	-	-	449	445	484	488	-	421	462	455	456	448
3.	45	45	49	49	51	50	44	44	50	48	46	45
4.	25	26	31	34	30	29	-	31	32	32	27	27
5.	22	21	27	32	27	28	-	26	26	27	29	27
6.	80	80	99	99	90	90	-	93	95	94	89	87
TIBIA												
1.	-	-	383	-	405	404	-	367	397	396	-	-
2.	-	-	356	-	392	390	-	344	367	367	-	-
3.	-	-	78	-	79	78	-	74	78	77	73	-
4.	-	-	33	-	31	32	-	28	28	28	-	-
5.	-	-	23	-	21	22	-	23	23	22	-	-
6.	-	-	93	-	85	88	-	83	85	81	-	-
FIBULA												
1.	-	-	374	375	386	388	-	-	377	-	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	93		96		101		103		105		107	
AGE	25-35		25-35		35+		35+		40+		30+	
SEX	M		M		M		M		M		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	347	344	324	-	331	-	330	-	321	-	-	332
2.	335	327	316	-	325	-	327	-	314	-	-	320
3.	24	26	23	-	22	-	22	-	20	21	-	22
4.	20	21	21	-	16	-	22	-	19	20	-	18
5.	49	48	43	-	46	-	47	48	43	-	-	50
6.	73	78	66	-	65	-	68	-	64	68	-	69
7.	68	72	61	-	63	-	69	-	60	60	-	66
ULNA												
1.	280	280	-	-	-	-	271	273	255	-	-	267
2.	242	242	-	-	-	-	242	247	225	227	-	230
3.	60	63	-	-	-	-	51	52	49	49	-	54
RADIUS												
1.	-	260	-	-	-	-	-	257	238	240	-	250
2.	-	242	-	-	-	-	-	242	226	228	-	235
3.	25	25	-	-	-	-	22	22	23	23	-	26
4.	-	50	-	-	-	-	-	45	40	40	-	45
CLAVICLE												
1.	162	163	-	-	-	163	-	-	-	-	-	147
2.	45	45	-	-	-	37	-	-	-	-	-	37
FEMUR												
1.	461	457	440	440	-	-	-	-	440	439	-	450
2.	459	452	437	438	-	-	-	-	439	438	-	444
3.	51	52	46	47	-	-	-	-	48	48	-	51
4.	31	31	32	31	-	-	-	-	30	29	-	33
5.	28	30	26	26	-	-	-	-	26	26	-	28
6.	95	96	90	90	-	-	-	-	88	86	-	94
TIBIA												
1.	-	-	376	-	-	-	-	-	352	339	-	365
2.	-	-	354	-	-	-	-	-	346	334	-	350
3.	81	81	77	76	-	-	-	-	74	73	-	82
4.	-	-	30	-	-	-	-	-	31	29	-	33
5.	-	-	22	-	-	-	-	-	21	19	-	22
6.	-	-	87	-	-	-	-	-	80	76	-	90
FIBULA												
1.	386	385	-	-	-	-	-	-	-	333	-	346

POST-CRANIAL DATA (Cont'd)

BURIAL	108		109		111		112		115		116	
AGE	A		A		25+		30+		30+		17+	
SEX	M		M		M		M		M		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	-	299	323	318	-	326	316	320	294	293	-	-
2.	-	292	319	314	-	321	314	317	288	286	-	-
3.	-	22	25	26	-	23	24	25	22	22	-	-
4.	-	18	22	23	-	22	23	22	17	18	-	-
5.	-	42	49	48	-	48	49	51	42	43	-	-
6.	-	65	75	79	-	75	72	77	64	66	-	-
7.	-	60	67	69	-	65	65	65	-	59	53	54
ULNA												
1.	-	-	262	266	-	-	-	-	-	-	-	-
2.	-	-	228	232	-	-	-	-	-	-	-	-
3.	-	-	54	57	-	-	-	-	-	-	-	-
RADIUS												
1.	-	-	-	-	243	246	257	242	-	-	-	-
2.	-	-	-	-	228	231	239	227	-	-	-	-
3.	-	-	-	-	23	23	23	23	21	21	-	-
4.	-	-	-	-	49	49	45	48	-	-	-	-
CLAVICLE												
1.	-	130	148	147	-	144	146	-	126	-	-	124
2.	-	36	42	41	-	42	44	-	40	-	-	30
FEMUR												
1.	427	427	441	436	450	451	444	447	424	420	-	-
2.	424	425	439	434	447	448	441	444	419	410	-	-
3.	43	45	48	49	48	48	51	51	46	46	-	-
4.	31	31	34	34	32	31	36	34	26	26	-	-
5.	27	26	27	27	29	28	27	27	24	24	-	-
6.	90	90	97	96	97	97	98	97	81	81	-	-
TIBIA												
1.	-	-	389	393	372	372	368	374	342	338	-	-
2.	-	-	386	387	364	362	366	369	335	329	-	-
3.	-	71	86	79	79	74	77	78	74	75	-	-
4.	-	-	31	33	32	31	31	32	30	31	-	-
5.	-	-	25	25	23	24	22	22	21	20	-	-
6.	-	-	94	95	85	86	88	88	81	82	-	-
FIBULA												
1.	-	-	-	373	-	354	-	-	332	-	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	117		118		127		128		132		134	
AGE	17+		17-25		17-21		40+		17-21		17-21	
SEX	F		F		M		M		M		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	-	-	264	-	290	300	317	-	308	312	-	-
2.	-	-	260	-	286	296	306	-	298	304	-	-
3.	-	-	17	-	21	21	22	-	22	22	-	-
4.	-	-	14	-	18	19	17	-	17	17	-	-
5.	-	-	34	-	45	45	45	-	44	44	-	-
6.	-	-	50	-	64	63	64	-	63	65	-	-
7.	-	-	51	-	60	60	61	-	62	62	-	67
ULNA												
1.	-	-	-	-	245	250	-	-	246	251	-	272
2.	-	-	-	-	217	223	235	-	219	222	-	-
3.	-	-	-	-	47	47	-	-	46	49	-	50
RADIUS												
1.	-	-	-	-	222	226	236	-	226	-	-	-
2.	-	-	-	-	210	215	222	-	212	-	-	-
3.	-	-	-	-	23	23	22	-	22	-	-	-
4.	-	-	-	-	44	43	41	-	42	-	-	-
CLAVICLE												
1.	-	123	-	-	140	133	146	-	142	143	-	-
2.	-	34	-	-	32	34	35	-	35	41	-	-
FEMUR												
1.	400	400	380	380	406	-	450	-	-	427	-	-
2.	394	395	376	374	403	-	445	-	-	421	-	-
3.	43	42	39	39	48	-	48	-	-	45	-	-
4.	26	27	25	25	38	-	28	-	-	29	-	-
5.	23	23	22	23	25	-	27	-	-	25	-	-
6.	80	83	74	75	82	-	86	-	-	85	-	-
TIBIA												
1.	-	328	313	-	335	343	353	-	365	368	-	-
2.	-	318	310	-	333	336	344	-	360	362	-	-
3.	-	68	65	-	71	70	74	-	74	73	-	-
4.	-	27	23	-	26	24	36	-	30	31	-	-
5.	-	21	17	-	21	21	30	-	20	21	-	-
6.	-	77	65	-	75	72	108	-	80	83	-	-
FIBULA												
1.	-	-	-	-	327	335	-	-	346	-	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	135		143		144		145		151		152	
AGE	20-25		30+		35+		25-30		25+		30+	
SEX	M		M		M		F		M		F	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	314	316	-	295	336	-	287	294	314	313	-	-
2.	313	313	-	291	335	-	284	292	300	300	-	-
3.	21	24	-	22	24	-	19	20	23	22	-	-
4.	19	22	-	17	20	-	15	16	17	18	-	-
5.	46	46	-	42	47	47	36	37	45	46	-	-
6.	63	71	-	65	77	-	58	58	66	67	-	-
7.	62	63	60	59	61	63	53	53	59	61	-	-
ULNA												
1.	259	-	-	-	-	-	-	259	253	249	-	-
2.	230	-	-	212	-	-	-	226	221	221	-	-
3.	49	-	-	-	-	-	-	43	49	48	-	-
RADIUS												
1.	237	-	-	227	252	252	229	232	232	233	-	-
2.	226	-	-	214	238	238	216	217	218	221	-	-
3.	22	-	22	23	23	23	19	20	22	23	-	-
4.	40	-	-	42	49	50	35	37	45	46	-	-
CLAVICLE												
1.	142	139	140	135	-	151	-	-	137	131	124	126
2.	35	40	36	35	-	40	-	-	43	41	29	29
FEMUR												
1.	443	444	-	420	460	454	411	415	437	436	-	422
2.	438	440	-	415	460	454	407	411	434	435	-	420
3.	48	49	47	46	48	49	41	40	44	43	-	43
4.	28	28	-	27	30	32	24	24	28	26	-	28
5.	23	26	-	26	27	28	26	26	26	25	-	25
6.	82	85	-	84	92	93	78	79	86	82	-	82
TIBIA												
1.	358	360	346	345	384	380	-	352	342	341	-	354
2.	352	353	337	339	376	373	-	344	335	338	-	349
3.	73	72	72	-	74	75	-	64	70	70	-	66
4.	27	28	28	29	32	32	-	25	32	32	-	26
5.	20	20	20	21	25	24	-	21	20	22	-	22
6.	78	79	80	79	91	90	-	72	87	87	-	75
FIBULA												
1.	-	-	-	-	-	-	-	-	-	329	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	153		154		158		160		162		163	
AGE	25-30		25+		25+		25+		21-30		25+	
SEX	F		M		F		M		M		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	285	-	-	318	300	302	-	317	296	301	313	302
2.	284	-	-	315	290	296	-	312	294	296	307	295
3.	19	-	-	22	23	24	-	25	22	23	21	21
4.	16	-	-	18	18	18	-	21	22	22	17	16
5.	36	-	-	42	38	38	47	45	45	47	43	43
6.	55	-	-	61	65	70	-	74	70	70	62	63
7.	54	-	60	67	58	54	62	62	63	64	60	58
ULNA												
1.	257	-	262	263	-	243	275	-	-	259	-	-
2.	229	-	234	235	-	212	242	-	-	223	-	-
3.	41	-	49	53	-	50	51	-	-	50	-	-
RADIUS												
1.	-	235	245	246	221	226	255	-	-	238	-	-
2.	-	223	234	234	205	214	245	-	-	224	-	-
3.	-	19	22	22	21	20	23	22	-	25	-	-
4.	-	38	43	45	44	48	47	-	-	45	-	-
CLAVICLE												
1.	-	128	-	147	-	138	-	-	145	142	-	-
2.	-	34	-	38	-	44	-	-	34	35	-	-
FEMUR												
1.	426	-	439	435	408	-	-	-	445	447	-	-
2.	426	-	436	433	406	-	-	-	442	446	-	-
3.	36	-	47	47	41	41	-	-	48	49	-	-
4.	23	-	27	28	26	26	-	-	30	29	-	-
5.	26	-	28	29	27	27	-	-	27	24	-	-
6.	76	-	87	89	85	84	-	-	89	87	-	-
TIBIA												
1.	-	-	-	362	346	-	-	-	363	365	-	-
2.	-	-	-	356	337	-	-	-	359	357	-	-
3.	-	-	74	76	68	-	-	-	76	77	-	-
4.	-	-	-	30	26	28	-	-	27	26	-	-
5.	-	-	-	21	22	22	-	-	24	23	-	-
6.	-	-	-	81	78	79	-	-	81	80	-	-
FIBULA												
1.	-	-	-	-	-	-	-	-	-	-	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	164		166		167		169		176		177	
AGE	30+		40+		30-40		40+		25+		50+	
SEX	M		M		M		F		F		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	322	325	327	329	232	-	286	291	285	291	322	327
2.	319	320	324	326	319	-	284	287	283	290	317	320
3.	22	23	25	25	22	-	20	22	17	17	23	23
4.	20	22	18	20	18	-	16	17	13	13	20	20
5.	47	48	45	46	44	-	37	38	35	36	45	45
6.	66	71	73	77	67	-	62	63	49	50	71	71
7.	61	62	67	68	64	66	49	52	54	54	64	64
ULNA												
1.	254	260	-	274	-	286	-	-	-	261	259	263
2.	215	218	235	235	-	254	-	-	-	227	220	221
3	52	51	-	55	-	50	-	-	-	42	50	55
RADIUS												
1.	230	-	251	251	265	267	-	-	-	236	236	-
2.	215	-	235	235	250	252	-	-	-	226	222	-
3.	22	-	22	22	23	23	-	-	-	-	24	-
4.	43	-	49	51	42	42	-	-	-	34	50	-
CLAVICLE												
1.	156	152	145	137	141	141	126	125	-	134	154	151
2.	40	42	41	42	37	35	32	34	-	30	43	43
FEMUR												
1.	445	442	442	444	440	-	-	400	415	-	440	442
2.	434	438	436	442	437	-	-	397	411	-	439	441
3.	49	49	46	46	48	-	39	39	39	39	48	48
4.	29	28	28	31	31	-	-	24	23	-	31	32
5.	28	27	26	27	27	-	-	24	20	-	27	27
6.	91	91	87	94	93	-	-	78	73	-	94	95
TIBIA												
1.	356	360	377	-	-	-	332	330	-	-	360	366
2.	348	353	372	-	-	-	329	328	-	-	354	364
3.	77	77	75	-	-	-	62	64	-	-	75	76
4.	31	32	32	-	-	-	25	25	-	-	32	31
5.	24	23	24	-	-	-	19	20	-	-	27	23
6.	90	90	92	-	-	-	72	72	-	-	91	89
FIBULA												
1.	340	343	-	-	-	-	-	-	-	-	-	-

POST-CRANIAL DATA (Cont'd)

BURIAL	179		180		182		188		190		191	
AGE	21-25		30+		20-25		A		25+		A	
SEX	M		M		M		M		F		M	
	L	R	L	R	L	R	L	R	L	R	L	R
HUMERUS												
1.	292	296	358	-	332	330	310	315	277	279	322	315
2.	292	296	350	-	322	323	308	312	273	276	307	307
3.	22	21	25	-	21	23	21	22	23	25	24	23
4.	19	19	19	-	18	18	20	20	16	17	17	16
5.	41	41	47	-	47	48	45	47	39	37	45	47
6.	65	65	74	-	65	67	67	70	66	69	70	70
7.	60	59	61	-	74	64	62	65	57	59	65	65
ULNA												
1.	254	253	281	280	274	271	259	260	226	244	261	-
2.	221	221	251	250	245	241	228	229	198	216	231	-
3.	51	50	54	54	47	47	50	51	45	49	50	-
RADIUS												
1.	232	-	264	263	255	256	236	238	217	222	242	-
2.	219	-	250	250	240	243	225	225	202	209	229	-
3.	21	21	24	23	26	22	22	19	20	21	23	-
4.	45	-	49	49	46	49	44	45	44	45	46	-
CLAVICLE												
1.	132	135	153	149	150	145	157	-	-	-	150	152
2.	43	43	42	44	34	36	39	-	-	-	37	37
FEMUR												
1.	-	404	508	-	459	460	442	453	398	399	438	440
2.	-	403	507	-	453	454	439	447	396	396	435	435
3.	-	45	52	53	48	50	49	49	41	41	46	-
4.	-	28	35	-	23	28	31	31	28	27	34	34
5.	-	26	28	-	25	26	28	28	25	25	28	28
6.	-	88	101	-	80	84	94	94	82	82	98	97
TIBIA												
1.	-	-	412	420	382	386	-	-	237	237	356	360
2.	-	-	405	412	374	375	-	-	325	322	349	353
3.	-	-	80	-	-	76	-	-	67	67	76	74
4.	-	-	35	33	23	26	-	-	29	28	32	32
5.	-	-	24	26	20	21	-	-	21	22	20	21
6.	-	-	96	94	68	73	-	-	77	78	86	88
FIBULA												
1.	-	-	-	-	-	378	-	-	318	-	-	-