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Bronze and Iron Ages warriors from the Qarashamb burial ground: anthropological and paleopathological perspective*

• Anahit Yu. Khudaverdyan •

Institute of Archaeology and Ethnography, National Academy of Science, Republic of Armenia

Address for correspondence:

Anahit Yu. Khudaverdyan
Institute of Archaeology and Ethnography, National Academy of Science, Republic of Armenia
E-mail: ankhudaverdyan@gmail.com

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Abstract

This article enters the anthropological materials from warrior burials of the Qarashamb burial ground. Monument are in the territory of the Kotayk province of Armenia. The article provides a comprehensive analysis within the framework of integrative anthropology and represents itself consolidation of two of it such sections as physical anthropology and paleopathology. When describing and diagnosing pathological changes, a macroscopic method of research was used. The analysis showed that individuals has features of the southern-european type. According to the average modulus of the crown, the individuals shows evidence of microdontism. Based on osteometric characteristics, individuals were characterized by medium height and strong physique. The specificity of the development of musculoskeletal relief is associated with horse riding. The osteological evidence suggests that these — warrior burials were more likely status symbols, since the remains do not exhibit any battle related ante- or perimortem trauma. The lifetime general state of health of individuals can be characterized as healthy.

Keywords: Armenia; Bronze and Iron Ages; military burials; paleoanthropology; paleopathology

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Introduction

Bronze and Iron Ages archaeological sites in Armenia are the subject of increased interest and in-depth study in recent decades. Conclusions about advanced warfare in the population of these archaeological cultures strengthened in historiography. Numerous finds of war attributes (specialized weapons, fortresses, chariots) point to the key role of warfare in the life of ancient Armenian population (1). According to the data hitherto reviewed, it seems undeniable that violence, in one form or another, was indeed present during the Bronze and Iron Ages (2, 3, 4). The warrior burials were made conspicuous among other members of a given community. During excavations at a necropolis in Shirakavan, a fairly complete skeleton of a male warrior buried together with a horse was found (5). Several bones exhibited signs of healed trauma, including a small blunt force lesion on the frontal bone, broken nose, and fractured clavicle and two ribs (especially the eighth and ninth) as well as traumatic synostosis of tibia and fibula. The juries on the clavicle, tibia, and fibula were accompanied by infection and were followed by severe degenerative alterations. These injuries could have caused long-term disabilities. The remains unearthed in burial № 17 from Bover I burial ground (Shnogh, Lori Province) belonged to a woman who seemed to live as a professional warrior and was buried as an individual of rank. During our work, we identified a rich array of traumatic lesions, which shed light on her daily activities, occupation, and warfare practice. We also revealed a trapped metal arrowhead in her femur. For this region, projectile injury to bone, induced by an arrow wound, strongly suggests interpersonal aggression. The same individual also suffered blows to the pelvic bone, femur, and tibia (6). The results of multiple traumatic events in the skeleton of this woman reveal living conditions characterized by numerous episodes of violence, hypothesizing that the individual may have been the victim of repeated ill-treatment during the course of her life. Skeletal material from Nerkin Getashen (burial 1, male, 20-25 years) contains an example of trauma to the pelvis in the form of an arrow wound to the left ilium. The direction of the arrow penetration indicates an entry through the lower abdomen (2). The lack of healing suggests that this injury likely was a key contributor to the death of this individual. Penetrating wounds to the abdomen are associated with high mortality given the danger of damaging major arteries and nerves within the abdominal region, as well as the high risk of infection associated with potential injury of the intestines and possible leakage of fecal matter (7).

The Bronze and Iron Ages populations in Armenia research suggests that the frequency of traumatic bone is quite variable in all of the samples and ranges from 14.3% to 56.3% (2). The injuries are distributed among 37 males and 13 females. Of these, 42 were cranial injuries (28.6% affected). Approximately 16.4% of the combined sample from Armenia (20 of 122) showed traumatic lesions to the parietal bone. The parietal lesions tended to be left-sided (11 of 20), which may indicate that the injuries resulted from face-to-face assault by right-handed attackers (2). The age distribution of injuries to the cranium shows a different pattern, where injuries are most common in the age group 20-29. Injuries were also observed on the humerus, ulna, ribs, os coxae, femur, tibia, and fibula. One of the main causes of humeral fractures is a direct blow from a hatchet or another weapon, especially when the aggressor who seeks to inflict a wound to an opponent's skull misses the head and instead hits the shoulder. The recorded bone fractures strongly suggest the presence of interpersonal violence in the studied communities.

The article analyzes anthropological materials from Qarashamb burial ground. The burial ground of Qarashamb has thus far provided us with no less than five clear examples of man warrior burials (№ 119, 182, 211, 513, 626). Ancient literary sources and archaeological finds show that the societies of the Bronze and Iron Ages had a very strong hierarchic structure, wherein preoccupations of warfare represented a way of living (1). The methods reviewed and recommended by Buikstra and Ubelaker (8, p.16–38) were used to establish the age and sex of these individuals. The all examined skeletal remains were identified as a male based on the dimorphic characteristics of the skull and the pelvis. Pubic bone degeneration, changes to the auricular surface of the pelvic bone, and sternal rib end modification were used to determine of age at the time of death. The bones of the lower leg (tibia and fibula) were chosen to determine the stature, using a regression formula developed by Trotter and Gleser (9, p. 79–123). Measurements of the skulls and bones were taken as outlined in Alekseev (10, 11). Next, a

Figure 1. Plan of Burial 119, available skeletal elements from Burial 119 of the Qarashamb cemetery, traumatic disturbances (20).

series of standard measurements are taken of the teeth, and the presence and absence of "non-metric traits" (12, 13). Maximum bucco-lingual and maximum mesiodistal diameters were measured for each tooth in the dental arcade, following Zubov (13).

Non-metric traits are additional sutures, facets, bony processes, canals and foramina, which occur at the skeletons (14) and are believed to suggest hereditary affiliation between skeletons (15). The origins of non-metric traits have been extensively discussed in the osteological literature and it is now thought that while most non-metric traits have genetic origins, some can be produced by factors such as mechanical stress (16) or environment (17).

Musculoskeletal stress markers have been widely used by bioarchaeologists as indicators of physical activity. These stress markers occur at the sites of the attachment of soft tissues (muscle, tendon, ligament, fascia and menisci) to the bone. In addition, the skull and the postcranial skeleton were examined macroscopically to investigate any pathological changes.

One method used by bioarchaeologists to interpret trauma is clinical analogy, because clinicians have the luxury of being able to interview their patients to elicit the cause of their injuries. Bioarchaeologists are not so fortunate and therefore must rely on medical literature, research, and protocols to aid in their descriptions and interpretations of trauma.

Trauma is divided into three categories: 1. trauma resulting from the presence of another pathological process, for example, bones weakened by osteoporosis are predisposed to fracture, 2. microtrauma due to repeated mechanical stress to the musculoskeletal structure over time, and 3. macrotrauma, which is attributed to a sudden physical stress. It is the latter category that is examined here and includes fractures, dislocations, and tears of a tendon or muscle attachment from the bone, which eventually become ossified.

All of these individuals' injuries were healed to some degree. Healed lesions on bone are identified in several ways: by a visible callus formation; through an angular deformity created by the fractured ends of the bone, which may appear as a fracture line on a radiograph; by a non-union of healed bone at the fractured ends; or in the case of the skull, the edges are sealed or bevelled by bone remodelling.

The bones of the skeletons for this study had been cleaned and restored in laboratory of physical anthropology of the Institute of Archaeology and Ethnography, National Academy of Science (Yerevan).

Results and discussion

Burial 119.

The cromlech has irregular rounded shape, composed of two concentric circles, with 5.30m (north to south) and 5m (east to west) of diameter (Figure 1-1). Soil burial, rectangular with rounded corners (1.72×1.00×1.10 m). Except for the human remains, a considerable number of animal bones were also found in the discussed tomb. Grave goods included an iron spearhead, dagger, a bronze belt, ceramic vessels, etc. (Figure 1-3). Based on the archaeological findings, the burial are dates to the 11th - 9th centuries BC. The skeleton was not complete and poorly preserved (Figure 1-2).

The remains belong to a man, whose biological age could be determined approximately between 50-55 years. In the vertical norm, the skull form corresponds to the sphenoid variant. The skull of individual is dolichocranial (72.194) with a medium transverse (196) and very large (141.5)

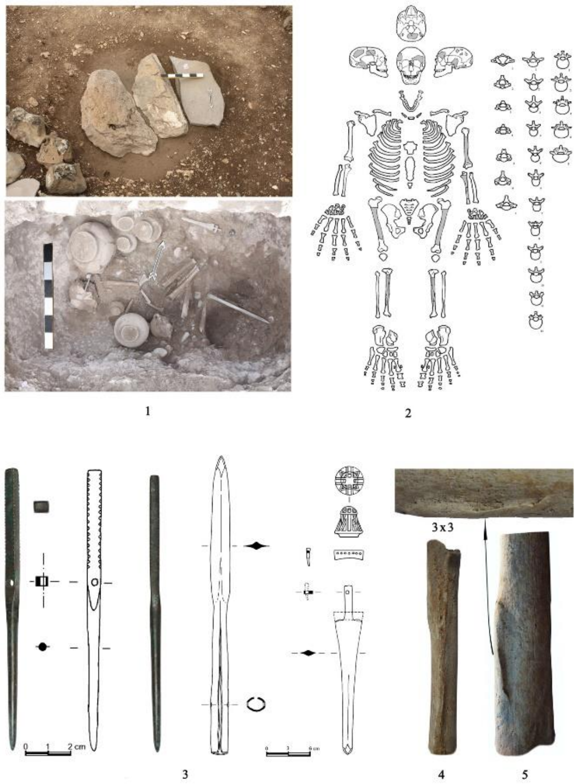

Figure 2. Plan of Burial 182, available skeletal elements from Burial 182 of the Qarashamb cemetery, traumatic disturbances (20).

longitudinal values. The relief of the lower edge of the frontal bone scale is medium developed (score 2). The parameter of the width of the skull base of the small values (121). The occiput is of medium width (107.2) with a very large arch (130) and large chord (102). The external occipital protuberance is medium developed, and in the lateral norm the occiput is rounded.

Accepting plasticity in the craniofacial skeleton allows us to consider cranial muscle markers as possible traits to use for activity reconstructions. In life, individual from burial 119 – like many adult Qarashamb males of his time – possessed great upper body strength. Such strength is inferred, in part, from degree of occipital superstructure (OSS) development at 2 pairs of neck and pectoral girdle muscle attachment sites on his posterior cranium (18, 19). Superstructures located where the upper trapezius muscles originate are referred to as tubercles on the occipital torus (TOT), and those located where the superior oblique muscles insert are known as retromastoid processes (PR). Superstructures vary in expression from moderate PR to markedly developed TOT.

The parietal arch (122) and chord (114) are medium. The mastoid is medium developed. The forehead is of wide (103). The frontal-transverse index is middle (72.8) - mesozem. Nasal breadth is medium (25). The tuberosity of the external and internal surface angle is distinctly expressed on both sides (m. pterygoideus medialis, m. masseter). The body is very short (25?) with a very small (10) thickness.

On the skull are seen the next nonmetric cranial variations: foramina supraorbitalia, foramina frontalia, foramina parietalia, os wormii suturae squamosum, os apicis lambdae, os wormii suturae lambdoidea. These minor anomalies were probably genetic in origin.

The shape and the degree of their attrition correspond to the individual's age. Had been observed the loss of molars during lifetime (P1, M1, M2 /right/, M1, M2 /left/, M1, M2 /left/, M1 /right/) (Table 1).

This individual shows evidence of hypodontia. The crown diameter of the maxillary and mandibular molars range from very small to large very quantities. The mesio-distal (MDcor) diameters of the crowns of the first and second molars are placed in the category of very large meanings. The vestibular-lingual (VLcor) diameters of the crowns of the first and second molars are placed in the category of small and very small meanings. The crown height falls into the category of small and very small meanings. The hypoconus of the second upper molars is reduced. 4-tubercle forms are marked on the lower first molars. The vestibular-lingual (VLcor) diameter is placed in the category of large, the mesio-distal (MDcor) diameter is placed in the category of small meanings. The crown height falls into the category of very small meanings.

According to the absolute dimensions, the long bones of the postcranial skeleton is characterized by medium values (Table 2). The smallest circumference of the diaphysis of the humerus is characterized by large values. The structure of the upper part of the diaphysis of the ulna is normal, the section does not have a specialized form - eurolining. The size of the ulnar and radial bone is characterized of the medium values. The length of the femur is characterized of medium values. The circumference of the diaphysis of the femur is characterized of very large values. The proximal femora is characterized by eurymeria (expanded). The massiveness of the femur bones is strong. There is an additional articular area on the lower articular surface of the tibia. The present individual had a height of approximately 166 cm.

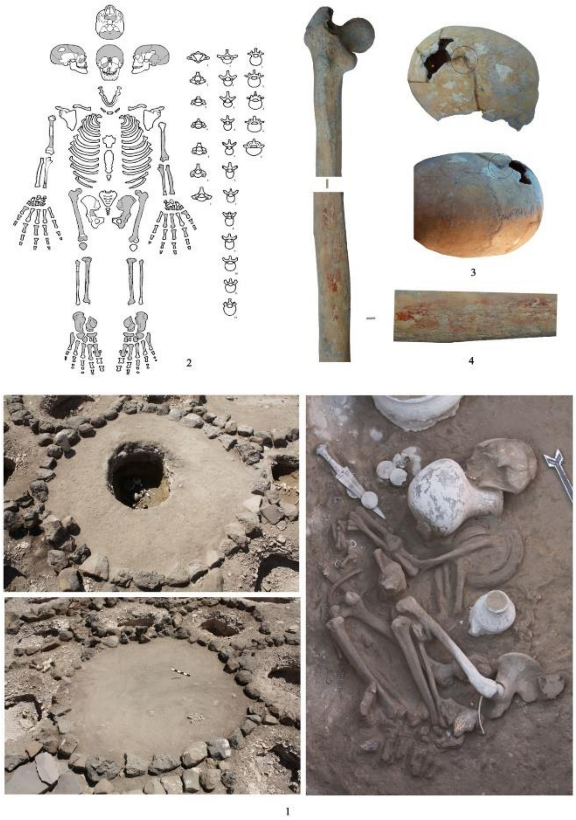

Figure 3. Plan of Burial 211, available skeletal elements from Burial 211 of the Qarashamb cemetery, red ochre, traumatic disturbances (20)

Traces of physical exertion are observed on the bones of the upper and lower limbs. The crest of the lesser tubercle, the intertubercular sulcus of the humerus and the deltoid tuberosity of the humerus are fairly well developed on the humeral bones (Table 3). The radial roughness is well developed on the radial bones which is the reflection of the corresponding development of the muscles bending its shoulder and forearm. The quadrate pronator muscle is attached to the distal-lateral crest that is well developed on ulnar bones. There is also a well-developed lateral edge of the inferior limb of radius to which this muscle is also attached.

The gluteal rough is sufficiently developed on the thigh bones and, consequently, on the gluteus maximus of both legs. The femurs also show Poirier's facet. Poirier's facet is a type of pressure facet, which is generally obtained when there are certain movements that cause the two bones of a joint to rub against each other. The Poirier's facet is created by an extension of the articular surface of the femoral head onto the anterior surface of the femoral neck (21, p. 395). This occurs where the femoral neck touches the acetabulum, due to habitual extension of the hips and knee flexion (16, p.147), as can occur during horseback riding. The posterior surface of tibia corresponding to the soleal line of tibia (the third head of triceps muscle of calf) is well developed. The relief on the posterior surface of both tibias corresponding to the soleus line (third head of the triceps tibia muscle) is well developed. Some cone-shaped osseous exostoses were also present on the calcaneal tuberosity.

The individual lacks nonspecific stress markers: periostitis, cribra orbitalia, enamel hypoplasia. The individual had an overbite, which meant that the upper teeth protruded slightly over the lower teeth, causing wear on the inner (lingual) surface of the maxillary teeth and the outer part (buccal) of the crowns of the mandibular anterior teeth. Two dental abscesses were noted. Dental abscesses occur when bacteria enter the pulp cavity of a tooth causing inflammation and a build-up of pus at the tip of the root. Eventually, a hole forms in the surrounding bone allowing the pus to drain out and relieve the pressure. The calculus deposits were slight. Periodontitis (receding gums) was slight in both the maxilla and mandible.

On the skull are fixed several traumatic disturbances. Blunt force trauma to the cranium was identified based on depression fractures (sometimes with circular fracture lines around the impact site) on the frontoparietal area and/or linear fracture lines (22, 23). This individual has healed blunt force trauma to the frontal bone above the nasal bones (Figure 1-4). The lesion has a rounded form. The enwound was well healed with new bone formation. Injury caused by blunt object on the left part of the parietal bone (Figure 1-6). This trauma is caused by a direct hit from an attacker, standing face-to-face with the victim. The trauma was received long before the individual's death. There is also with cut marks on the cranium (left temporal bone), which show sign of healing (Figure 1-5). No evidence of necrosis can be seen from this individual. Various researchers have shown that behavioral models and general lifestyle maybe reflected by the specific patterns of degenerative joint pathology (24). This individual suffered from degenerative joint disease, especially in the vertebral column. There is some pitting on the bodies of the cervical vertebrae indicating disc damage in this part of the spine. Several vertebrae were asymmetrical (scoliosis), with the vertebral body not being kidney shaped, but more teardrop shaped. Such alteration is present in cervical vertebrae and lumbar vertebrae. A generally accepted principle

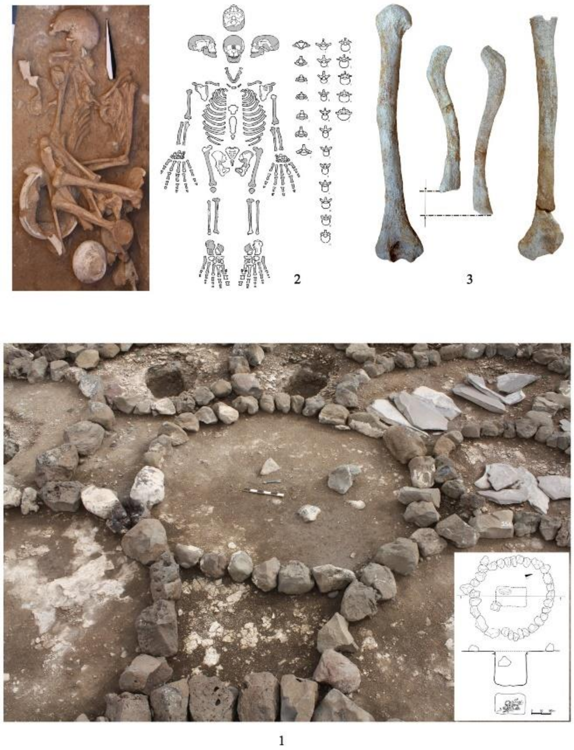

Figure 4. Plan of Burial 513, available skeletal elements from Burial 513 of the Qarashamb cemetery (20)

about osteoarthritis is that changes observed in and/or around the joints may be representative of modifications due to biomechanical factors such as trauma or activity, and those patterns have certain implications in the interpretation of the individuals lifestyle (24, 25). In horse riders, for example, higher incidence of cervical and lumbar degenerative spondyloarthropathy has been suggested (26). The rider's posture causes the muscles in the back to contract to balance the spine and to prevent injury, which leads to large compressive forces being produced resulting in greater pressure placed on the intravertebral discs and facet joints (27)

Burial 182.

Soil burial, rectangular with rounded corners (1.45×0.78×0.9m), oriented along an east-west line (Figure 2-1). Except for the human remains, a considerable number of animal bones were also found in the discussed tomb. Grave goods included a bronze dagger, bronze spear, bronze pin and ceramic vessels (Figure 2-3). Based on the archaeological findings, the burial are dates from the 12th - 9th centuries BC. The skeleton was not complete and poorly preserved (Figure 2-2).

Traces of physical exertion are observed on the bones of the upper limb (Table 3). The deltoid tuberosity of the humerus is fairly well developed. At the proximal end of the femur belonging to the individual, there are some enthesopathies previously noted as common in horse riders (28, 29). In intensive horseback riding for instance, the linea aspera on the femur can become very pronounced due to strain of the adductor and some other muscles (30, p. 104). The femora of the skeleton has a strongly developed linea aspera (рис. 2-4) in conjunction with pronounced areas of insertion of all three gluteal muscles, but especially of the gluteus minimus and gluteus mediuson the greater trochanter. The relief on the posterior surface of both tibias corresponding to the soleus line (third head of the triceps tibia muscle) is well developed.

The male (burial 182) had an ante-mortem long bone fracture. The fracture was located on the shaft of his left femur. The callous (length of 75 mm, maximum width 11mm) was generally smooth and well remodeled on its anterior, lateral and posterior surfaces. Bone growth is identified based on the presence of woven bone (bone that is formed quickly and is raised above the rest of the bone surface) and lamellar bone (organized woven bone that fuses with the rest of the bone surface) at the site of trauma (31).

Evidence for infection was observed in the skeleton. The infection was characterised by superficial inflammatory lesions on the lateral surfaces of the left tibia and right femoral. Tibiae and femur are most likely to show evidence for inflammation because they are more vulnerable than other parts of the body.

<u>Burial 211.</u>

The cromlech irregular rounded shape with 5.70m (north to south) and 5.40m (east to west) of diameter (Figure 3-1). The burial pit (dimensions 2.00×1.36×1.38m) filled by a small and medium stones and earth (Figure 3-1). Grave goods included a bronze dagger, obsidian arrowheads, bronze plaques, and ceramic vessels. Based on the archaeological findings, the burial are dates to the 15th - 13th centuries BC. The skeleton was not complete and poorly preserved (Figure 3-2). Bones were coated in red ochre and buried (Figure 3-4).

The remains belong to a man, whose biological age could be determined approximately between 30-35 years. The skull is mesocranial (75.61) with big longitudinal (186.5) and middle transversal (141) diameter. The relief of the lower edge of the frontal bone scale is poorly developed (score 1).

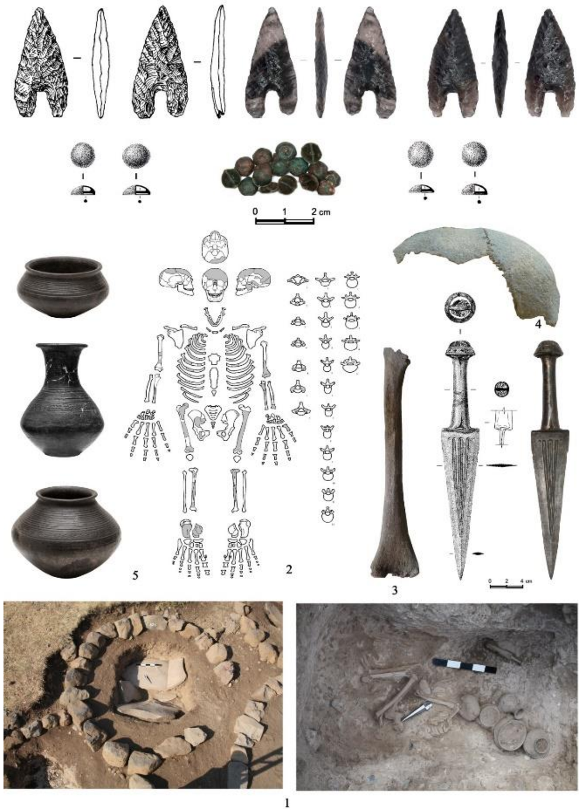

Figure 5. Plan of Burial 626, available skeletal elements from Burial 626 of the Qarashamb cemetery, tumpline deformation (20).

The width of the forehead is big, the frontal-transverse index is of medium (71.64). The frontal arch (140) and chord (121) very large, the parietal arch (135) and chord (118.8) large. The occiput is of medium width (107.5) with a medium arch (115) and large chord (101.5). The outer occipital protrusion is poorly developed and in the lateral norm the back of the head is rounded. The mastoid is medium (score 2) developed. The upper face width is of medium (106). The horizontal facial profile angles fall into the category of small size, i.e. the face of the Caucasoid standards is well profiled.

On the skull are seen the next nonmetric cranial variations: foramina frontalia, os wormii suturae squamosum and os wormii suturae lambdoidea.

According to the absolute dimensions, the postcranial bones are characterized by the values of all the signs that go falls into the gradation of small values (with the exception of the radius) (Table 2). The radius is in all dimensions characterized by medium values. The upper part of the diaphysis of the ulna is flattened (platolenia). The proximal femora is characterized by eurymeria (expanded), bony spicules or exostosis were observed in the trochanteric fossa, which also exhibits a Poirier facet (i.e. bulging of the articular surface of the femoral head toward the anterior portion of the femoral neck). The upper section of tibia is expanded in the transverse direction, i.e. according to platycnemic index, eurikemia is characteristic both for the right and left sides. The transverse section of tibial diaphysis is a rectangle of an irregular form. The posterior body surface is practically divided into two surfaces - posterior-medial and posterior-lateral. There is an additional articular area on the lower articular surface of the tibia. These facets are thought to be caused by habitual squatting, and may therefore be activity-related. The present individual had a height of approximately 162.1 cm.

We perceived hypertrophy and entheseal changes on a wide scale of muscular attachments (Table 3). We could record hypertrophy on the forearm, on the humerus at the attachment of m. teres major, m. pectoralis major, m. latissimus dorsi, m. deltoideus and at the distal end where the common flexors and extensors attach (epicondylus medialis, lateralis and crista supraepicondylaris lateralis), on the radius at the attachment of m. biceps brachii,at the site of margo interosseus and on the ulna at the attachment of m. brachialis. A deep radial fossa on the distal end of the humerus could result from the habit of carrying loads in a bag slung over the shoulder and held in place with the hand. The arm is tightly flexed at the elbow so that the head of the radius impacts above the distal epiphysis of the humerus (29).

The weak traits that characterize habitual horse-riders were observed in femora. In both femurs, the linea aspera (Figure 3-4) is highly marked. In the right femur, a moderate exostosis can be observed at the superior margin of the greater trochanter and to the vertex of the trochanter minor and al crest at both condyles. The relief on the posterior surface of both tibias corresponding to the soleus line (third head of the triceps tibia muscle) is well developed. It is protrudes relatively long above the body level.

Other post-cranial traits observed included exostosis in the right tibia (height 6.8mm). An exostosis (bone spur) is the formation of new bone on the surface of a bone. This is a benign growth of new bone on top of the existing bone.

On the skeleton are fixed several traumatic disturbances: 1. Injury caused by blunt objects on the right part of the parietal bone (dimension of the injury is more than 38 mm), 2. Injury caused by blunt object on the right femur (dimension -

21.5mm). There were no signs of inflammation in both cases. Apparently, both injuries were caused during the same encounter.

Button osteomas (rounded bone knob) was seen in individual from burial 211. Osteomas are benign bone tumors that can be usually seen as a solitary circular, sharply demarcated bony nodule on the outer surface of the cranium. It is most commonly seen on frontal and parietals (31). They affect all ages, they are symptomless (32, p. 171-172).

In that skull, there is little doubt that the antemortem destruction of the right mastoid region was caused by acute mastoiditis with widespread erosion. The erosion had reached the lateral sinus and may have caused a sinus thrombosis, but there is no evidence of intracranial extension apart from that feature, and the cause of death is uncertain. There is no sign of healing, and this individual probably died from the extensive inflammation of the ear region.

Burial 513.

The cromlech rounded shape with 4.30×4.40 m of diameter. Soil burial, rectangular with rounded corners (1.55×1.00×1.75 m), oriented along a north-south line (Figure 4-1). Grave goods included a bronze dagger, obsidian arrowheads, bronze buttons, bronze awl and ceramic vessels. Based on the archaeological findings, the burial are dates to the 14th - 13th centuries BC. The skeleton was no complete and poorly preserved (Figure 4-2).

Remains belong to a male who had died at the age of 35-45.

The top of the brainpan skull is of an ovoid shape. The cranial sutures are serrated. The skull relief is poorly developed. The skull of the individual is dolichocranic (57.28), with a very small transverse (122) and very large longitudinal diameter (213) that is on the higher end of the norm. The forehead (88) is narrow, the frontal chords are middle in size (112). The parietal chord is very large (127.5) in size. The projection length of the lower jaw of small size (97).

The angles are deployed, the width ramus mandible is medium (33). The front width are large. The tuberosity on the external surface of the angle (the reposition of the mastication muscle, m. masseter) and the internal surface of the angle (the reposition of the internal wing muscle m. pterygoideus medialis) is distinctly discerned on both sides. The symphysisis of medium height (30.5), the body is medium height (30), massive and thick (14).

Cranial non-metric traits observed included ossicles in the lambdoid suture and sutural mastoid foramen.

Both the mandible and the maxilla were recovered. There were 32 tooth positions, but only 9 teeth were recovered. The mesio-distal and vestibule-lingual (Table 1) sizes of the molars fall into the category of vary small to average. According to the average module (M1-M3) the individual is inclined to microdontism which is particularly typical of South European forms. The crown height of the molars falls into the category of very small values. Shovel-shaped was noted on the central incisor. On the second molars, the hypocone is not reduced (score 4-), also not reduced metaconus (score 2). Additional morphological details are missing. On the left lateral incisor moderately expressed marginal ridges on the lingual surface (score 2). The marginal ridges are observed on the lingual surface of the canine teeth. The sizes of the vestibular tubercle on the maxillary first premolars are slightly larger than those of the lingual one (score 2). The furrow pattern of the maxillary premolar masticatory surface has a low level of differentiation. The first mandibular molars have a 5-tubercular structure with a “Y” crown-pattern. The second molars have a 4-tubercular structure with the crown pattern "X" on the left tooth. The third right molar is 4-tubercular with an “X” crown pattern.

Both clavicles show a developed conoid tubercle. It is the attachment point for the conoid ligament, which connects to the scapula’s coracoid process, in order to strengthen the joint between the two bones. There is difference in size between left and right elements (right 164 mm, left 172 mm) (Figure 4-3). Asymmetry is the degree of variability between the contralateral sides of the body, and occurs naturally due to the exertion of various forces over time. Since these forces vary on an individual level, based on factors affecting the growth and muscularity of elements.

The structure of the upper part of the diaphysis of the ulna is normal the section does not have a specialized form - eurolining. The length of the femur is characterized by small sizes. The section of the femur is characterized by hyperplatimeria. The tibias are characterized by very large values of the longitudinal dimensions. The relief on the posterior surface of both tibias corresponding to the soleus line (third head of the triceps tibia muscle) is well developed.

The reconstruction of body proportions based on the dimensions of the skeleton bones revealed the following trends: the intermembral index (H1+R1):(F2+T1) are characterized by large values (72.53); intermembral index (H1+R1)/(F1+T1) go beyond the highest line of intergroup variation (Table 2). The values of the tibia-femoral index (T1/F2: 95) go beyond the highest line of intergroup variation: i.e. the individual possesses the longest tibia, the maximum value of the shoulder-femoral index is also observed. The values of the shoulder-femoral index go beyond the highest line of intergroup variation (H1/F2: 78.81; H1/F1: 76.63). The values of the radio-humeral pointer are characterized by above average values (65.92). Now let's turn to the osteological length of the individual's limbs. The osteological length of the upper limbs (H1+R1: 594; H1+U1:475.5/right/, 480/left/, as well as the osteological length of the lower limbs (F2+T1: 819; F1+T1: 831) are characterized by above average values.

The present individual had a disproportionate physique and a height of approximately 169.6±4.7 cm. The proportions of limbs with elongated distal segments are is particularly typical of South European forms.

Many evident muscular insertions or even enthesopathies are distributed on different bones, suggesting an intense activity during life: on the claviculae the deltoid and pectoralis major; on the radii the biceps; on the ulnae the brachialis and the pronator quadratus; on the femurs the very prominent linea aspera and the enthesopathy of the gluteus maximus and the adductor magnus; on the tibiae the enthesopathy of the soleus. Individual of precise "military bearing". Yet one of the most extreme of the activity-related changes to the individual from burial 513 forearm bones is the massive spur on the back of the olecranon process of the ulna that represents hyperostosis of bone into the insertion site of the tendon of the triceps muscle. The long head of this muscle courses above the posterior surface of the humerus, and its main action is to extend the forearm, as well as draw the arm toward the body (32). Dutour (33) has noted its presence in habitual throwers, such as baseball players and presumptive Neolithic net casters.

The gluteal rough is sufficiently developed on the thigh bones and, consequently, on the gluteus maximus of both legs. The weak traits that characterize habitual horse-riders were observed in femora. The tibia, bilaterally, at the anterior surface of the distal end, a facet is observable, due to the hyperflexion of the ankle.

The skull shows evidence of mastoid disease that had probably developed in the middle ear, destroyed the anterior wall of the left external auditory meatus and tympanic plate, and involved the temporomandibular articulation. The condyle of the mandible was destroyed by the pathologic process, which had spread backward into the mastoid antrum and opened into the lateral sinus.

<u>Burial 626.</u>

The cromlech rounded shape (3.05 m), oriented along a north-west line (Figure 5-1). Soil burial, rectangular with rounded corners (1.60×0.95×1.20 m). Except for the human remains, a considerable number of animal bones were also found in the discussed tomb. The grave inventory was represented by implements such as an obsidian arrowhead, a bronze dagger, bronze buttons and ceramic vessels. Based on the archaeological findings, the burial dates to the 14th - 13th centuries BC.

The skeleton was poorly preserved (Figure 5-2) and belonged to a male, aged between 20 and 29 years at the time of death.

On the skull are seen the next nonmetric cranial variation: os wormii suturae lambdoidea. The maxillary first premolar was examined (mesio-distal size = 7mm, vestibule-lingual = 9.5mm, crown height = 8.5mm.). The rest of the teeth were missing. The lingual and vestibular tubercles on the premolar are approximately of the same size (score 3).

Complete septal apertures of the distal humerus were found in the left humerus of individual. The deltoid tuberosity of the humerus is fairly poorly developed (Table 3). Individual has the bilateral enthesopathies on the superiolateral third of the femoral diaphysis inferior to the lesser trochanter and lateral to the linea aspera. This is the insertion area for the gluteus maximus muscles (30, p.119) (Figure 5-3).

Unintentional cranial deformation was found in individual (Figure 5-4). Tumpline deformation presents as post-coronal depression. The length of horizontal grooving 89 mm, width 29.5 mm. Unintentional modification can be caused by the carrying of loads in a basket sling from a head-band (or tumpline), resulting in a shallow depression from side to side across the frontal or parietal bones of the cranial vault (29, 4, 19).

The cranial infection found among this individual is characterized by several factors including the thickening of the cortical bone, sclerotic surface. Porosity or lytic areas are absent. A strong depression fracture without any traces of healing was located on fourth rib. Most of the rib fractures are due to falls (standing height or higher), but they can also be a consequence of impacts.

Conclusion

Anthropological analysis human skeletal remains from Qarashamb reveal:

1. The archaeological material found within these burials suggested that the associated individuals possessed military honor or glory during life. Elaborate swords, knives, additional metal offerings, and higher quality ceramics reinforced the assumption that these – warrior‖ tombs contained individuals who had high status in society.
2. We have found Poirer's facets, a type of enthesopathy located on the superolateral third of the femur, among warriors from Qarashamb. This type of bone-changing stress is caused by habitual hip extension and stabilization with an upright posture necessary to maintain balance (30, p. 119). To do this, the gluteus maximus muscles must be extended for stability (30, p. 119). These are found among modern athletes including - football players, skiers, and horseback riders (30, p. 119). Due to the physical strain necessary to create these enthesopathies in a warrior from Qarashamb, horseback riding or constant traversing of mountainous terrain would be probable causes (35). Horseback riding was an activity of the elite during the Bronze and Iron Ages (36, 37). Horses were expensive to purchase and maintain.
3. Warfare is a strangely exciting topic to everybody and weapons are a frequent funerary artefact usually giving good background information. We have identified five cranial depression fractures (Burials 119, 211, 626) on the skeletal material, as well as one chopped (Burial 182) and one stab wound (Burial 119). All injuries detected have a life-long character and a military orientation in the absence of traumatic injuries of lethal nature. Many mortal wounds may not be visible in the bones because they only affect soft tissues that have not been preserved. Therefore, most of the soft-tissue injuries sustained by archaeological populations will be invisible, although occasionally soft tissue injuries can be inferred through ossification of the tissues at the site of damage, known as myositis ossificans (38, p. 85-86).
4. The analysis showed that individuals are characterized by features of the southern-european type. The individuals from Qarashamb gravitate toward microdontism (according to the average modulus of the crown). Analysis of non-metric features on the skulls reveals, the most frequent features were: os wormii suturae lambdoidea (4 individuals), foramina frontalia, os wormii suturae squamosum (2 individuals). According to osteometric characteristics, all of the individuals were medium height and strong physique.
5. Among the reconstructed components of life support can be included the wealth and fullness of the food base. The living conditions (primarily nutrition) were similar for the entire layer that formed the layer of warriors. The presence of tartar and the absence of caries indicate the predominance of the protein component in the diet.

This analysis of the human skeletons from five of the Qarashamb burials has yielded results that suggest certain trends in the population and offer suggestions for future research.

References

1. Avetisyan P, Melikyan V, Hakhverdyan A, Chazin H., Harutyunyan T. The dynamics of socio-cultural transformations from the20th–19th to the 8th–7th centuries BC (based on the results of exca-vations at the Karashamb necropolis). In: Avetisyan P (ed), Archaeology of Armenia inregional context II. International Conference dedicated to the 60thAnniversary of the Institute of Archaeology and Ethnography Yerevan, 9th-11th of July, 2019, pp. 31-32, 2019.
2. Khudaverdyan AYu. Trauma in human remains from Bronze Age and Iron Age archaeological sites in Armenia. Bioarchaeology of the Near East, 2014, 8: 29–52.
3. Khudaverdyan AYu, Yengibaryan AA, Vardanyan ShA, Matevosyan RSh, Karalyan ZA. Trauma analysis in paleopathology: distribution, structure, interpretation (Bronze and Iron Ages, Armenia). The New Armenian Medical Journal, 2014, 8 (1): 4-15.
4. Khudaverdyan AYu. Artificial Deformation of Skulls from Bronze Age and Iron Age Armenia. The Mankind Quarterly, 2016, 56 (4): 513-534.
5. Khudaverdyan AYu, Khachatryan AA, Yeganyan LG. Multiple trauma in a horse rider from the Late Iron Age cemetery at Shirakavan, Armenia. Bioarchaeology of the Near East, 2016, 10: 47-67.
6. Khudaverdyan AYu, Yengibaryan AA, Hobosyan SG, Hovhanesyan AA, Saratikyan AA. An Early Armenian Female Warrior of the 8-6 c. BC from Bover I site (Armenia). Int J Osteoarch. 2019, 30(1): 119-128.
7. Connor MRF, Mowat LH. Some notes on gunshot and other wounds. The British Journal of Surgery, 1915, 3:135-141.

8. Buikstra JE, Ubelaker DH. (eds.) 1994. Standards for Data Collection from Human Skeletal Remains (Fayetteville).
9. Trotter M, Gleser GC. A re-evaluation of estimation of stature based on measurements of stature taken during life and of long bones after death. Am J Phys Anthropol, 1958, 16: 79–123.
10. Alekseev VP, Debets GF. Craniometry (methods of anthropological research). Moscow: Science, 1964.
11. Alekseev VP. Osteometry (methods of anthropological research). Moscow: Science. 1966.
12. Zubov AA. Odontology: A Method of Anthropological Research. Moscow: Science, 1968.
13. Zubov AA. Ethnic odontology. Moscow: Science. 1973.
14. Movsesyan AA, Mamonova NN, Richkov YuG. The program and method of research of anomalies of a skull. Anthropology questions, 1975, 51: 127-150.
15. Saunders SR. Non-metric variation. In: Işcan MY, Kennedy KAR. (eds), Reconstruction of Life from the Skeleton. New York, 1989, pp. 95-108
16. Kennedy KAR. Skeletal Markers of Occupational Stress. In: Mehmet YI, Kennedy KAR (eds.), Reconstruction of Life From the Skeleton. New York: Wiley-Liss, Inc. 1989, pp. 129-160
17. Trinkhaus E. Bilateral asymmetry of human skeletal non-metric traits. Am J Phys Anthropol, 1978, 49: 315-318.
18. Heathcote G, Bansil K, Sava V. A protocol for scoring three posterior cranial superstructures which reach remarkable size in ancient Mariana Islanders. Micronesica, 1996, 29: 281–298
19. Khudaverdyan AYu. Tumpline Deformation on Skulls from Late Bronze and Early Iron Age Armenia: A Cause of Enigmatic Cranial Superstructures? The Mankind Quarterly, 2018, 59 (1): 8-30.
20. Khudaverdyan AYu, Melikyan VV. On the issue of military burials of the Bronze and Iron Ages of the Karashamb burial ground, Armenia (according to physical anthropology and paleopathology). Bulletin of the Moscow State Regional University, 2019, 5: 125-155.
21. Kostick EL. Facets and imprints on the upper and lower extremities of femora from a Western Nigerian population. Journal of Anatomy, 1963, 97(3):393-402.
22. Galloway A. Fracture patterns and skeletal morphology. In: Galloway A (ed.), Broken Bones: Anthropological Analysis of Blunt Force Trauma (Springfield, Il), 1999, pp. 63–223.
23. Lovell NA. Analysis and Interpretation of Skeletal Trauma. In: Katzenberg ME, Saunders SE. (eds.), Biological Anthropology of the Human Skeleton, second edition. New Jersey: John Wiley and Sons, 2008, pp. 341-386.
24. Angel JL. Early skeletons from Tranquility, California. Smithsonian Contributions to Anthropology, 1966, 2:1-19.
25. Bridges PS. Degenerative joint disease in hunter-gatherers and agriculturists from the Southeastern United States. Am J Phys Anthropol, 1991, 85:379-392.
26. Tsirikos A, Papagelopoulos PJ, Giannakopoulos PN, Boscainos PJ, Zoubos AB, Kasseta M, Nikiforidis PA, Korres DS. Degenerative spondyloarthropathy of the cervical and lumbar spine in jockeys. Orthopedics, 2001, 24(6):24561–24564.
27. Nicol G, Arnold GP, Wang W, Abboud RJ. Dynamic pressure effect on horseand horse rider during riding, Sports Engineering, 2014, 17(3):143-150.
28. Molleson T, Blondiaux J. Riders' bones from Kish, Cambridge Archaeological Journal, 1994, 4: 312-316.
29. Molleson T. A method for the study of activity related skeletal morphologies. Bioarchaeology of the Near East, 2007, 1: 5–33.
30. Capasso L, Kennedy K, Wilczak C. Atlas of occupational markers on humanremains, Teramo: Edigrafital S.P.A., 1999.
31. Ortner DJ. Identification of Pathological Conditions in Human Skeletal Remains. New York: Academic Press, 2003.
32. Waldron T. Paleopathology. New York: Cambridge University Press, 2009.
33. Crouch J. Functional Human Anatomy, 4th Edition. Philadelphia: Lea & Febiger, 1985.
34. Dutour O. Enthesopathies (lesions of muscular insertions) as indicators of the activities of Neolithic Saharan populations. Am J Phys Anthropol, 1986, 71: 221–224.
35. Angel JL. The reaction area of the femoral neck. Clinical Orthopaedics, 1964, 32:130-142.
36. Dickinson OT. The Origins of Mycenaean Civilization (Goteberg, Studies in Mediterranean Archaeology, 1977.
37. Morris I. Burial and Ancient Society: The Rise of the Greek City-State. Cambridge: University of Cambridge Press, 1987.
38. Roberts C, Manchester K. The archaeology of disease. 3rd edn. Ithaca: Cornell University Press, 2005.

Table 1. Dental features individuals from Qarashamb.

	Individual № 119		Individual № 513	
	Maxilla Vestibule-lingual diameter (VL_{cor})			
	прав.	лев.	прав.	лев.
I1	-	-	-	7
I2	-	-	-	-
C	-	-	-	-
P1	-	4	-	-
P2	-	4.5	-	-
M1	9.5?	6.5	-	-
M2	8.5	8.5	-	10.2
M3	-	-	-	-
	Mesio-distal diameter (MD_{cor})			
I1	-	-	-	8.2
I2	-	-	-	-
C	-	-	-	-
P1	-	7.5	-	-
P2	-	8.5	-	-
M1	11.5	10.5	-	-
M2	11	10.5	-	10
M3	-	-	-	-
	Crown height (H_{cor})			
M1	6.7	-	-	-
M2	5.5	5.5	-	5
M3	-	-	-	-
	Mesio-distal neck diameter (MD_{col})			
M1	8	6	-	-
M2	7.2	7.2	-	8
M3	-	-	-	-
	Crown area MD × VL			
M1	109.3	68.3	-	-
M2	93.5	89.3	-	102
M3	-	-	-	-
	Crown index I_{cor} (VL / MD) × 100			
M1	82.7	61.91	-	-
M2	77.3	80.96	-	102
M3	-	-	-	-
	Crown module m_{cor} MD + VL / 2			
M1	10.5	8.5	-	-
M2	9.8	-	-	10.1
M3	-	-	-	-
	Mandibule			
	Vestibule-lingual diameters (VL_{cor})			
I1	-	-	-	-
I2	-	-	-	6.5
C	-	-	-	7.5
P1	-	-	-	6.8
P2	-	-	-	8.5
M1	10	-	10.7	10.2
M2	-	-	-	9.9
M3	-	-	-	9.5
	Mesio-distal diameter (MD_{cor})			
I1	-	-		-
I2	-	-		5.5
C	-	-		6.5
P1	-	-		6.8
P2	-	-		7.5
M1	9.5	-	9.9?	10.7
M2	-	-		9.5
M3	-	-		9.9
	Crown height (H_{cor})			
M1	4.2	-	3.5	4.2
M2	-	-	-	5.5?
M3	-	-	-	5.5?
	Mesio-distal neck diameter (MD_{col})			
M1	9	-	8,5	8,5
M2	-	-	-	7,5
M3	-	-	-	7
	Crown area MD × VL			
M1	95	-	105.93	109.2
M2	-	-	-	94.1
M3	-	-	-	94.1
	Crown index I_{cor} (VL / MD) × 100			
M1	105.3	-	108.1	95.4
M2	-	-	-	104.3
M3	-	-	-	95.96
	Crown module m_{cor} MD + VL / 2			
M1	9.8	-	10.3	10.5
M2	-	-	-	9.7
M3	-	-	-	9.7

Table 2.Postcranial measurements of skeletons from Qarashamb

	Burial 119 right /left	Burial 513 right /left	Burial 182 right /left	Burial 211 right /left	Burial 626 right /left
Humerus					
1. Maximal length	-/-	331/-	-/-	-/-	-/-
2. Total length	-/-	327/-	-/-	-/-	-/-
3. Upper epiphysis breadth	51?/-	48,2/-	-/-	-/-	-/-
4. Maximal midshaft breadth	68.8/63.8	58/61.5	-/-	-/-	-/-
5. Largest diameter Ø of the middle diaphysis	25.8/23	23.8/24.1	-/25.8	-/22	-/-
6.Smallest Ø of the middle diaphysis	22.2/18	22.8/21	-/22.8	-/20	-/-
7. Minimal midshaft breadth	71/70	67/65?	-/70	-/66	-/56
7a. Midshaft circumference	77/74	71/71	-/74	-/71	-/-
7:1 Robusticity index	-/-	20.3	-/-	-/-	-/-
6:5 Cross-section index	86.1/78.3	95.8/87.2	/88.4	/90.91	-/-
Radius					
1. Maximal length	253/-	263/260	-/-	-/240	-/-
2. Physiological length	239.5/-	255/252	-/-	-/229	-/-
4. Cross-section diameter	13/13.9	13.5/14	-/-	-/13.5	-/-
5. Sagittal shaft diameter	18/17.2	15/16	-/-	-/16.8	-/-
3. Minimal shaft circumference	45/46	41/41	-/-	-/46	-/-
3:2 Robusticity index	18.8/	16.1/16.3	-/-	-/20.1	-/-
5:4 Cross-section index	138.5/123.8	111.2/114.3	-/-	/124.5	-/-
Ulna					
1. Maximal length	-/-	-/-	-/-	-/-	-/-
2. Physiological length	-/-	-/-	-/-	-/-	-/-
11. Sagittal diameter	15/14	-/-	-/16	-/15	-/-
12. Transverse diameter	19/17.2	-/-	-/18.8	-/18	-/-
13. Upper transverse diameter	19/19	-/20	-/18?	-/21	-/-
14. Upper sagittal diameter	19.2/19	-/23	-/26	-27	-/-
3. Minimal shaft circumference	-/-	-/-	-/43?	-/39	-/-
3:2 Robusticity index	-	-/-	-/-	-/-	-/-
11:12 Cross-section index	78.95/81.4	-/-	/85.2	/83.4	-/-
13:14 Platyleny index	98.96/100	/86.96	/69.3	/77.8	-/-
Femur					
1. Maximal length	451/-	432/-	-/-	-/416	-/-
2. Natural length	442/441	420/-	-/-	-/404	-/-
21. Condylar breadth	85/-	-/-	-/-	-/-	-/-
6. Sagittal diameter of midshaft	30.2/30.2	31/31.9	31/29.2	26.5/27.8	22/22.9
7. Transverse midshaft diameter	28/29	30.5/30	28.2/29.9	30/31.5	23.6/23.2
9. Upper transverse shaft diameter	37/38.5	36/38	38/37	36,5/39	-/33
10. Upper sagittal shaft diametere	28.9/31	25,5/25	25,2/25,5	23,5/25,5	-/22,6
8. Midshaft circumference	90.5/91	95/95	92/90	89/92	74/74
8:2 Robusticity index	20.5/20.7	22.7/	-/-	/22. 8	-/-
6:7 Pilastry index	107.9/104.2	101.7/106.4	109.93/97.7	88.4/88.3	93.3/98.8
10:9 Platymery index	78.2/80.6	70.9/65.8	66.4/68.92	64.4/65.4	/68.5
Tibia					
1. Full length	378/375	399/-	-/-	342/346	-/-
2. Condylo-talar length	351.5/351	353/-	-/-	302.5/302.8	-/-
1a. Maximal length	383/380	-/-	-/-	347/351	-/-
5. Upper epiphysis breadth	77/-	-/-	-/-	72/-	-/-
6. Lower epiphysis breadth	-/50.3	46/-	-/-	49/44	-/-
8. Sagittal diameter at midshaft level	33/34.5	38/36.8	33/33	31/30	27.8/-
8a. Sagittal diameter at the nutrient foramen level	38/39	40.5/41	39/40	35.8/34	-/-
9. Transverse diameter at midshaft level	24/21.8	23/24.5	22/23	23/22.5	22.9/-
9a. Transverse diameter at the nutrient foramen level	27/26	25/25.5	24/25	25.8/23.8	-/-
10 Midshaft circumference	90/89	95/93	90/89	85/82	81/-
10b. Minimal shaft circumference	82/81	90/-	86/-	80/77	-/75
9:8 Cross-section index	72.8/63.2	60.6/66.6	66.7/69.7	74.2/75	82.4/
10b:1 Robusticity index	21.7/21.6	22.6/	-/-	23.4/22.3	-/-
9a:8a Cross-section index	71.1/66.7	61.8/62.2	61.6/62.5	72.1/70	-/-
10:1 Robusticity index	23.9/23.8	23.9/	-/-	24.9/23.7	-/-
Fibula					
1. .Maximum length	-/374	-/-	-/-	-/-	-/-
Skeletal proportions					
Brachial index (R1 : H1)	-	79.5	-	-	-
Tibio-femoral index (T1 : F2)	85.6/85.1	95	-	85.7	-
H1+R1/F1+T1 Intermembral index	-	72.6	-	-	-
H1+R1/ F2+T1 Intermembral index	-	78.9	-	-	-
H1:F2 Humero-femoralindex	-	65.92	-	-	-
Radio-tibial index (R1 : T1)	66.94	71.5	-	69.7	-

Table 3. The recording system for musculoskeletal stress

	Burial 119		Right and Left in total	Burial 182		Right and Left in total
	Right	Left		Right	Left	
Humerus						
Crista tuberculi minoris, crista tuberculi majoris	2	2.5	2.3	-	2	-
Tuberositas deltoidea	2.5	3	2.8	-	2	-
Tuberculum majus, tuberculum minus	2	-	2	-	-	-
Margi lateralis, medialis et anterior Epicondili lateralis et medialis	2.5	2.5	2.5	-	-	-
In total	2.3	2.7	2.4	-	-	-
Radius						
Tuberositas radii	3	2.5	2.3	-	-	-
Margo unterossea	2	2	2	-	-	-
Sulcus musculi flexoris halluces	2	-	2	-	-	-
Processus styloideus	2.5	-	2.5	-	-	-
In total	2.4	2.3	2.2	-	-	-
Ulna						
Margo interossea, margo posterior	2.5	2	2.3	-	2.5	-
Crista musculi supinatoris	2.5	1.5	2	-	-	-
Tuberositas ulnae	2	1.5	1.8	-	2	-
In total	2.4	1.7	2.1	-	-	-
Femur						
Trochanter major	1.5	1.5	1.5	-	-	-
Trochanter minor	3	3	3	-	-	-
Tuberositas glutea	2.5	3	2.75	3	3	3
Linea aspera	3	3	3	3	3	3
Epicondili	1.5	1.5	1,5	-	-	-
In total	2.3	2.4	2.35	-	-	-
Tibia						
Tuberositas tibiae	2.5	2	2.3	-	-	-
Margo anterior, margo interossea	2	2	2	3	3	3
Linea m. solei, m. soleus	2.5	2	2.3	2.5	2.5	2.5
Sulcus musculi flexoris halluces	2	2	2	-	-	-
In total	2.3	2	2.2	-	-	-
Fibula						
The edges development	3	3	3	-	-	-

Continued table 3

	Burial 211		Right and Left in total	Burial 513		Right and Left in total
	Right	Left		Right	Left	
Humerus						
Crista tuberculi minoris, crista tuberculi majoris	-	2.5	-	1.5	1.5	1.5
Tuberositas deltoidea	-	3	-	2	1.5	1.8
Tuberculum majus, tuberculum minus	-	-	-	1.5	-	1.5
Margi lateralis, medialis et anterior Epicondili lateralis et medialis	-	2	-	1.5	1	1.3
In total	-	2.5	-	1.7	1.4	1.5
Radius						
Tuberositas radii	-	1	-	1.5	2	1.8
Margo unterossea	-	1.5	-	1.5	2	1.8
Sulcus musculi flexoris halluces	-	2.5	-	1.5	2	1.8
Processus styloideus	-	2.5	-	1	-	1
In total	-	1.9	-	1.4	2	1.4
Ulna						
Margo interossea, margo posterior	-	2.5	-	1.5	2	1.8
Crista musculi supinatoris	-	2.5	-	-	1	1
Tuberositas ulnae	-	2	-	-	1	1
In total	-	2.4	-	1.5	1.4	1.3
Femur						
Trochanter major	-	2	-	1	-	-
Trochanter minor	3	3	3	1.5	-	-
Tuberositas glutea	3.5	3.5	3.5	2	2	2
Linea aspera	2.5	3	2.8	2	2.5	2.3
Epicondili	-	1.5	-	1	1.5	1.3
In total	3	2.6	2.8	1.5	2	1.9
Tibia						
Tuberositas tibiae	2	1.5	1.8	2	2	2

Margo anterior, margo interossea	2.5	2.5	2.5	2.5	2	2.3
Linea m. solei, m. soleus	3	3	3	2	2?	2
Sulcus musculi flexoris halluces	2.5	2.5	2.5	2	-	-
In total	2.5	2.4	2.5	2.2	2	2.2
Fibula						
The edges development	-	-	-	-	2.5	-

Continued table 3

	Burial 626		Right and Left in total
	Right	Left	
Humerus			
Crista tuberculi minoris, crista tuberculi majoris	-	-	-
Tuberositas deltoidea	1	-	-
Tuberculum majus, tuberculum minus	-	-	-
Margi lateralis, medialis et anterior Epicondili lateralis et medialis	-	1	-
In total	-		1
Radius			
Tuberositas radii	-	-	-
Margo unterossea	-	-	-
Sulcus musculi flexoris halluces	-	-	-
Processus styloideus	-	1	-
In total	-	-	-
Ulna			
Margo interossea, margo posterior	-	-	-
Crista musculi supinatoris	-	-	-
Tuberositas ulnae	-	-	-
In total	-	-	-
Femur			
Trochanter major	1?	-	-
Trochanter minor	1.5	1.5	1.5
Tuberositas glutea	-	2.5	2.5
Linea aspera	2.5	2.5	2.5
Epicondili	1?	-	-
In total	1.5	2.2	1.9
Tibia			
Tuberositas tibiae	-	-	-
Margo anterior, margo interossea	2	2	2
Linea m. solei, m. soleus	-	1?	-
Sulcus musculi flexoris halluces	-	-	-
In total	-	1.5	-
Fibula			
The edges development	-	-	-