

## Results from the Anthropological Investigation of Human Bone Remains from Excavations on UPI 5040 Section of Antique Necropolis of Apolonia Pontica

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The study includes results from the investigation of human bone remains from two complexes with inhumation and three ones with cremation burial ritual, investigated during excavations of a section of the antique necropolis of Apolonia Pontica, situated in the area of Kalfata-Budzhaka, included in recent building activity. The investigated materials shed light to the history of the population, which inhabited the antique town in the 3<sup>rd</sup>-5<sup>th</sup> c. BC.

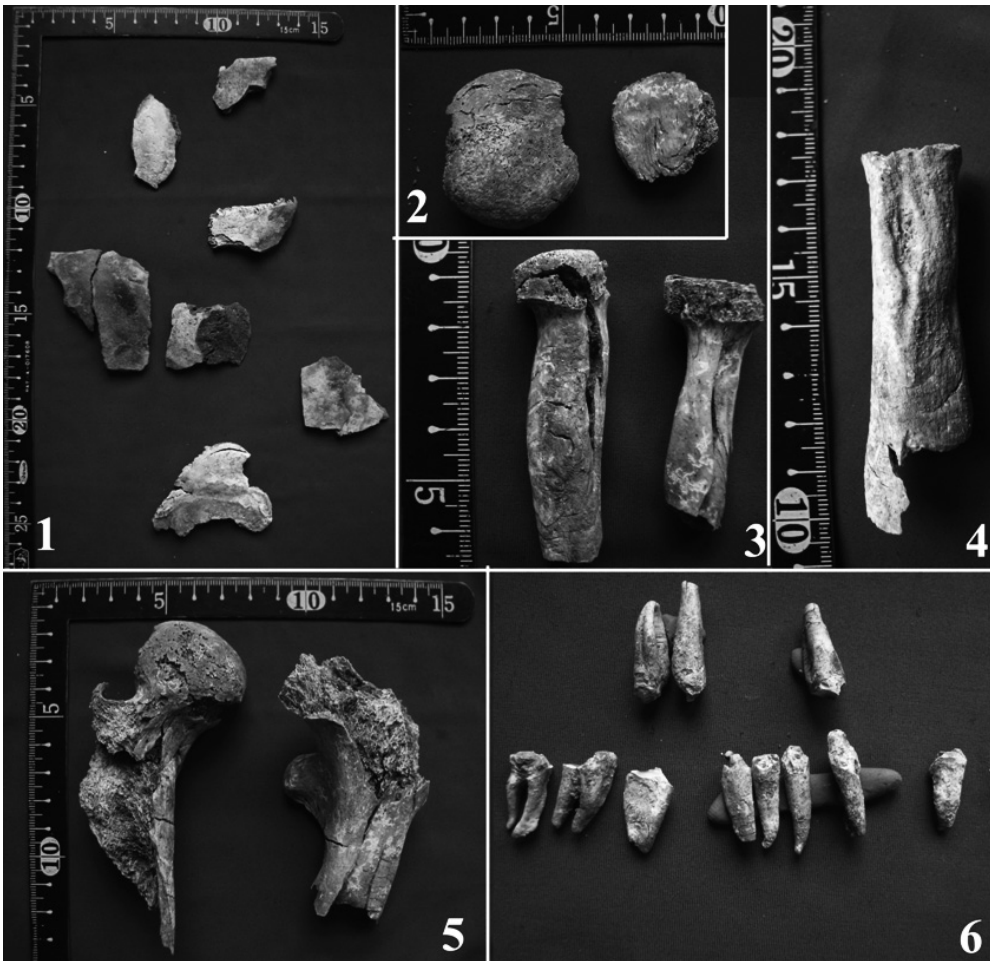
*Key words:* South necropolis, Apolonia Pontica.

### Materials and Methods

During archaeological excavation on a section of the antique necropolis of Apolonia Pontica in the area “Kalfata/Budzhaka”, committed to modern construction activity, five burial complexes are uncovered [10]. Three of them, N 1, 2 and 4 are result from burials after the cremation ritual, and two, respectively N 3 and 5, after inhumation ritual. Complexes are dated in the 3<sup>rd</sup>-5<sup>th</sup> c. BC, or graves with cremation burial ritual, N 1 and 2 and the inhumations N 3 and 5 in the beginning-first quarter of the 3<sup>rd</sup> c. BC, and a complex with cremation N 4 in the 5<sup>th</sup> c. BC [10]. The anthropological investigation is held in laboratory conditions aiming to provide information about age, sex and additional individual specifics of buried according to preserved material.

In anthropological identification are used classical methods. One of the skeletons from inhumations, from grave N 5 is almost completely preserved. The one from grave N 3 is partially preserved, missing skull fragments, except a big portion from the lower jaw, vertebral column, except a fragment from a thoracic vertebra, ribs and some fragments from bones of limbs. The preserved portion of the skull vault from grave N 5 allowed use of methods for assessment of cranial sutures obliteration [7, 9]. Grave N 3 doesn't provide much data for age estimation, except auricular surface on both iliac bones, preserved in poor condition, but assessed as showing degenerative relief, and age was estimated according to it in broader limits, being impossible to precise the exact stage of development [5]. The sexual identification in both inhumations is achieved

by the form of the greater sciatic notch [1, 7]. The sexual identification of individual from grave N 5 is also confirmed by the features of cranial bones [6]. Material from complexes with cremation burial ritual is in relatively large quantities with many big, identifiable fragments, suggesting low pyre temperature. These complexes provided sufficient number of fragments with identifiable anatomical sites (**Fig. 1**), which served in anthropological identification. For age achievement in cases of cremated bone remains are applied methods for assessment of cranial sutures obliteration [7, 9]. In all complexes with cremated remains, N 1, 2 and 4, are identified fragments from bones with finished development. In material from grave N 2 are found numerous remains from permanent teeth with finished root development, which confirmed data from bones from the postcranial skeleton, which point to individual with finished skeletal development.



**Fig. 1.** Identified materials from cremations. **1.1.** Identified fragments from skull vault, grave, N 4. **1.2.** Left patellae with different dimensions from an adult and a child, grave N 1, presenting different individuals in the material from cremation. **1.3.** Proximal fragments from both radiuses, grave N 1. **1.4.** Fragment from diaphysis of right humerus, enthesopathic changes on the right humerus, enthesopathic lesion on the place of attachment of latissimus dorsi muscle, grave N 1. **1.5.** Proximal fragments from both femurs, grave N 1. **1.6.** Fragments from permanent dentition, grave N 2

Two of the complexes with cremated materials and both inhumations provide some metrical data for correlation to standard tables for diameters of femoral, humeral and radial heads, femoral and humeral bicondylar breadth (**Tables 1, 2**) [2, 4]. In both inhumations obtained measurements are relatively high and stay between both sexes (**Table 2**). Results for both complexes with cremations, graves N 1 and 2, don't contribute much for sexual identification, as none of the obtained dimensions is complete (**Table 1**). Nevertheless, reconstructed measurements point to male sexual identification. In one case dimensions are used in age determination after proving smaller values than expected for an adult individual. Material from both inhumations allows individual's stature reconstruction after lengths of long bones of limbs, achieved by Trotter-Glaeser's and Pearson-Lee's formulae [8]

**Table 1.** Basic measurements in cm. Complexes with cremation

Bone 1	Grave N 1		Grave N 2
	D	B	D
Femur dx/sn	> 4.00	–	> 4.10
Humerus dx/sn	> 3.90	–	–
Humerus sn?	–	> 5.20	–
Radius dx	> 1.90*	–	–
Radius sn	> 1.85*	–	–
Radius dx/sn	–	–	> 2.10*
Patella dx	320**	3.15	–

\*Reconstructed measurement is characteristic for male sex; D – head diameter; B – bicondylar breadth; \*\*height; dx – right; sn – left.

**Table 2.** Basic measurements in cm. Complexes with inhumation. Stature estimation

Bone	Grave N 3	Grave N 5		
	L	L	D	B
Femur dx		44.1	4.55	7.4
Femur sn	≥ 44.8	43.5	4.6	7.46
Tibia dx	38.6	35.8	–	–
Tibia sn	38.8	36.0	–	–
Humerus dx		31.0	–	–
Humerus sn		29.9	–	–
Stature T-G	173.76 (170.4÷177.12)*	163.96(160.42÷167.50)**		
Stature P-L	165.8*	157.53		

\*Reconstructed stature after measurements of tibiae; \*\* Reconstructed stature after measurements of bones of lower limbs; T-G – Trotter-Glaeser's formula; P-L – Pearson-Lee's formula.

## Results and Discussion

Preservation of the material in the graves with remains from a cremation burial ritual allows identification of the individuals approximately as three males at an age of 35-40 up to 45, 30-40 and 50-60 for graves N 1, 2 and 4, respectively. In two of the complexes is registered singular fragment from an individual at a different age. In the grave N 1 the age estimation of the additional bone, a left patella, as originating from a child at about 7 up to 14 years, highly contradicts to the determined age for the individual, presented in most fragments. In the other complex, grave N 4 difference in determined age is not as pronounced. Here the additional bone fragment is a small one, from the left parietal, from the place between the coronal and sagittal sutures, both showing complete lack of obliteration, which appears in contradiction with the observed advanced obliteration on the found lambdoid suture – complete on the endocranial surface and advanced, still visible, on the ectocranial surface. As such a situation could appear in some pathological conditions of premature, advanced obliteration in some segments of sutures here, even if most possibly can be found a second individual, presented in the singular discussed fragment, the situation is appraised as unclear. Inhumations provide more suitable material for age and sex identification and in these complexes are found remains from singular burials, containing two female individuals at an age approximately 40-50 each, age being less accurately determined for the individual from grave N 3, because of the insufficient data. As the investigated section is too small it is impossible from these results to be obtained more general conclusions for specifics in the burial ritual at the time with preference of incineration for males and, respectively, inhumations for females.

State of preservation of bones doesn't allow description of characteristics of anthropological type or physical development. Nevertheless, stature was obtained for both individuals from the inhumations (**Table 2**). The female from grave N 3 is expected to have reached at mean 173.76 cm after Trotter-Glaeser's formula and 165.8 cm after Pearson-Lee's one, being a female of a middle to high stature. The other female also reaches middle stature, being expected to have average height of 163.96 cm after Trotter-Glaeser's formula and slightly below middle stature with 157.53 after Pearson-Lee's formula for stature reconstruction. From traits, which form the anthropological type complex only on the cranial fragments from Grave N 5 is determined the form of lower margin of piriform aperture, shaped as *anthropina*.

Data for health condition of the individuals are poor. Some remains from dentitions are available in four individuals – from both inhumations and from cremations N 1 and 2 (**Fig. 1**). Only the one from grave N 5 presents full dentition (only lower left central incisor lost post-mortem). The material from grave N 3 (the other inhumation) presents a complete dentition of the lower jaw. Both individuals show relatively good dental health for determined age. In one of them there are two molars lost before death – both first molars. The other studied dentition showed no pathological changes in connection to the dental caries. Both dentitions showed periodontal changes of the alveolar processes. Both complexes with cremated bones N 1 and 2 confirm the results for good dental health of the population – the one from grave N 1 presented a fragment of mandible, on which the teeth had been present before death – these are both medial premolars, both canines and all incisors. Numerous teeth found in the material from grave N 2 point to their presence before death, too.

A specific trait, recognized on teeth – the linear enamel hypoplasia is ascertained on the dentition of individual from grave N 5. The lines correspond to 2 ½ and 3 years of age. These changes should be connected with periods, characterized by a developmental stress. They could have been caused either by a malnutrition and dietary deficiency,

or by periods of chronic, long-lasting disease during childhood. Such are not a rare finding in past populations, as childhood appeared as one of the most hazardous periods in human development in the preindustrial societies. The studied material doesn't confirm high incidence of this trait in the studied population – as the dentition from grave N 3 lacks such defects. The singular teeth from the incineration N 2 also can be assessed as unaffected of enamel hypoplasia with some degree of uncertainty. Specific changes, observed on the fragment from the frontal bone of the individual from grave N 1 point also to possibility of dietary insufficiency. Here the cortical bone from the *glabella* region and over superciliary arches shows porous structure (**Fig. 1**).

In the only fragment from a thoracic vertebra found in the remains from grave N 3 is ascertained bone reaction on the articulation surface with the rib (**Fig. 2**). Other preserved long bones of limbs show destructed places, on which the degenerative joint disease can't be observed, but lack of osteochondrotic defects point to lack or low de-



**Fig. 2.** Grave N 3. **2.1-2.** Right and left tibia. Lateral squatting facet, arrow. **2.3-4.** Right and left femur. Overdeveloped muscle relief. **2.5.** Fragment of the mandible, dentition. **2.6.** Thoracic vertebra. Bone reaction on the articulation surface with left rib. **2.7.** Fragment of right pelvic bone, form of *incisura ischiadica majo*

velopment of this pathology. The other skeleton from inhumations, the one from grave N 5, isn't affected from such changes.

Remains from two of the individuals show traces of tendon and muscle disorders. These are a fragment from the right humerus from grave N 1 with cremated bones and both femurs from grave N 3. In first case the place of the defect can be connected to the attachment site (insertion) of the latissimus dorsi muscle, where is formed a deep groove after an enthesopathic reaction (**Fig. 1**). In the other case, from grave N 3 on the dorsal side of both femurs is registered area of bone reaction and additionally grown relief (**Fig. 2**), which can be associated to adductors attachment site (insertion) possibly of adductor magnus muscle. This relief development could have been caused by overloading in habitual activity, incidental trauma, or specific health conditions. Some other clues about habitual activity are pronounced bilateral asymmetry with predominant lengths of bones of the right side of upper limbs of the only one relatively well preserved skeleton – the one from grave N 5. This points to clear right handedness. Bones of lower limbs of the other skeleton, from inhumation (grave N 3), point to reconstruction of long lasting squatting position in everyday life, pronounced in the clearly developed lateral squatting facets on both tibiae (**Fig. 2**) after methods of recognition of markers of musculo-skeletal stress [3].

## Individual Results

### **Grave N 1, cremation. Male, 35-40 to 45 years; sub-adult, 7-14 years**

Numerous fragments from cremated bones with relatively big dimensions.

*Age*: after obliteration of cranial sutures on found segments and low synostosis level of vertebrae of sacrum, which allowed their separation on pyre; *sex*: after masculineness of long bones, relief of muscle attachment sites, relief of occipital bone and reconstruction of big dimensions.

*Identifiable bones, cranial fragments*: occipital bone fragment, which shows developed relief; parietal bones fragments; frontal bone fragment from the *glabella* region, showing developed relief; segments from lambdoid and sagittal sutures, which show lack and initial obliteration, respectively; mandible fragment, from the chin area with alveoli of incisors, canines and first premolars, which had been lost after dead, possibly on pyre.

*Fragments from postcranial skeleton*: proximal and distal parts from both femurs (**Fig. 1: 5**); distal part from tibia; proximal parts from both humerals, radiuses (**Fig. 1: 3**) and left ulna, the latter shows massive structure and developed relief of muscle attachment sites; fragments from the articulation surface of both acetabula; fragments from seven thoracic, including first thoracic vertebra, all lumbar vertebrae and two proximal vertebrae from sacrum, separated in pyre; bones from this skeleton show massive structure, developed relief and fragments point to bones with relatively big dimensions (**Table 1**). In the material from this complex is found a left patella with small dimensions (**Table 1**).

*Pathology and specifics*: the fragment from frontal bone shows porous changes of the *glabella* region; the articulation surfaces of the long bones and vertebral fragments show lack of degenerative joint disease changes; a fragment from diaphysis of the right humeral bone shows deep enthesopathic lesion on the place of attachment of *latissimus dorsi* muscle (**Fig. 1: 4**).

*Individual fragment from different individual*: after dimensions of the found patella (**Fig. 1: 2**) it is associated to individual of sub-adult age, approximately *Infans II*, or 7-14 years at time of dead; there are no other identifiable bone fragment to be connected to this individual.

### Grave N 2, cremation. Male, 30-40 years.

Numerous fragments from cremated bones with relatively big dimensions.

*Age:* after obliteration of cranial sutures on found segments; *sex:* after massiveness of long bones, relief of muscle attachment sites, relief of occipital bone and reconstruction of big dimensions.

*Identifiable bones, cranial fragments:* occipital bone fragment, which shows developed relief and segment of lambdoid suture with initial obliteration; fragment from left temporal bone with mastoid process with developed relief; fragments of teeth, from which are distinguished three canines, incisor, two premolars and roots and fragments from four molars, all teeth show finished root development and small dimensions (**Fig. 1:6**).

*Fragments from postcranial skeleton:* proximal parts from both femurs, proximal fragment from diaphysis of left tibia; distal part from both humerals; proximal parts of radius and left ulna; fragments from both taluses, which show bones with big dimensions; fragment from the first cervical (articulation surface of contact with the *dens axis*, fragment from another, unidentifiable cervical and two thoracic vertebrae.

### Grave N 3, inhumation. Female, (35) 40-50 years.

Incomplete cranial and postcranial skeleton, many bones are not presented.

*Age:* after the relief of auricular surface of iliac bones; *sex:* after the form of greater sciatic notch.

*Cranial skeleton:* missing, except a big portion from mandible with preserved teeth; two separated from alveoli upper canine and molar (**Fig. 2:5**); the teeth show small dimensions; the mandible shows pronounced mental tubers, developed relief.

*Dentition:*

8	7	X	5	4	3	2	1		1	2	3	4	5	6	X	7	8
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*Postcranial skeleton:* complete and fragmented long bones of limbs; fragment from thoracic vertebra, fragments of both pelvic bones with pronounced groove under auricular surfaces, which show degenerative relief.

*Pathology and specifics:* developed periodontal changes of the alveolar process of the mandible (**Fig. 2:5**); on dorsal side of both femurs overgrowth of muscle attachment site, associated with adductor muscles (**Fig. 2:3-4**); bone reaction on the place, more pronounced on the left bone.

### Grave N 4, cremation. Male, 50-60 years.

Relatively numerous, but smaller number in relation to the material from graves N 1 and 2 fragments from cremated bones. *Age:* after obliteration of cranial sutures on found segments; *sex:* after the relief of occipital bone and form of upper margin of orbit.

*Possible additional fragment:* it appears possible that the described fragment from left parietal originates from another individual at lower age.

*Identifiable bones, cranial fragments:* occipital bone fragment, which shows developed relief and segment of lambdoid suture with advanced obliteration, fragments from parietals; fragment from left parietal between sagittal and coronal suture, both showing no obliteration; fragment from upper margin of orbit with oval shape (**Fig. 1:1**).

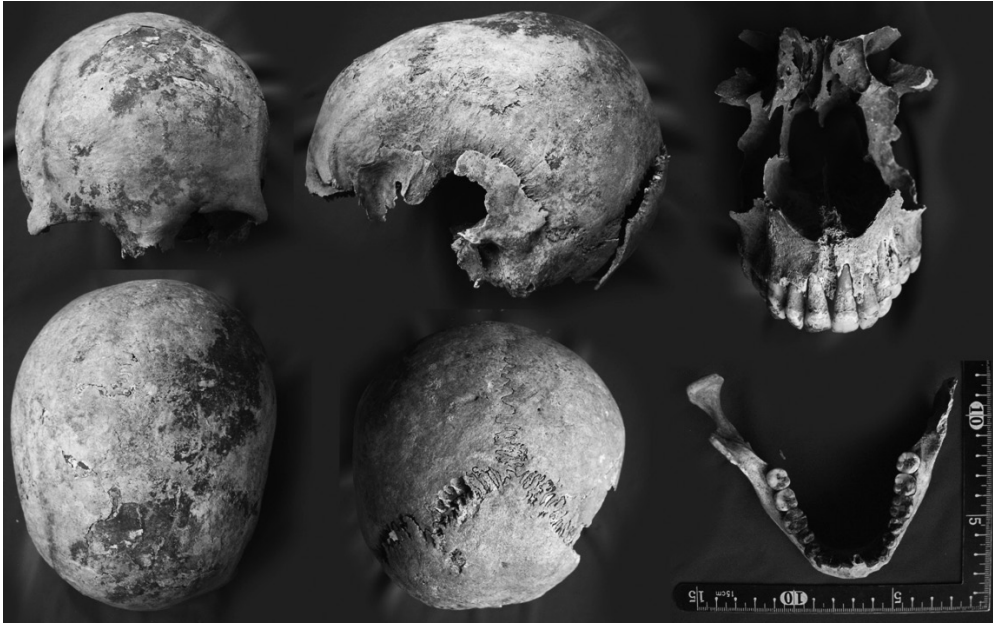
*Fragments from postcranial skeleton:* fragments from diaphyses of limbs; proximal fragment from left ulna; fragments from three lumbar vertebrae.

**Grave N 5, inhumation. Female, 40-50 years.**

Relatively completely presented skeleton.

*Age:* after obliteration of cranial sutures; *sex:* after the form of greater sciatic notch and cranial features.

*Cranial skeleton:* incomplete *calva* (**Fig. 3**), missing fragment from left parietal; mandible and maxilla, with preserved dentition; sharp edge of upper orbital margins, no relief on *glabella* region, low relief of superciliary arches, advanced obliteration



**Fig. 3.** Grave N 5. Skull vault, frontal, left lateral, vertical and occipital views. Fragments from maxilla and fragment from sphenoid and mandible

of cranial sutures; mandible with developed mental tubers, high angle, low relief; low abrasion of teeth; lower edge of piriform aperture is formed as *anthropina*.

*Dentition:*

8	7	6	5	4	3	2	1		1	2	3	4	5	6	6	7	8
8	7	6	5	4	3	2	1		-	2	3	4	5	6	6	7	8

*Postcranial skeleton:* complete and fragmented bones of limbs; five cervical, including second cervical vertebrae, and all of thoracic and lumbar vertebrae, complete preserved and fragmented ribs; fragments from both pelvic bones, showing broad form of greater sciatic notch.

*Pathology and specifics:* developed periodontal changes of the alveolar processes; linear enamel hypoplasia, with lines corresponding to 2 ½ and 3 years of age; mild traces from recombined *cribra orbitalia*.



## Conclusions

The investigated material is still of small number, but it makes possible to obtain data for age and sex of the buried in the section of the necropolis and the results of this investigation point to relatively favorable conditions of survivorship for the studied period. Data about health condition of the buried are also poor, but again, results, mostly derived from presented dentitions, testify for a good health state of individuals during life.

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