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POPULATION OF ANCIENT SIRMIUM

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ABSTRACT

This paper presents the paleodemographic structure of people in the 1st–5th century AD in Sirmium, their economic and social status, level of sanitary conditions, nutrition and health care, diseases which directly left traces on osteological material, and diseases that left no visible marks on bones, and may indeed have been the direct cause of death of people in ancient Sirmium. Based on our research, we can conclude, although the sample is not particularly large, that the quality of life in Sirmium in the 1st–5th century AD, especially at the transition from the 3rd to the 4th century, was at an enviable level.

Key words: Roman necropoles, 1st–4th century AD, 4th and 5th century AD, children, juveniles, adults, health status

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In the last fifteen years, more than 1,200 people who inhabited the area of Sirmium/Sremska Mitrovica and its vicinity in the period from the 1st to the 16th century have been anthropologically investigated in Sremska Mitrovica (Fig. 1).[1] The investigated remains comprise human osteological material that was found in 70 locations.[2] The results of anthropometry showed that the population was heterogeneous in all periods (1st–16th century),[3] which concurs with historical data and the fact that Sirmium/Sremska Mitrovica was always described in historical sources as a city with a "multinational population." The smallest heterogeneity is observed in the Germanic population, which is quite understandable, while a pronounced heterogeneity is observed among the populations living in the area of Sirmium/Sremska Mitrovica during the period of 10th–12th and 13th–16th century.[4]

When it comes to ancient Sirmium, 334 individuals (77 children (23.0%), 34 juveniles (10.2%) and 223 adults (66.8%)), from the periods of the 1st–4th century and from the 4th–5th century, were anthropologically analysed (Tables 1 and 2).[5] It is important to note that during the period of 1st–4th centuries these people were buried outside the city walls, i.e. *extra muros*; that in the 4th century they were buried in particular around the martyrs of St. Irenaeus and St. Sinerotes, also *extra muros*, and later, during the 4th and 5th centuries, when the Huns' invasion took over and when the population was threatened with real danger, inside the city walls – *intra muros* (Fig. 1).

During the investigation of the skeletal remains from the 5th century (the time of the Huns' invasion), we even encountered situations where the skeletons of children, juveniles and adults were dug out of the primary graves by their loved ones, which were probably *extra muros*, and transferred *intra muros*, as secondary burials, in less sarcophagi or masonry tombs. Also, depending on the material possibilities, the population was buried in: sarcophagi, masonry tombs, graves with different shapes of construction or in ordinary grave pits (Fig. 1; Pl. I and II).

1 I would like to express my gratitude to Mr M. Radmilović for the map of the site (Fig. 1.) and for post-production of all illustrations (Fig. 1; Plates I–VI).

2 Miladinović-Radmilović 2011.

3 Miladinović-Radmilović 2011, 575.

4 Miladinović-Radmilović 2011, 560.

5 Miladinović-Radmilović 2011, 224, Table 82; 379, Table 148.

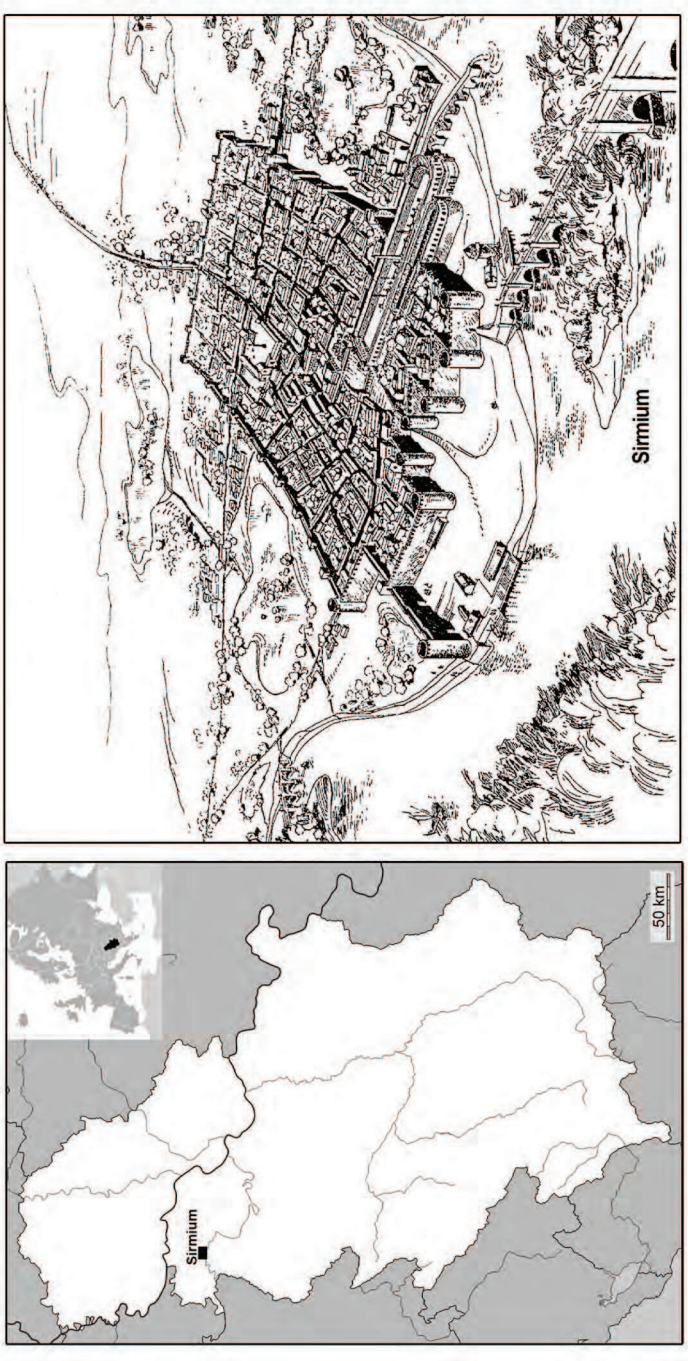

Fig. 1. Location of Sirmium on the map, with the position of the Republic of Serbia in Europe; Sirmium during the 4th century, ideal reconstruction of (Jeremić, 2004: 11, fig. 12)

The city population was found at most sites during the period 1st–5th century. One of the locations where this was not the case is certainly site No. 80. During an archaeological excavation on site No. 80 in 1996, 37 individuals from the ancient period, dating to 2nd–3rd century were excavated. Considering all existing conditions, such as the location of their burial (next to the marsh (Majurska bara) and city dump (many bones had traces of cut-marks); the way they were buried (some were just "thrown away"), the paleodemographic situation (23 males, age between 25 and 50 years old), the presence of bone injuries (two of them were fatal), all kinds of fractures and bone splits, subperiostal and superiostal hematomas, unsuccessful attempts of manual strangulation, joint diseases (osteoarthritis), circulatory disorders, tumors, osteomyelitis, *sinusitis*, dental diseases and considerable traces of skeletal markers of occupational stress, one can conclude that people buried here didn't lead a wealthy life.[6] They were probably part of the urban poor, slaves or freedmen manual labourers, but most likely they were disobedient soldiers. The results of the anthropological investigation shown a high frequency of auditory exostoses in the male sample (30%) (Pl. III,1). Auditory exostoses are commonly recognised as localised hyperplastic growths of a predominantly acquired origin. Several clinical and anthropological studies have pointed out close links between the occurrence of auditory exostoses and prolonged cold water exposure, generally due to the practice of aquatic sports, or to working activities involving water contact or diving.[7] In the 2nd century, Sirmium was the seat of the river fleet command (*Classis prima Flavia Augusta*).[8] As an important communicative centre, Sirmium had a port and bridges. These people could have worked in the port (or built bridges?), made breakwaters or joined ships, and could have been in direct contact with water. It is more likely that they were involved in the process of making canals and draining marshes that Probus organised in this area in the 3rd century.[9]

6 Miladinović-Radmilović 2010, 142.

7 Miladinović-Radmilović 2010.

8 Вулић 1929, 154.

9 Mirković 1971, 35.

METHODOLOGICAL FRAMEWORK

As we have already mentioned, 334 individuals from ancient Sirmium (period 1st–5th century) were anthropologically analysed (Tables 1 and 2).

In determining sex in children and juvenile (*Juvenilis* I) individuals, we put emphasis on the study of morphological elements of the mandible (protrusion of *protuberantia mentalis*, the shape of the alveolar arch, protuberance in the *gonion* area) and the pelvis (the angle of the greater sciatic notch, the position of the pelvic arch, the curvature of crista iliaca). The methodology was based on data obtained by Schutkowski during his extensive research.[10]

For sex determination on skeletal materials of juvenile (*Juvenilis* II) and adult individuals we adopted a combination of morphological and metrical methods. Specific attention was paid to morphological elements of the skull (*glabella, planum nuchale, processus mastoideus, processus zygomaticus, arcus supercilialis, protuberantia occipitalis externa, os zygomaticum, tubera frontale et parietale,* inclination of *os frontale, margo supraorbitalis and* shape of *orbitae*) and the pelvis (*sulcus praearicularis, incisura ischiadica s. ischialis major, arcus pubis s. pubicus et angulus subpubicus, arc compose,* the appearance of *os coxae, corpus ossis ischii, foramen obturatum, crista iliaca, fossa iliaca, pelvis major, pelvis minor;* subpubic region: ventral arc, subpubic concavity and medial appearance of the ischio-pubic branch), whereas the method of operation was adopted from a group of European anthropologists,[11] Buikstra and Ubelaker.[12] Morphological elements were also analysed on the mandible (the overall appearance of mandible (*corpus mandibulae, ramus mandibulae* and *angulus mandibulae), mentum, angulus mandibule* and *margo inferior*), based on criteria defined by Ferembach and his associates,[13] and metric elements relevant for sex determination in skeletons.[14] Teeth were measured for mesio-distal and vestibulo-lingual diameters using a method approved by Hillson.[15] According to these diameters, the difference in tooth size was monitored mostly on canines; should

10 Schutkowski 1993.

11 Ferembach, Schwidetzky and Stloukal 1980, 519–527.

12 Buikstra and Ubelaker 1994, 15–21.

13 Ferembach, Schwidetsky and Stloukal 1980, 523–525.

14 Ferembach, Schwidetsky and Stloukal 1980, 523–525; Bass 1995, 84, 85.

15 Hillson 1990, 240–242; idem. 1996, 80–82.

they be missing from osteological material, other teeth would suffice (molars, premolars and incisors).[16] Morphological and metric elements were observed during the analysis of other postcranial bones as well. Morphological elements that caught our attention the most were the degrees of development of: *tuberositas deltoideae, tuberositas radii* and *margo interosseus* (of the radius), *tuberositas ulnae* and *margo interosseus* (of the ulna), *linea aspera* and *tuberositas tibiae.* Bone appearance, body curvature and *facies auricularis* were morphological elements observed in the sacrum.[17] Metric elements played a more significant role in sex determination based on the postcranial skeleton, and were given additional attention.

Individual age estimation in children and juvenile (*Juvenilis* I and II) individuals was based on degree of formation and teeth eruption (Ubelaker's scheme);[18] degree of ossification of the epiphysis-diaphysis connections (table with time scales (in years) during which epiphysis-diaphysis connections ossificate);[19] length of long bones (tables (with time scales shown in years and months) defined by Bass[20] and Ferembach with associates).[21]

Individual age in juveniles (*Juvenilis* II) and adults was established upon: degree of obliteration of local skull sutures (Vallois' scheme);[22] changes in maxillary and mandibular teeth (changes in occlusal surface on the dental material was compared with the numerical classification of attrition of the upper (occlusal) surface of molars in relation to age, which was defined by Brothwell,[23] and changes on occlusal surface of all teeth in relation to age, defined by Lovejoy;[24] morphological changes in sternal ends of ribs (metamorphoses of depth, joint cavities, shape, edges and ridge configuration were examined, together with overall state of bone, based on ten (0–8) phases of progression covering the period from 18 to over 70 years);[25] morphological

16 Garn, Lewis and Kerewsky 1965.

17 Mikić 1978, 18, 19; Bass 1995, 114.

18 Ferembach, Schwidetzky and Stloukal 1980, 528, 529.

19 Ferembach, Schwidetzky and Stloukal 1980, 531.

20 Bass 1995, 155, 168, 176, 228, 247, 257.

21 Ferembach, Schwidetzky and Stloukal 1980, 532.

22 Vallois 1937.

23 Brothwell 1981, 72.

24 Lovejoy 1985.

25 Işcan, Loth and Wright 1984a; idem. 1984b; idem. 1985.

changes on the medial end of the clavicle (morphological changes of the clavicle documented by Scheuer and Black were observed;[26] they established five (1–5) phases of progression covering periods lasting from 14 to 29 years); morphological changes in pubic symphysis joint surface (Todd's method was used in which the metamorphosis of the pubic symphysis surface is divided in ten chronological phases during aging, starting with age 18 and leading up to the age of 50 and over);[27] sacroiliac region (individual age of adult individuals was determined using models defined by Lovejoy and his associates.[28] They classified the changes in this region in eight stages, from late adolescence to old age phase, with most attention directed to observation of position, edge *lipping* and porosity of the bone in this region).

Twenty-six epigenetic variations on the cranium and eleven on the postcranial skeleton were observed.[29]

Stature in children and juvenile (*juvenilis I*) individuals was calculated using a formula defined by Maresh,[30] whereas for juvenile (*juvenilis II*) and adult individuals Trotter and Gleser's formulas were used.[31]

POPULATION FROM ANCIENT SIRMIUM IN 1ST –4TH CENTURY AD

Osteological material of human origin was found at 28 sites. The material was not available for anthropological analysis from 14 sites.[32] Anthropological analysis revealed that skeletal remains of 188 individuals were discovered at the sites from the 1st–4th century AD, in Sremska Mitrovica and in the vicinity: 44 children (23.4%), 22 juvenile (11.7%) and 122 adult (64.9%) individuals (Fig. 1; Table 1; Plate

26 Scheuer and Black, 2000.

27 Todd 1920, 285–334; idem. 1921a; idem. 1921b.

28 Lovejoy et al. 1985.

29 Hauser and De Stefano 1989; Ђурић-Срејић 1995, 238–260.

30 Walker and Pérez-Pérez, 18.

31 Trotter and Gleser 1952.

32 There are a number of reasons for that, starting with the fact that the material from several sites was sent to the USA for anthropological analysis during the 1970s, up to the fact that part of the material was buried in 1985 in Palanka Street (Sremska Mitrovica) so as to free space in the museum depot for other artefacts, without any analysis having been performed (Miladinović-Radmilović 2013).

I, 1–3; Plates III and IV). The average lifespan of the individuals was 25.14 years, and if only adult individuals are observed, it was 28.61 years. The average life expectancy of adult male individuals was 36.3 years, and women 28.37 years. The average body height of adult female individuals was 159 ± 4 cm, and male 175 ± 5 cm.[33]

DISEASES AFFECTING CHILDREN

Dental analysis showed the presence of enamel hypoplasia and caries (Table 3).[34] Paleopathological analyses revealed several diseases affecting children skeletons: bone injuries, changes in bones caused by blood disorders (*cribra orbitalia, cribra palatina*, *cribra humera, cribra femora et tibia* and deep lesions at the ends of postcranial long bones), joint diseases (osteoarthritis), metabolic bone diseases (scurvy and rickets) and middle ear inflammation (Table 3; Plate III).[35]

*

Markers of occupational stress left traces on the postcranial skeleton of an individual aged 14, from site No. 80 (Table 4).

DISEASES AFFECTING JUVENILES AND ADULTS

Dental analysis showed the presence of abrasion, enamel hypoplasia, periodontal disease, calculus, anomalies of the jaw and dental arch, the significant presence of caries on teeth of these individuals (caries ranged from caries stains, dot-shaped caries, developed caries, so-called "gross-gross" caries, to caries that resulted in teeth loss), cysts and periapical cystic cavities.[36]

When it comes to juveniles and adults, the paleopathological situation is somewhat different. Osteological materials exhibit a larger number of diseases (Table 6; Plates III and IV): *bone fractures, injuries and fissures* (common injuries caused by

33 Miladinović-Radmilović 2011, 224, 233.

34 Miladinović-Radmilović, Vulović and Đukić 2016, 67, Tables 3 and 5.

35 Miladinović-Radmilović, Vulović and Đukić 2016, 67, Tables 3 and 5.

36 Miladinović-Radmilović 2011, 45–235.

accidents, blunt objects, stab wounds and slashes inflicted by a knife,[37] sword or dagger;[38] fissures of ribs, vertebrae, upper and lower limbs, and fractures of hyoid bone, ribs, clavicles, metacarpal bones and upper and lower limbs);[39]*developmental skeletal anomalies* (*spina bifida, foramen sternale*, sacralization of L5, coccyx sacralization, developmental anomaly of the sternum, patellae, atlas and scapulae, as well as bone fusion (ribs and manubrium, innominate bone and sacrum, tibia and fibula)); *joint diseases* (osteoarthritis, spondylosis and spondylarthrosis**,** eburnation of joint surface and Schmorl's nodes); *metabolic bone diseases* (osteoporosis, scurvy and rickets); *changes in bones caused by blood disorders* (*cribra orbitalia* and *cribra femora*); *changes in bones caused by blood circulation disorders* (*osteochondritis dissecans* and tissue necrosis); *bone tumors*; *infectious bone inflammation* (tuberculous osteomyelitis); *periostitis* (superiosteal hematoma which were not caused by trauma or osteomyelitis)*; sinusitis and torus auditivus.*

*

Markers of occupational stress left traces on the postcranial skeleton of 60 individuals (Table 5).

POPULATION FROM ANCIENT SIRMIUM IN 4TH AND 5TH CENTURY AD

Osteological material of human origin was found at 32 sites. The material was not available for anthropological analysis from 16 sites. Anthropological analysis revealed that skeletal remains of 146 individuals were discovered at the sites from the 4th and 5th century AD, in Sremska Mitrovica and in the vicinity: 33 children (22.6%), 12 juvenile (8.2%) and 101 adult (69.2%) individuals (Fig. 1; Table 2; Plate I, 4–6; Plates II, V and VI). The average lifespan of the individuals was 26.3 years, and if only adult individuals are observed, it was 35.2 years. The average life expectancy of adult male individuals was 40.5 years, and women 31.9 years. The average

37 Stab wounds were the direct cause of death in two males from site No. 80 (stab wounds were discovered on the occipital bone and between the third and the fourth cervical vertebra).

38 Миладиновић-Радмиловић, Ђукић и Вуловић 2016.

39 Injuries, fractures and fissures were usually followed by infections and subperiostal and superiostal hematomas.

body height of adult female individuals was 160 ± 4 cm, and male 174 ± 4 cm.[40]

DISEASES AFFECTING CHILDREN

Dental analysis showed the presence of caries in only one male child.[41] Paleopathological analyses revealed several diseases affecting children skeletons: changes in bones caused by blood disorders (*cribra orbitalia*, *cribra femora*, porotic hyperostosis and deep lesions at the ends of postcranial long bones) and metabolic bone diseases (active periostitis (scurvy?)).[42]

*

Markers of occupational stress were not found on children postcranial skeletons (Table 4).

DISEASES AFFECTING JUVENILES AND ADULTS

Dental analysis showed the presence of abrasion, enamel hypoplasia, periodontal disease, calculus, anomalies of the jaw and dental arch, the significant presence of caries on the teeth of these individuals (caries ranged from caries stains, dot-shaped caries, developed caries, so-called "gross-gross" caries, to caries that resulted in teeth loss), cysts and periapical cystic cavities.[43]

When it comes to juveniles and adults, the paleopathological situation is also different in the period from the 1st–4th century AD. Osteological materials exhibit a larger number of diseases (Table 6; Plates V and VI): *bone fractures, injuries and fissures* (injuries of upper and lower limbs, lower limb fissures, and upper and lower limb fractures); *developmental skeletal anomalies* (*foramen sternale,* developmental anomalies of hyoid bone and sternum and fusion of tibia and fibula); *joint diseases* (osteoarthritis, spondylosis and spondylarthrosis, eburnation of joint surface and Schmorl's nodes); *metabolic bone diseases* (osteoporosis and scurvy); *changes in bones caused by blood disorders* (*cribra orbitalia*); *changes in*

40 Miladinović-Radmilović 2011, 379, 387.

41 Miladinović-Radmilović, Vulović and Đukić 2016, 67, Tables 4 and 5.

42 Miladinović-Radmilović, Vulović and Đukić 2016, 67, Tables 4 and 5.

43 Miladinović-Radmilović 2011, 239–388.

bones caused by blood circulation disorders (*osteochondritis dissecans* and embolism *a. subclaviae*); *bone tumors; infectious bone inflammation* (infectious osteomyelitis); *periostitis* (superiosteal hematoma which were not caused by trauma or osteomyelitis) and *Stafne's Defect*.[44]

*

Markers of occupational stress left traces on the postcranial skeleton of 43 individuals (Table 5).

DISCUSSION AND CONCLUSION

Looking at Tables 3 and 6, one can notice that there is a dramatic reduction of the diseases in the 4th and 5th centuries, as well as the fact that the most of these diseases could not have been the direct cause of the death of the population in the ancient Sirmium. Most diseases and causes of death remain undetermined, as they do not leave marks on bones and partly because of the usually poor preservation of osteological materials from archaeological sites.[45] However, even if pathological changes are visible on skeletal material, in some cases it is impossible to establish a differential diagnosis. The reason for this is that it is impossible to track stages of disease development, because different diseases have the same effect on bone tissue as a final outcome (such as tissue production or destruction) and because it is impossible to establish pathognomonic changes that are not related to bone tissue.[46]

Mortality during the 1st–4th century could have been caused by a number of diseases. Alongside the described stab wounds to the cranial bones and vertebrae, the direct cause of death could have also been tuberculous osteomyelitis. There are many diseases that leave no visible marks on bones, and may indeed be the direct cause of death. By all accounts, swamps were a constant source of epidemics (e.g. malaria). Food[47] and lead poisoning[48] was also frequent during the Roman period.

44 Миладиновић-Радмиловић и Димовски 2012.

45 Ђурић-Срејић 1995, 310.

46 Ђурић-Срејић 1995, 310.

47 Brothwell and Brothwell 1998, 189–192.

48 Waldron 1973.

Historical records contain fragmentary data of a "catastrophic plague" that afflicted Sirmium in the spring of 270 AD. This was when Claudius marched into the city, after spectacularly defeating the Goths at Naissus, earning himself the nickname "Goth." Hordes of German prisoners were brought along with him, some of whom were probably carriers of "plague germs." The military triumph quickly turned into a disaster. It is unclear how many inhabitants of Sirmium succumbed to the disease, but the number must have been huge. The scale of the disaster is best illustrated by the fact that Claudius himself died in the city as a result of the plague. The news echoed around the empire, and became the first piece of evidence of plague in this area.[49]

Although the situation was much better during the 4th and 5th century,[50] mortality could also have been the consequence of numerous diseases. A well-planned utility system, the use of clear drinking water from the wells of Fruska gora and other benefits like public baths and local thermal wells created hygienically favourable living conditions for the settlers. However, it is evident that the use of thermal wells did not reduce osteoarthritis and other joint diseases. Likewise, it should be added that respiratory and gastrointestinal infections, poisonings, as well as malaria could have been the main causes of death for the settlers.

*

Study of children's skeletal remains in necropoles are of particularly importance because the data related with children's health influences the overall health status of the whole investigated population. Child mortality is considered an adequate criterion for the social and sanitation conditions of a community and a sensitive indicator of inadequate nutrition. The highest mortality rate in children in ancient Sirmium was during the interval NB–7 years of age (*Infans* I), namely: 1st–4th century 43.2%, and 4th and 5th century 48.5% (Tables 1 and 2). Mortality rate in adult females was the highest in the age range 23–40 (*Adultus* I i II), namely: 1st–4th century 24.4% (age 23–30, *Adultus* I), or 42.2% (age 23–40, *Adultus* I and II), and 4th and 5th century 18.9% (age 23–30, *Adultus* I), or 32.4% (age 23–40, *Adultus* I and II). It is interesting to note that mortality in children was lower

49 Mirković 1971, 35

50 It is interesting to note that during 4th and 5th centuries in Sirmium/Sremska Mitrovica the percentage of individuals with markers of occupational stress is significantly lower than in period 1st–4th century (Tables 4 and 5).

during periods when females lived longer, and vice versa, mortality in children was higher during periods when females lived shorter.[51]

Neonatal mortality (the first four weeks after birth) is most often caused by an infant's physiological and organic weaknesses,[52] genetic and other developmental anomalies. On the other hand, postneonatal mortality (aged one month to one year) almost entirely depends on exogenic conditions. High postneonatal mortality indicates poor sanitary conditions, malnutrition and increased exposure to infections, especially gastrointestinal and respiratory.[53] Infant nutrition is particularly important. Breastfeeding, i.e. mother's milk, satisfies nutritious requirements, enables proper growth and development, maintains immune protection and stops exposure to bad sanitary conditions associated with artificial feeding, reducing instances of diarrhea, acute urinary and respiratory infections, parasitosis, nutrition disorders, anemia and many other diseases, thus lowering mortality.[54] The number of mortalities in children less than one year old at sites in ancient Sirmium and the surrounding area were as follows: 1st–4th century – 6 (13.6%), and 4th and 5th century – 9 (27.3%).[55]

Unquestionably, there are other significant causes of death. Some of them are: sudden infant death syndrome (usually occurs before the fourth month), infanticide, miscarriage, etc.

When mortality of children older than one year is concerned, it can be concluded that although the nutritional needs of children decreased, especially after the age of three, diet still played an important role. Likewise, diarrhea, respiratory and gastrointestinal infections were the leading causes of death, together with accidents.[56]Mortality rates of children over one year old, at sites in ancient Sirmium and the surrounding area, were as follows: 1st–4th century – 38 (86.4%), and 4th and 5th century – 24 (72.7%).[57]

51 Miladinović-Radmilović 2011, 559, 574.

52 Saunders and Katzenberg 1992.

53 Gastrointestinal infections are more frequent during summer, and respiratory during winter months (Миладиновић-Радмиловић, 2008).

54 Katzenberg, Herring and Saunders 1996; Herring, Saunders and Katzenberg 1998.

55 Miladinović-Radmilović 2011, 566, 576.

56 Миладиновић-Радмиловић, 2008.

57 Miladinović-Radmilović 2011, 566, 576.

*

Cribra orbitalia is a pathological condition and an indicator of subadult stress, but also a successful method for determining the living conditions of archaeological populations. It often occurs on skeletal remains in our country. Morphological osteological changes characterised by *cribra orbitalia* are perceived in superior orbital walls in the form of small hollow lesions.

Since the 1950s, most authors have considered that the occurrence of *cribra orbitalia* is associated with an iron deficiency anemia. Factors that affect this type of anemia include: poor and inadequate diet, unhygienic conditions of life, chronic gastro-intestinal disease, gastrointestinal and parasitic infections, lead poisoning, changes in nutritional habits, and nutrition rich in phytate that prevents iron absorption. However, recent hematological research by Walker and his associates, shows that iron-deficiency anemia does not provide a reasonable physiological explanation for the marrow hypertrophy that produces the pathological lesions paleopathologists refer to cribra orbitalia.[58] In their opinion, many cribra orbitalia lesions are a result of the megaloblastic anemia acquired by nursing infants through the synergistic effects of depleted maternal vitamin B_{12} reserves and unsanitary living conditions that are conducive to additional nutrient losses from gastrointestinal infections around the time of weaning.

For that purpose, we examined the frequency and distribution of *cribra orbitalia* in 334 individuals (223 adults – 66.8%, 34 juveniles – 10.2% and 77 children – 23.0%) with 29 sites from the 1st to the 5th century.[59]

The total frequency of *cribra orbitalia* in Sirmium in the 1st–5th century was 14.3%. It is estimated that *cribra orbitalia* occurs in 10% of the population in developed countries and in 25–50% of the population in developing countries.

On the basis of this we can conclude, although the sample is not particularly large, that the quality of life in Sirmium in the 1st–5th AD, especially at the transition from the 3rd to the 4th century, was at an enviable level, that the *cribra orbitalia* was most likely the result of changes in the nutritional habits of the children, the physiology of juvenile and adult female individuals, chronic gastro-intestinal diseases and, to a lesser extent, in the poorer part of the population, unhygienic conditions of life, infectious diseases, parasitic infections and poor nutrition.

58 Walker et al. 2009.

59 Миладиновић-Радмиловић 2012.

This situation can be assumed since we know from historical data that by introducing the Tetrarchy system of rule in the Empire, Sirmium became the capital of one of four parts of the state, along with Mediolanum (Milan) in Italy, Trier in Gaul and Nicomedia in Asia Minor. At the transition from the 3rd to the 4th century, Sirmium was a developed city with a forum, temples, administrative buildings, granaries, baths, a theatre or amphitheatre, a water supply, sewage, and many private buildings. The representative part of the city included a fringe belt from the old forum to The Sava. There were public buildings and palaces of the most prominent representatives of the upper classes; palace with mosaics and small thermal spas in the yard. In that area there was a market and the craft-trade part of Sirmium with workshops and shops (*tabernae*). At that time, the basic components of economic power consisted of agriculture, viticulture, craft and stonemasonry workshops, an armaments factory and trade.

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BIBLIOGRAPHY

Bass 1995 – W. M. Bass, *Human Osteology, A Laboratory and Field Manual*. Columbia: Missouri Archaeological Society 1995.

Brothwell 1981 – D. R. Brothwell, *Digging up bones*. London: British Museum (Natural History) and Oxford: Oxford University Press, 1981.

Brothwell and Brothwell 1998 – D. R. Brothwell ad P. Brothwell, *Food in Antiquity – A Survey of the Diet of Early Peoples*. Expanded edition. Baltimore and London: The Johns Hopkins University Press, 1998.

Buikstra and Ubelaker 1994 – J. E., Buikstra and D. H., Ubelaker, *Standards for data collection from human skeletal remains.* Arkansas Archeological Survey Research Series, No 44. Fayettville, Arkansas: Arkansas Archeological Survey 1994.

Ђурић-Срејић 1995 – М. Ђурић-Срејић, *Увод у физичку антропологију древних популација*. Београд: Завод за уџбенике и наставна средства 1995.

Ferembach, Schwidetzky and Stloukal 1980 – D. Ferembach, I. Schwidetzky and M. Stloukal, Recommendations for age and sex diagnosis of skeletons. *Journal of Human Evolution* 7, 1995, 517–549.

Garn, Lewis and Kerewsky 1965 – S. Garn, A. Lewis and R. Kerewsky, X – linked inheritance of teeth size. *Journal of Dental Research* 44, 1965, 439–441.

Hauser and De Stefano 1989 – G. Hauser and G. F. De Stefano, *Epigenetic Variants of Human Skull*. Stittgart: E. Schweizerbart'sche Verlagsbuchhandlung 1989.

Herring, Saunders and Katzenberg 1998 – D. A. Herring, S. R. Saunders and M. A. Katzenberg, Investigation the Weaning Process in Past Populations. *American Journal of Physical Anthropology* 105, 1998, 425–439.

Hillson 1990 – S. Hillson, *Teeth*. Cambridge: Cambridge University Press 1990.

Hillson 1996 – S. Hillson, *Dental Anthropology*. Cambridge: Cambridge University Press 1996.

Işcan, Loth and Wright 1984a – M. Y. Işcan, S. R. Loth and R. K. Wright, Metamorphosis at the sternal rib end: A new method to estimate age at death in males. *American Journal of Physical Anthropology* 65, 1984, 147–156.

Işcan, Loth and Wright 1984b – M. Y. Işcan, S. R. Loth and R. K. Wright, Age estimation from the rib by phase analysis: White males. *Journal of Forensic Sciences* 29, 1984, 1094–1104.

Işcan, Loth and Wright 1985 – M. Y. Işcan, S. R. Loth and R. K. Wright, Age estimation from the rib by phase analysis: White females. *Journal of Forensic Sciences* 30, 1985, 853–863.

Jeremić 2004 – M. Jeremić, L'Hippodrome de Sirmium à la lumière de nouvelles recherches. *Mélanges d' Antiquité Tardive 5:* 1–15. Studiola in honorem Noël Duval. Collection Bibliothèque de l' Antiquité Tardive. Paris: Brepols publishers 2004.

Lovejoy 1985 – C. O. Lovejoy, Dental Wear in the Libben Population: Its Functional Patterns and Role in the Determination of Adult Skeletal Age at Death. *American Journal of Physical Anthropology* 68, 1985, 47–56.

Lovejoy et al. 1985 – C. O. Lovejoy et al., Chronological metamorphosis of the auricular surface of the ilium: A new method for the determination of skeletal age at death. *American Journal of Physical Anthropology* 68, 1985, 15–28.

Katzenberg, Herring and Saunders 1996 – M. A. Katzenberg, D. A. Herring and S. R. Saunders, Weaning and Infant Mortality: Evaluating the Skeletal Evidence. *Yearbook of Physical Anthropology* 39, 1996, 177–199.

Mikić 1978 – Ž. Mikić, O antropološkoj metodologiji terenske obrade skeletnih nalaza. *Godišnjak Centra za balkanološka ispitivanja ANUBiH* 16/14, 1978, 3–44 (201–242).

Миладиновић-Радмиловић 2008 – Н. Миладиновић-Радмиловић, Полна и старосна структура дечијих индивидуа сахрањених на средњовековној некрополи на локалитету 85 у Сремској Митровици. *ГСАД* 24, 2008, 445–456.

Miladinović-Radmilović 2010 – N. Miladinović-Radmilović, Exostoses of the External Auditory canal. *Старинар* LX/2010, 137–146.

Miladinović-Radmilović 2011 – N. Miladinović-Radmilović, *Sirmium – Necropolis*. Beograd: Arheološki institut, Sremska Mitrovica: Blago Sirmijuma 2011.

Миладиновић-Радмиловић 2012 – Н. Миладиновић-Радмиловић, Учесталост и дистрибуција *cribrae orbitaliae* у Сирмијуму. *Саопштења* XLIV, 2012, 229–236.

Miladinović-Radmilović 2013 – N. Miladinović-Radmilović, *Caring for the human skeleton remains in Sremska Mitrovica (Sirmium).* Strategie e Programmazione della Conservazione e Trasmissibilità del Patrimonio Culturale, a cura di A. Filipović, Williams Troiano. Edizioni Scientifiche Fidei Signa. Rome: Italian Heritage Awards 2013, 282–291.

Миладиновић-Радмиловић и Димовски 2012 – Н. Миладиновић-Радмиловић и Н. Димовски, Стафнеов дефект на налазима мандибула из римског периода и позног средњег века са два локалитета у Војводини. *Рад Музеја Војводине* 54, 2012, 97–103.

Миладиновић-Радмиловић, Ђукић и Вуловић 2016 – Н. Миладиновић-Радмиловић, К. Ђукић и Д. Вуловић, Трагови насилних повреда у пределу главе и врата на примеру скелетних остатака из историјских периода у Србији. *Весник – часопис за историју, музеологију и уметност* 43, 2016, 53–67.

Miladinović-Radmilović, Vulović and Đukić 2016 – N. Miladinović-Radmilović, D. Vulović and K. Đukić, Health status of children in ancient Sirmium. *Starinar* LXVI/2016, 65–80.

Mirković 1971 – M. Mirković, Sirmium – its History from the 1st Century A. D. to 582 A. D. *Sirmium* I, 1971, 5–94.

Saunders and Katzenberg 1992 – S. R. Saunders and M. A. Katzenberg, *Skeletal Biology of Past People: Research Methods.* New York: Wiley–Liss 1992.

Scheuer and Black 2000 – L. Scheuer and S. Black, *Developmental Juvenile Osteology*. London: Academic Press 2000.

Schutkowski 1993 – H. Schutkowski, Sex Determination of Infant and Juvenile Skeletons: I. Morphognostic Features. *American Journal of Physical Anthropology* 90, 1993, 199–205.

Todd 1920 – T. W. Todd, Age changes in the pubic bone: I The male white pubis. *American Journal of Physical Anthropology* 3, 1920, 285–334.

Todd 1921a – T. W. Todd, Age changes in the pubic bone: II The pubis of the male Negro–white hybrid; III The pubis of the white female; IV The pubis of the female Negro–white hybrid. *American Journal of Physical Anthropology* 4, 1921, 1–70.

Todd 1921b – T. W. Todd, Age changes in the pubic bone: VI The interpretation of variations in the symphyseal area. *American Journal of Physical Anthropology* 4, 1921, 407–424.

Trotter and Gleser 1952 – M. Trotter and G. C. Gleser, Estimation of stature from long bones of American whites and Negroes, *American Journal of Physical Anthropology* 10, 1952, 463–514.

Vallois 1937 – H. W. Vallois, La Durre de la vie chez l'Homme fossile. *L'Anthropologie* 47, 1937, 499–532.

Вулић 1929 – Н. Вулић, Sirmium данашња Сремска Митровица. *Гласник историјског друштва* у Новом Саду, Сремски Карловци, II–2, 1929, 153–164.

Waldron 1973 – H. A. Waldron Lead poisoning in the ancient world. Medical History 17, 1973, 391–399.

Walker et al. 2009 – P. L. Walker, R. R. Bathurst, R. Richman, T. Gjerdrum and V. A. Andrushko, The Causes of Porotic Hyperostosis and Cribra Orbitalia: A Reappraisal of the Iron-Deficiency-Anemia Hypothesis. *American Journal of Physical Anthropology* 139, 2009, 109–125.

Walker and Pérez-Pérez – P. L. Walker and A. Pérez-Pérez, *Age, Height and Long Bone Growth in Children*. Unpublished manuscript.

Plate I
1–3) Site No. 21, "tomb" made of brick, viewed from different angles before and after opening (1–3);
4) Site No. 26, grave;
5) Site No. 47, grave 3;
6) Site No. 67, Grave 1 in sonde 7 (photo documentation of CAID, The Museum of Srem)

Plate II
1–4) Site No. 26, graves (photo documentation from USA); 5) Painted tomb discovered in Mike Antića Street; 6) Site No 74, child's sarcophagus (lapidarium, The Museum of Srem)

1

2

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4

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6

Plate III
1) Site No. 80, Grave 1, male, 35–45 years old: torus auditivus;
2) Site No. 76, Grave 2 (I), male, 9 years old: cribra orbitalia on orbital roofs;
3) Site No. 77, Grave 1 (I), male (?), 10 years old: cribra femora;
4) Site No. 76, Grave 7, male, 18 months old: traces of scurvy on the left orbital roof;
5) Site No. 80, Grave 1, male, 35–45 years old: stab injury on the occipital bone;
6) Site No. 80, Grave 8, male, 35–40 years old: stab marks inflicted by sword or knife on cervical vertebrae

Plate IV
1) Site No. 12, grob BB (I), male, 33–42 years old: ankylosing spondylitis;
2) Site No. 12, grob BB (I), male, 33–42 years old: sacralization of L5, anterior side of the sacrum;
3) Site No. 12, grob BB (I), male, 33–42 years old: sacralization of L5, posterior side of the sacrum;
4) Site No. 77, Grave 11, male, 36 years old: spondylosis and spondylarthrosis on the cervical vertebrae and possible appearance of tuberculous osteomyelitis on vertebrae;
5) Site No. 77, Grave 2 (I), male, about 45 years old: irregularly healed fracture of the left clavicle;
6) Site Trasa kanalizacije – Arsenija Čarnojevića Street, male, 54–64 years old: traces of healed fractures on ribs

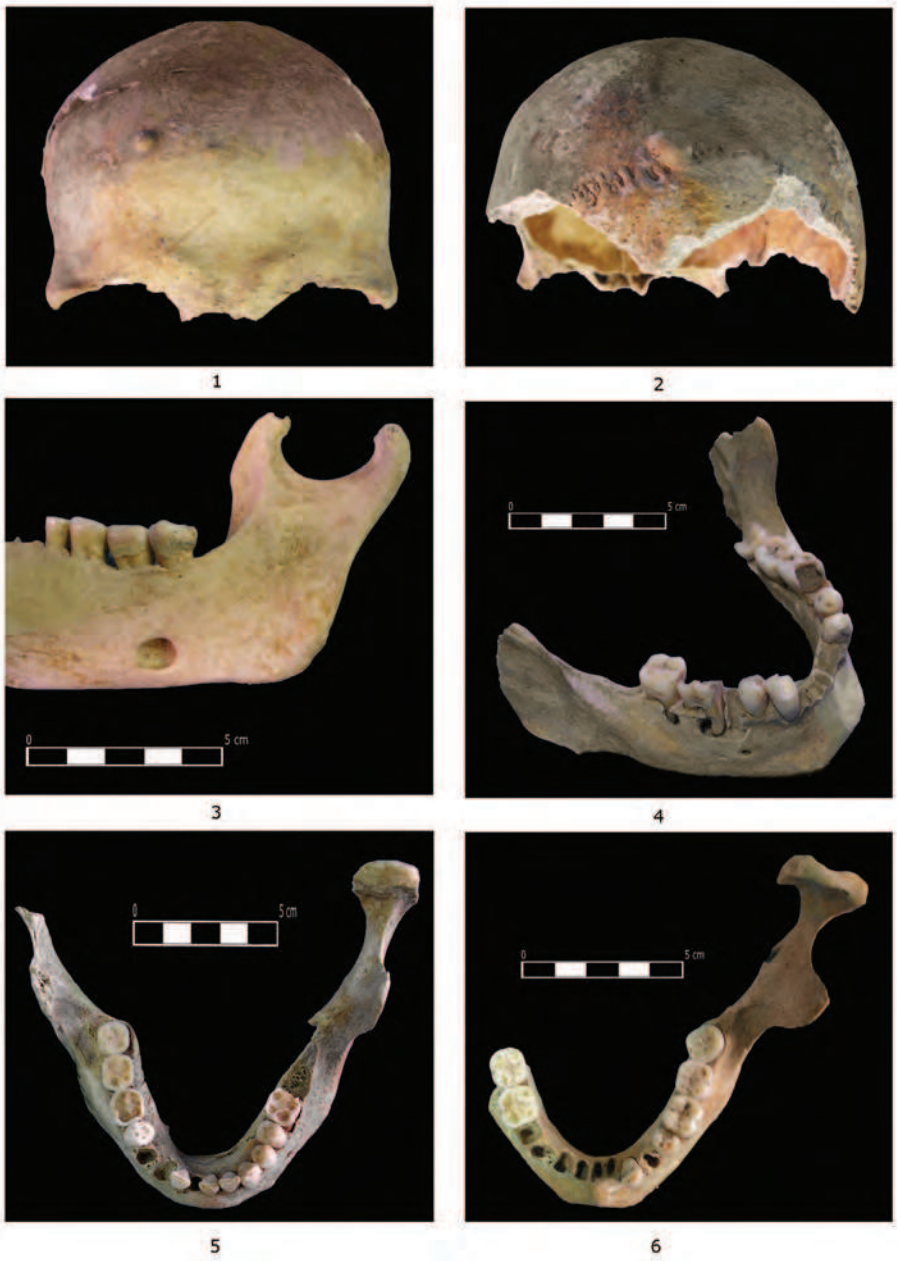

Plate V
1) Site No. 60, Grave 2 (I), male, 46 years old: osteomas on the frontal bone;
2) Site No. 60, Grave 2 (I), male, 46 years old: osteomas on the lambdoid suture;
3) Site No. 55, Grave 2, male, 35–45 years old: Stafne's Defect on the mandible;
4) Site No. 60, Grave 6, male, 35–45 years old: caries on the teeth of the mandible and periapical cystic cavity;
5) Site No. 50, Dislocated bones (I), male, 45–55 years old: teeth attrition;
6) Site No. 60, Grave 2 (I), male, 46 year olds: tumour on the mandible

Plate VI– 1–3) Site No. 55, Grave 1 (I), adult male: irregularly healed fracture of left fibula; 4) Sector I (I), male, about 35 years old: fusion of the upper ends of the left tibia and fibula; 5–6) Site No. 55, Grave 2, male, 35–45 years old: infective osteomyelitis on foot bones

Table 1. Paleodemographic structure of people in the 1st–4th century A. D. in Sirmium (Miladinović-Radmilović 2011, 224, Table 82)

AGE		MALE	FEMALE	UNDE-TER-MINED SEX	TOTAL
INFANS I	Fetus	-	-	-	-
	NB–0.5 year	-	2	1	3
	0.5–1 year	2	-	1	3
	1.5–2 years	1	-	1	2
	2.5–3 years	1	1	-	2
	3.5–4 years	1	1	-	2
	4.5–5 years	-	-	1	1
	5.5–6 years	1	2	2	5
	6.5–7 years	-	-	1	1
INFANS II	7.5–8 years	1	-	1	2
	8.5–9 years	1	-	2	3
	9.5–10 years	2	-	-	2
	10.5–11 years	1	-	2	3
	11.5–12 years	-	-	-	-
	12.5–13 years	1	1	1	3
	13.5–14.5 years	-	1	1	2
UNKNOWN AGE		1	-	9	10
TOTAL NUMBER OF CHILDREN		13	8	23	44
JUVENILIS I (15–18 years)		3	2	5	10
JUVENILIS II (19–22 years)		-	4	2	6

JUVENILIS I (15–18 years)	3	1	2	3	5	2	10	**6**
JUVENILIS II (19–22 years)	-		4		2		6	

ADULTUS I (23–30 years)	14	3	11	2	3	-	28	**5**
ADULTUS II (31–40 years)	17		6		-		23	
MATURUS I (41–50 years)	6	-	5	-	-	-	11	-
MATURUS II (51–60 years)	3		-		-		3	
SENILIS I (61–70 years)	-	-	1	-	-	-	1	-
SENILIS II (71 and more)	-		-		-		-	
UNKNOWN AGE	20		11		20		51	
TOTAL NUMBER OF JUVEN. AND ADULTS	67		45		32		144	
TOTAL NUMBER OF INDIVIDUALS	80		53		55		188	

Table 2. Paleodemographic structure of people in the 4th and 5th century A. D. in Sirmium (Miladinović-Radmilović 2011, 379, Table 148)

AGE		MALE	FEMALE	UNDETER-MINED SEX	TOTAL
INFANS I	Fetus	-	-	-	-
	NB–0.5 year	-	2	5	7
	0.5–1 year	-	-	2	2
	1.5–2 years	1	-	3	4
	2.5–3 years	1	-	3	4
	3.5–4 years	-	-	2	2
	4.5–5 years	-	-	-	-
	5.5–6 years	1	-	2	3
	6.5–7 years	-	-	2	2

INFANS II	7.5–8 years	-		-		1		1	
	8.5–9 years	-		-		-		-	
	9.5–10 years	-		-		-		-	
	10.5–11 years	-		-		-		-	
	11.5–12 years	1		-		1		2	
	12.5–13 years	1		-		-		1	
	13.5–14.5 years	-		-		1		1	
UNKNOWN AGE		1		-		3		4	
TOTAL NUMBER OF CHILDREN		6		2		25		33	
JUVENILIS I (15–18 years)		2	-	1	3	2	3	5	6
JUVENILIS II (19–22 years)		-		1		-		1	
ADULTUS I (23–30 years)		6	-	7	2	1	-	14	2
ADULTUS II (31–40 years)		12		3		-		15	
MATURUS I (41–50 years)		5	5	4	-	-	-	9	5
MATURUS II (51–60 years)		3		-		-		3	
SENILIS I (61–70 years)		2	-	1	-	-	-	3	-
SENILIS II (71 and more)		-		-		-		-	
UNKNOWN AGE		25		15		10		50	
TOTAL NUMBER OF JUVEN. AND ADULTS		60		37		16		113	
TOTAL NUMBER OF INDIVIDUALS		66		39		41		146	

Table 3. Paleopathological finds on children skeletal remains (Miladinović-Radmilović, Vulović i Đukić 2016, 72, Table 5)

CHILDREN DISEASES	**1st–4th century A. D.**	**4th and 5th century A. D.**
Enamel hypoplasia	6 (13.63%)	– –
Caries	3 (6.81%)	1 (3.03%)
Cribra orbitalia	5 (11.36%)	2 (6.06%)
Cribra femora	10 (22.72%)	3 (9.09%)
Cribra humera	6 (13.63%)	– –
Cribra fibula	1 (2.27%)	– –
Cribra palatina	1 (2.27%)	– –
Porotic hyperostosis	– –	1 (3.03%)
Scurvy	5 (11.36%)	– –
Rickets	1 (2.27%)	– –
Bone injuries	1 (2.27%)	– –
Inflammation of the middle ear	2 (4.54%)	– –
Periostitis	– –	2 (6.06%)
Deep lesions	8 (18.18%)	6 (18.18%)

Table 4. Markers of occupational stress (children)
(Miladinović-Radmilović 2011, 572, Table 222)

MARKERS OF OCCUPATIONAL STRESS	1st–4th century AD	4th and 5th century AD
Males	- -	- -
Females	- -	- -
Undeterminated sex	1 (4.3%)	- -
Total number of individuals	1 (2.3%)	- -

Table 5. Markers of occupational stress (juveniles and adults)
(Miladinović-Radmilović 2011, 572, Table 223)

MARKERS OF OCCUPATIONAL STRESS	1st–4th century AD	4th and 5th century AD
Males	42 (62.7%)	25 (41.7%)
Females	14 (31.1%)	15 (40.5%)
Undeterminated sex	4 (12.5%)	3 (18.8%)
Total number of individuals	60 (31.9%)	43 (38.0%)

Table 6. Diseases of juveniles and adults
(Miladinović-Radmilović 2011, 569, Table 220; 570, Table 221)

DISEASES OF JUVENIL. AND ADULTS	1st–4th century AD	4th and 5th century AD	DISEASES OF JUVENIL. AND ADULTS	1st–4th century AD	4th and 5th century AD
Fractures of bones, injuries and fissures	30 (16.0%)	8 (7.0%)	Changes in bone caused by circulation disorder	20 (10.6%)	4 (3.5%)
Males	22 (32.8%)	7 (11.7%)	Males	16 (23.9%)	3 (5.0%)
Females	6 (13.3%)	1 (2.7%)	Females	2 (4.4%)	1 (2.7%)
Undeterminated sex	2 (6.3%)	- -	Undeterminated sex	2 (6.3%)	- -
Congenital anomalies	20 (10.6%)	4 (3.5%)	Changes in bone due to endocrine disorders	- -	- -
Males	14 (20.9%)	2 (3.3%)	Males	- -	- -
Females	5 (11.1%)	2 (5.4%)	Females	- -	- -
Undeterminated sex	1 (3.1%)	- -	Bone tumors	10 (5.3%)	7 (6.2%)
Joint diseases	80 (42.6%)	47 (41.6%)	Males	6 (8.9%)	3 (5.0%)
Males	49 (73.1%)	32 (53.3%)	Females	4 (8.9%)	4 (10.8%)
Females	19 (42.2%)	13 (35.1%)	Infectious bone inflammation	8 (4.3%)	2 (1.8%)

Undeterminated sex	12 (37.5%)	2 (12.5%)	Males	7 (10.4%)	1 (1.7%)
Schmorl's node	18 (9.6%)	6 (5.3%)	Females	- -	1 (2.7%)
Males	9 (13.4%)	6 (10.0%)	Undeterminated sex	1 (3.1%)	- -
Females	9 (20.0%)	- -	Periostitis	10 (5.3%)	3 (2.7%)
Metabolic diseases	8 (4.3%)	3 (2.7%)	Males	8 (11.9%)	3 (5.0%)
Males	6 (8.9%)	2 (3.3%)	Females	1 (2.2%)	- -
Females	2 (4.4%)	1 (2.7%)	Undeterminated sex	1 (3.1%)	- -
Undeterminated sex	- -	- -	Sinusitis	1 (0.5%)	- -
Changes in the bones caused by blood disorders	8 (4.3%)	3 (2.7%)	Males	1 (1.5%)	- -
Males	4 (6.0%)	1 (1.7%)	Torus auditivus	3 (1.6%)	- -
Females	4 (8.9%)	2 (5.4%)	Males	3 (4.5%)	- -
Undeterminated sex	- -	- -	Stafne defect	- -	1 (0.9%)
			Males	- -	1 (1.7%)

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