OSTEOPATHIES IN A SAMPLE OF HUMAN SKULLS FROM THE MAUSOLEUM CRYPT OF THE FIRST WORLD WAR HEROES, IN IAȘI (IAŞI COUNTY, ROMANIA)

Vasilica-Monica GROZA
Romanian Academy – Iași Branch, „Olga Necrasov" Centre of Anthropological Research
E-mail: moni_ian@yahoo.com
ORCID: 0000-0003-1396-707X

CZU:94(100)"1914/1918":572

Cornel-Mădălin VĂLEANU
„Moldova" National Museum Complex of Iași
E-mail: madalinvaleanu@yahoo.com

Luminiţa BEJENARU
Romanian Academy – Iași Branch, „Olga Necrasov" Centre of Anthropological Research
„Alexandru Ioan Cuza" University of Iași, Faculty of Biology, Romania
E-mail: bejlumi@yahoo.com
ORCID: 0000-0001-5409-7248

Summary. This study describes osteopathies identified in a sample of 50 human skulls collected from the Mausoleum Crypt of the World War I Heroes in Iași-*Calea Galata* (Iași County, Romania). The skulls have been collected during consolidation and rehabilitation of the monument, in 2020–2021. The osteological material belonged to four adolescents (three males and one female), 25 young adults (22 males and three females), 19 middle adults (males) and two old adults (males). The distribution by sex indicates a higher male mortality rate as opposed to females (i.e., 46 males and four females), resulting in a higher masculinity index of 8.69. The frequency of pathologies, anomalies and non-metric features was estimated both separately by sex, and for the entire sample.

In the entire analysed sample, the wormian bones recorded 46%, followed by cranial trauma (20%), porotic hyperostosis (18%), cribra orbitalia and supraorbital foramen (with equal frequency – 10%), premature synostosis of the sagittal suture and infection (6% each), and metopic suture (4%).

Keywords: osteopathies, human skulls, Mausoleum of World War I Heroes, Iași, Romania

INTRODUCTION

Skeletal lesions observed on human remains offer insights onto the general wellbeing of humans in the past, as well as informing on the biological and evolutionary responses to disease today[1]. Palaeopathology is a science investigating the origins of diseases, their spread, dynamics and their effect on human life[2]. Pathological aspects are induced by the interaction between genetic and non-genetic factors (the latter deriving from the environment)[3]. Bone anomalies are changes in the normal bone structure induced by disruptions of the chemical or metabolic functions under the influence of exogenous, genetic or teratogenic factors[4].

As for the non-metric features (also called epigenetic, discontinuous morphological or discrete traits), these are forms of variations observed in the bone structure. The cranial non-metric

[1] F. Rivera, M. Mirazón Lahr, *New evidence suggesting a dissociated etiology for cribra orbitalia and porotic hyperostosis*, in: American Journal of Physical Anthropology, 2017, p. 1-21.

[2] J.J. Gładykowska-Rzeczycka, *Palaeopathology in Poland at the beginning of the 21st century,* in: Studies in Historical Anthropology, **4**, 2004–2006, p. 25-48.

[3] J.B. Gregg, P.S. Gregg, *Dry Bone. Dakota Territory Reflected*, Sioux Printing, 1987.

[4] *Ibidem*.

traits have been used extensively to chart the history and divergence of human populations[5]. This study intends to analyze the frequency and characteristics of pathologies, anomalies and non-metric features observed in a sample of human skulls from the Mausoleum Crypt of World War I Heroes in Iași-*Calea Galata* (Iași County, Romania) (Fig. 1/a, b).

The analysed sample was collected during monument rehabilitation performed in 2020–2021, under the coordination of archaeologist PhD Mădălin-Cornel Văleanu.

According to the photographic archive, the Mausoleum had a protection zone around it, in which six large and 600 smaller crosses were placed, in the memory of the 6.000 soldiers whose remains were reburied around the Mausoleum or in his basement. There is no reliable information but, probably, reburials in the perimeter of Heroes' Mausoleum were made after its inauguration, the skeletons from the Great Cemetery of Heroes, located north of Galata Monastery, being also transferred here[6].

MATERIAL AND METHODS

The osteological material consists of 50 skulls, collected from the Mausoleum Crypt of World War I Heroes in Iași-*Calea Galata* (Iași County, Romania) during the rehabilitation of this monument, in 2020–2021. The skulls without mandibles (codified as C1 → C50) were randomly sampled from a mixture of bones without anatomical connection. The age at death and the sex were estimated in a previously paleodemographic analysis achieved by Groza et al. (2021)[7] resulting: young adults (50.00%), followed by middle adults (38.00%), adolescents (8.00%) and old adults (4.00%). Distribution by sex indicates a higher frequency of males (92%).

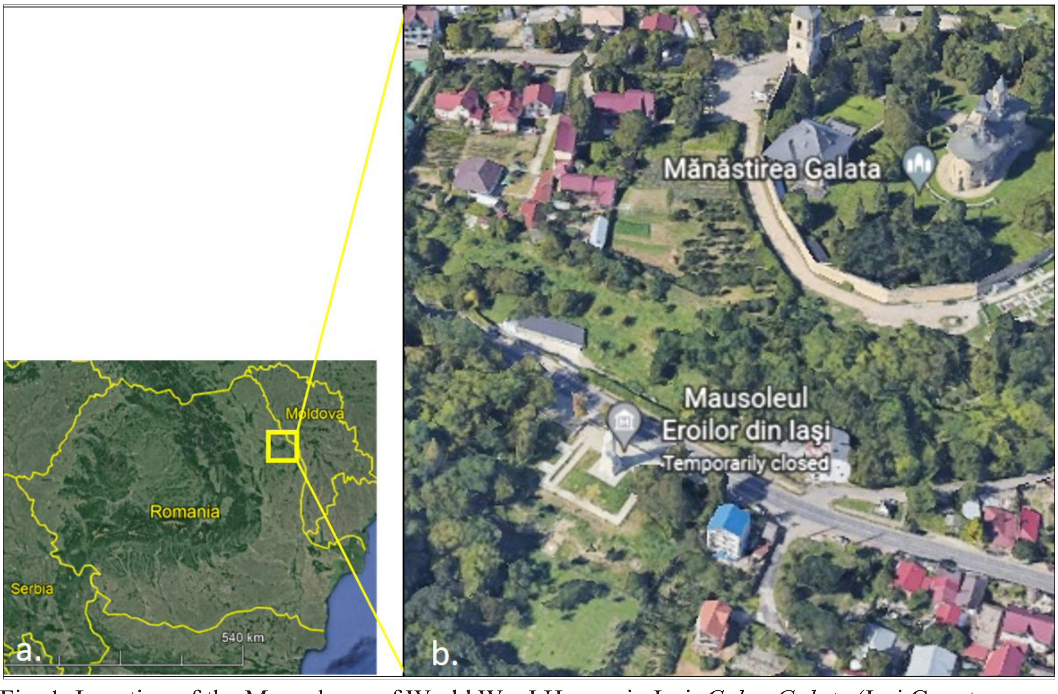

Fig. 1. Location of the Mausoleum of World War I Heroes in Iași–*Calea Galata* (Iași County, Romania): general (a); detail (b); (Source: Google Earth).

[5] E.A. Carson, *Maximum – likelihood variance components analysis of heritabilities of cranial nonmetric traits*, in: *Human Biology*, **78**(4), 2006, p. 383-402.

[6] V.-M. Groza, L. Bejenaru, M. C. Văleanu, *Bioanthropological study of human skulls from the Mausoleum Crypt of the First World War Heroes, in Iaşi (Iaşi County, Romania),* in: Memoirs of the Scientific Sections of the Romanian Academy, XLIV, 2021, 91-102.

[7] *Ibidem*.

In this study, the osteopathies are evaluated by macroscopic observations.

In order to identify them, there were used methods, criteria and techniques recommended by Mays, Waldron, Ortner, Aufderheide and Rodriguez-Martin, Barnes (1994)[8]. The frequency has been calculated by reporting the number of each osteopathy to the total number of craniums.

The presence/absence of porotic hyperostosis and cribra orbitalia was macroscopically examined in all skulls. The severity of both conditions was expressed by the stages 1-4: 1, scattered fine foramina; 2, large and small isolated foramina; 3, foramina are linked into a trabecular structure; 4, outgrowth in trabecular form from the outer table surface[9]. The complete metopic suture, extended from the bregma to the nasion, was recorded observing the two halves of the frontal bone clearly separated from each other. Wormian bones were described in terms of location, number, side, and shape. Generally, the most common fractures of the cranium affect the vault and they are caused by direct trauma. According to Lovell[10] these can be reported according to their basic type, usually linear, crush, or penetrating, which are not necessarily mutually exclusive. The shape of the supraorbital structure was recorded as a notch or foramen with careful distinction between frontal foramen, which, if present, is located medially to the supraorbital foramen or notch[11]. The photographic documentation was obtained with a Canon Power Shot G9 camera.

RESULTS AND DISCUSSION

The analysed skulls, well preserved, belonged to 50 human skeletons – four adolescents (three males and one female), 25 young adults (22 males and three females), 19 middle adults (males), and two old adults (males).

The frequency of osteopathies in the sample is presented in Table 1. Values were calculated for each sex (46 male and four female) and for the entire sample (50 subjects). In the entire sample, there were identified: wormian bones (46%), followed by cranial trauma (20%), porotic hyperostosis (18%), cribra orbitalia and supraorbital foramen (with equal frequency – 10%), premature synostosis of the sagittal suture and infections (6% each) and metopic suture (4%) (Table 1).

Table 1. Frequency of pathologies, anomalies and non-metric bone features in the sample

Pathologies*/anomalies/ non-metric features***	**Male (14-x years)**		**Female (14-x years)**		**Total**	
	N	**(%)**	**N**	**(%)**	**N**	**(%)**
*porotic hyperostosis**	9/46	19.56	-	-	9/50	18.00
*cribra orbitalia**	5/46	10.86	-	-	5/50	10.00
premature sagittal suture closure**	3/46	6.52	-	-	3/50	6.00

[8] S. Mays, *The archaeology of human bones,* Ed. Routledge, 1998; T. Waldron, *Palaeopathology*, Cambridge University Press, 2009; D.J. Ortner, *Identification of Pathological Conditions in Human Skeletal Remains*. Elsevier Academic Press, 2003, 463 p.; A.C. Aufderheide, C. Rodriguez-Martin, *The Cambridge Encyclopedia of Human Paleopathology*, Cambridge University Press, 1998; E. Barnes, *Developmental Defects of the Axial Skeleton in Paleopathology*, University of Colorado: Niwot, Colorado. 1994.

[9] P. Stuart-Macadam, *Porotic hyperostosis: representative of a childhood condition*. in: American Journal of Physical Anthropology, 66, 1985, p. 391-398; J.A. Suby, *Porotic hyperostosis and cribra orbitalia in human remains from southern Patagonia*, in: Anthropological Science Vol. 122(2), 2014, p. 69-79.

[10] N.C. Lovell, *Trauma Analysis in Paleopathology*, Yearbook of Physical Anthropology, 40, 1997, p. 139-170.

[11] M. Miloro, *Peterson's Principles of Oral and Maxillofacial Surgery*, BC Decker Inc., Hamilton, London, 2004.

*metopic suture****	2 /46	4.34	-	-	2/50	4.00
*wormian bones****	21/46	45.65	2/4	50.00	23/50	46.00
*cranial trauma**	10/46	21.73	-	-	10/50	20.00
*infections**	3/46	6.52	-	-	3/50	6.00
*supraorbital foramen****	5/46	10.86	-	-	5/50	10.00

Porotic hyperostosis (PH) and cribra orbitalia (CO). Porotic hyperostosis, describing the excessive development of porous lesions in bone tissue, is one of the most common occurring skeletal conditions observed in paleoanthropological studies[12]. There is a general consensus that anemia is the main factor resulting in porotic lesions, whether by acquired anemia due to parasites or nutritional deficiencies, or through genetic conditions, such as thalassemia (major and minor) and sickle cell anemia[13]. Porotic hyperostosis is one of the most frequently studied indicators of the subjects (skeletons) state of health, also providing valuable information about the environmental conditions during growth and development[14].

Cribra orbitalia (exocranian orbital porosity), which appears as a point-like corrosion of the external compact layer of the orbital roof and the thickening of the spongy bone layer[15]. Cribra orbitalia has been suggested to occur due to anemia[16], inflammation, ophthalmic infection, enlargement of the lacrimal gland, postmortem erosion, atrophy by pressure, thinning of the bone seen in osteoporosis[17], dietary deficiencies[18], and malarial infection[19].

Both lesions (porotic hyperostosis and cribra orbitalia) are widely used as indicators of health and nutritional status of ancient human populations and are generally recognized as evidence of

---

[12] S. Jatautis, I. Mitokaite, R. Jankauskas, *Analysis of cribra orbitalia in the earliest inhabitants of medieval Vilnius,* in: Anthropological Review, 74, 2011, p. 57-68; D. J. Ortner, *Identification of Pathological Conditions in Human Skeletal Remains, 2nd edn*., Elsevier Science/Academic Press, New York, 2003.

[13] G. Dabbs, *Health status among prehistoric Eskimos from Point Hope, Alaska,* in: American Journal of Physical Anthropology, **146**, 2011, p. 94-103; F. Facchini, E. Rastelli, P. Brasili, *Cribra orbitalia and cribra cranii in Roman skeletal remains from the Ravenna area and Rimini (I–IV century AD,* in: International Journal of Osteoarchaeology, **14**, 2004, p. 126-136.

[14] G. Vercellotti, D. Caramella, V. Formicola, G. Fornaciari, C.S. Larsen, *Porotic Hyperostosis in a Late Upper Palaeolithic Skeleton (Villabruna 1, Italy),* in: International Journal of Osteoarchaeology, **20** (3), 2009, p. 358-368.

[15] J. Kozak, M. Krenz-Niebała, *The occurrence of cribra orbitalia and its association with enamel hypoplasia in a medieval population from Kolobrzeg, Poland,* in: Variability and Evolution, **10**, 2002, p. 75-82.

[16] F. Rivera, M. Mirazón Lahr, *New evidence suggesting a dissociated etiology for cribra orbitalia and porotic hyperostosis,* in: American Journal of Physical Anthropology, 2017, p. 1-21; P.L. Walker, R.R. Bathurst, R. Richman, T. Gjerdrum, V.A. Andrushko, *The causes of porotic hyperostosis and cribra orbitalia: A reappraisal of the iron-deficiency-anemia hypothesis*, in: American Journal of Physical Anthropology, **139**, 2009, p. 109-125.

[17] U. Wapler, E. Crubézy, M. Schultz, *Is cribra orbitalia synonymous with anemia? Analysis and interpretation of cranial pathology in Sudan,* in: American Journal of Physical Anthropology, **123**, 2004, p. 333-339.

[18] G. Zariņa, S.B. Sholts, A. Tichinin, V. Rudovica, A. Vīksna, A. Engīzere, V. Muižnieks, E.J. Bartelink, S.K. Wärmländer, *Cribra orbitalia as a potential indicator of childhood stress: Evidence from paleopathology, stable C, N, and O isotopes, and trace element concentrations in children from a 17th-18th century cemetery in Jēkabpils,* Latvia. in: Journal of Trace Elements in Medicine and Biology, **38**, 2016, p. 131-137.

[19] N.E. Smith-Guzmán, *Cribra orbitalia in the ancient Nile Valley and its connection to malaria*, in: International Journal of Paleopathology, **10**, 2015. p. 1-12.

anemia[20]. Cribra orbitalia is more frequently encountered than porotic hyperostosis. If cribra orbitalia represented an earlier and less serious expression of the pathological process which also determines porotic hyperostosis, it could explain the much higher incidence of this pathology[21].

In this study, porotic hyperostosis (gr. II) was identified in nine male subjects, more accurately: aged between 20 and 50 years (Fig. 2; Fig. 3/a, b; Figs. 4-10). Cribra orbitalia was identified in five males aged between 20 and 40 years (Figs. 11-15).

Premature fusion of the cranial sutures (agenesis). Named also craniosynostosis, it appears between the ages of 30 and 40 years on the internal surface and 10 years later on the external surface. The fusion normally begins in the bregma point and then expands successively to the sagittal, coronal and lambdoid suture. Thus, craniosynostosis can be considered a normal process which appears at an abnormally early age. Craniosynostosis or suture agenesis can appear as an isolated case or as part of polytropic syndromes[22]. The connection between cranial malformations and craniosynostoses was suspected from the beginning of the 19th century and throughout the next decades and it became obvious that some of these craniosynostoses were associated with other congenital anomalies[23].

From the total analyzed skulls, premature fusion of the sagittal suture was identified in three cases, all males aged between 35 and 45 years (Figs. 16-18).

Metopic suture. The metopic suture separates the two frontal bones at the birth, running from the anterior fontanelle to the nasion. In the adult skull, it is found anterior to the coronal suture along the superior midsagittal crest of the frontal bone[24].

This suture normally closes between the 1st and 2nd year of life and is usually completely fused by the 3rd year, but it can remain patent to the 7th year. In rare cases the metopic suture may persist throughout life and can be spotted even in old people[25].

According to Berry and Berry[26], the appearance of this suture in adults varies from 0% to 7%, depending on ethnicity. In the Lebanese population, complete and incomplete metopism is present in 0.82% and 0.93% of cases, respectively, leading to an overall incidence of 1.75%. The incidence of the metopic suture is slightly higher in males (1.84%) than in females (1.62%). Moreover, according to Baaten et al. (2003)[27], people who live in rural areas have a higher incidence of complete and incomplete metopism compared to people living in urban areas, with ratios of 4:1 and 4:2, respectively.

---

[20] D.J. Ortner, *Identification of Pathological Conditions in Human Skeletal Remains, 2nd edn.*, Elsevier Science/Academic Press, New York, 2003; C.A. Roberts, K. Manchester, *Archaeology of Disease, 3rd edn.*, Sutton Publishing, Stroud, 2005.

[21] P.L. Walker, R.R. Bathurst, R. Richman, T. Gjerdrum, V.A. Andrushko, *The causes of porotic hyperostosis and cribra orbitalia: A reappraisal of the iron-deficiency-anemia hypothesis,* in: American Journal of Physical of Anthropology, **139**, 2009, p. 109-125.

[22] A.C. Aufderheide, C. Rodríguez Martin, *The Cambridge Encyclopedia of Human Paleopathology*, Cambridge University Press, Cambridge, 1998.

[23] J.D. David, D. Poswillo, D. Simpson, *The Craniosynostoses. Causes, Natural History and Management,* New York, Heidelberg, Berlin: Springer-Verlag, 1982.

[24] J. Skrzat, J. Walocha, J. Zawiliński, *A note on the morphology of the metopic suture in the human skull*, in: Folia Morphologica, Vol. 63, No. 4, 2004, p. 481-484.

[25] Y. Ide, Y. Inukai, S. Yoshida, I. Sato, *The internal structure of bony tissue of a human metopic suture by Soft X-ray*, in: Okajimas Folia Anatomica Japonica, **79**, 2003, 169-173; T. Nakatani, S. Tanaka, S. Mizukami, *A metopic suture observed in a 91-year-old Japanese mal*, in: Kaibogaku Zasshi, **73,** 1998, 265-267.

[26] C.A. Berry, R.J. Berry, *Epigenetic variation in the human cranium*, in: Journal Anatomy, **101**, 1967, p. 361-379.

[27] P.J. Baaten, M. Haddad, K. Abi-Nader, A. Abi-Ghosn, A. Al-Kutoubi, A. R. Jurjus, *Incidence of metopism in the Lebanese population,* in: Clinical Anatomy, 6, 2003, p. 148-151.

Metopism has been attributed to various conditions and/or causes such as increased intracranial pressure, mechanical stress, endocrine dysfunction, growth retardation, mental defects, heredity and heredo-specific factors as well as to specific cranial deformations such as plagiocephaly, stenocrotaphy, brachycephaly, scaphocephaly and hydrocephaly[28]. Irrespectively of the causative factors, however, the metopic suture retention has been reported to be of morphogenetic relevance to the skull configuration inasmuch as the metopic skulls have a distinctive frontal bone appearance[29].

In the sample under analysis, metopic suture was identified in two males aged between 20 and 40 years (Figs. 19, 20).

Wormian bones or sutural bones are accessory small bones, which occur accidentally or intercalated between or near cranial sutures, isolated from normal ossification center of skull[30]. Wormian bones were described by Danish anatomist Olaus Wormian in 1643 and *Ossa wormiana* was used as a term by Thomas Bartholin for these bones firstly[31]. They also named these bones as ossicles, intersutural bones, intercalary bones or supernumerary bones[32].

Their number and shape can vary from one person to another. They are present in the frontal and occipital bones and, in some cases, they lead to erroneous diagnoses of the cranial fractures[33].

However, the formation mechanism of wormian bones have not been clarified adequately yet[34]. The point of view of some authors is that wormian bones are derived from external factors such as dural strain near sutures and from intrinsic factors such as genetics[35].

From the total number of analyzed subjects, the wormian bones (within the lambdoid suture) (Figs. 21-23) were identified in 23 cases: 21 males aged between 18 and 50 years and two females aged between 20 and 25 years.

---

[28] R. Linc, J. Fleischmann, *The occurrence of metopism in our present population and its relationship to sinus frontalis,* in: Anthropologie, **7**, 1969, p. 35-40.

[29] S. Nikolova, D. Toneva, G. Agre, N. Lazarov, Data mining for peculiarities in the configuration of neurocranium when the metopic suture persists, in: Anthropologischer Anzeiger, **77**, 2020, p. 89-107; S. Nikolova, D. Toneva, G. Agre, *Reliability of sagittal suture maturation as an age-at-death indicator*, in: Forensic Imaging, **26,** 2021, Volume 26, Article 200464.

[30] D. Patel, K. Chauhan, D. Patil, *Morphological study of wormian bones in dried human skulls*, in: National Journal of Medical Research, **5(3)**, 2015, p. 222-225; T. Sreekanth, N. Samala, *Morphological study of wormian bones in dried adult human skulls in Telangana,* in: International Journal of Anatomy and Research, **4**(**4**), 2016, p. 3157-62.

[31] S. Albay, B. Sakallı, G.N. Yonguç, Y. Kastamoni, M. Edizer, *Ossa suturalia bulunma sikligi ve morfometrisi,* in: S. D. Ü. Tıp. Fakültesi Dergisi, **20**(**1**), 2013, p. 1-7.

[32] R. Showri, M.P. Suma, *Study of wormian bones in adult human skulls*, in: IOSR Journal of Dental and Medical Sciences, 15(12), 2016, p. 54-60; N. Kiliç Safak, R.G. Taskin, A.H. Yücel, *Morphologic and Morphometric Evaluation of the Wormian Bones*, in: International Journal Morphology 38(1), 2020, p. 69-73.

[33] S.B. Nayak, *Multiple Wormian bones at the lambdoid suture in an Indian skull,* in: Neuroanatomy*,* **7**, 2008, p. 52-53.

[34] E. Gümüs burun, A. Sevim, U. Katkici, E. Adigüzel, E.A. Güleç, Study of sutural bones in Anatolian-Ottoman skulls. in: International Journal of Anthropology, **12**(**2**), 1997, p. 43-48.

[35] P.A. Sanchez-Lara, J.M. Jr. Graham, A.V. Hing, J. Lee, M. Cunningham, *The morphogenesis of wormian bones: a study of craniosynostosis and purposeful cranial deformation*, in: American Journal of Medical Genetics Part A, 143A(24), 2007, p. 3243-51; S. S. Bellary, A. Steinberg, N. Mirzayan, M. Shirak, R.S. Tubbs, A.A. Cohen-Gadol, M. Loukas, *Wormian bones: a review*, in: Clinical Anatomy, 26(8), 2013, p. 922-927.

Cranial trauma. Trauma occupies second place and affects the skeleton in several ways – fracturing or dislocating the bone, disrupting its blood or nerve supply, or artificially deforming it[36].

Trauma can be defined in many ways, but in its conventional sense it is a lesion in a living tissue caused by an extrinsic force or mechanism[37]. Although the paleopathologists have made great progress in the interpretation of injuries found in ancient skeletal remains[38], violent behavior producing skeletal trauma is not always easily interpreted or understood from the bioarchaeological record. Human skeletal remains provide direct evidences on lesions, and these biological markers are useful in the reconstituting the behaviors of ancient populations[39]. Interpretation of skull fractures is conditioned by a variety of features, including bones involved, fracture appearance and malformation[40].

Trauma patterns can serve as an important measure of the lifestyle, organization, and stresses of past human populations, since traumatic injuries are directly linked to violent encounters[41], accidents[42], impairments and care for the injured[43], and reflect the various injury risks resulting from occupational, environmental or social conditions[44].

Cranial trauma (Figs. 24-26) was identified in ten male subjects, aged between 20 and 45 years, affecting especially the frontal bone.

Infection. Since most infectious diseases primarily affect the soft tissues, it is no surprise that there are few signs on the skeleton. The number of infections that affect the skeleton is small and includes osteomyelitis, tuberculosis, syphilis, leprosy, and polio[45]. There are some fungal and viral infections that may involve the skeleton in some parts of the world, and a number of infections that may rarely have a skeletal component[46] if the periosteum is involved.

[36] T.D. White, P.A. Folkens, *Human bone manual*, Elsevier Acadmic Press, 2005.

[37] R.R. Paine, D. Mancinelli, M. Ruggieri, A. Coppa, *Cranial Trauma in Iron Age Samnite Agriculturists, Alfedena, Italy: Implications for Biocultural and Economic Stress*, in: American Journal of Physical Anthropology, **132,** 2007, p. 48-58.

[38] C.S. Larsen, *Bioarchaeology: Interpreting behavior from the human skeleton*, New York, Cambridge University Press, 1997, 65-82/109-154.

[39] P. L. Walker, *A bioarchaeological perspective on the history of violence*, in: Annual Revue of Anthropology, **30**, 2001, p. 573-596.

[40] M.H. Kaufman, D. Whitaker, J. Mctavish, *Differential diagnosis of holes in the calvarium: Application of modern clinical data to palaeopathology*, in: Journal of Archaeological Science, **24**, 1997, p. 193-218.

[41] E.F. Kranioti, D. Grigorescu, K, Harvati, *State of the art forensic techniques reveal evidence of interpersonal violence ca. 30,000 years ago,* in: PLoS One, **14**(**7**), 2019, e0216718; M. Mirazón Lahr, F. Rivera, R.K. Power, A. Mounier, B. Copsey, F. Crivellaro, R. A. Foley, *Inter-group violence among early Holocene hunter-gatherers of West Turkana, Kenya,* in: Nature, **529**(**7586**), 2016, p. 394-398.

[42] J. Kappelman, R.A. Ketcham, S. Pearce, L. Todd, W. Akins, M.W. Colbert, A. Witzel, *Perimortem fractures in Lucy suggest mortality from fall out of tall tree,* in: Nature, **537**(**7621**), 2016, p. 503-507; E.N. L'Abbé, S.A. Symes, J.T. Pokines, L.L. Cabo, K.E. Stull, S. Kuo, L.R. Berger, *Evidence of fatal skeletal injuries on Malapa Hominins 1 and 2,* in: Scientific Reports, **5**, 2015, 15120.

[43] P. Spikins, A. Needham, B. Wright, C. Dytham, M. Gatta, G. Hitchens, *Living to fight another day: The ecological and evolutionary significance of Neanderthal healthcar,* in: Quaternary Science Reviews, 217, 2019, p. 98-118; P. Spikins, A. Needham, L. Tilley, G. Hitchens, *Calculated or caring? Neanderthal healthcare in social context*, in: World Archaeology, **50**(**3**), 2018, p. 384-403.

[44] L. Collier, C. Primeau, *A tale of two cities: A comparison of urban and rural trauma in medieval Denmark*, in: International Journal of Paleopathology, **24**, 2019, p. 175-184.

[45] T. Waldron, *Palaeopathology*, Cambridge University Press. 2009.

[46] M.E. Abd El Bagi, B.M. Sammak, M.S. Al Shahed, B.A Yousef, O.A. Demuren, M.Al. Jared, M.A. Al Thagafi, *Rare bone infections "excluding the spine",* in: European Radiology, **9**, 1999, p. 1078-1087.

The infection was identified in two male subjects aged between 35-45 years, at level of the frontal and parietal bones (Figs. 27, 28).

Supraorbital foramen. The frequency of the supraorbital foramen/supraorbital notch may be a result of adaptive changes and developmental responses to ambient temperature[47], reflecting a prevention of heat loss in the supraorbital neurovascular bundle passing through the supraorbital structures. This could be interpreted as a morphological adaptation to different climates and thermoregulatory processes concerning the human head[48].

Supraorbital foramen (Fig. 29) was recorded in five male subjects (10% of the total population) aged between 25-45 years.

CONCLUSIONS

The osteological material (skulls) analyzed in this study belong to skeletons found in secondary deposition in the Mausoleum Crypt of the First World War Heroes, in Iași-*Calea Galata* (Iași County, Romania). The sample consists of 50 skulls belonging to four adolescents (three ♂ and one ♀: 8%), 25 young adults (22 ♂ and three ♀: 50%), 19 middle adults (19 ♂: 38%) and only two old adults (one ♂: 4%).

If we refer to the entire sample, the main indicators of the state of health in the cranial segment are porotic hyperostosis (18%) and cribra orbitalia (10%). The presence of these exocranial porosities is frequently used as an instrument to evaluate the state of health and the nutritional status of the past populations; at present, they are also regarded as potential indicators of the environmental conditions. Among the types of anomalies, we identified premature fusion of the cranial sutures (craniosynostosis produced at an abnormally early age), with an incidence of 6%.

An important observation is that 20% of the skulls that belonged to male are affected by trauma and 6% by infection. Non-metric (epigenetic) features such as wormian bones (46%), followed by supraorbital foramen (10%) and metopic suture (4%) identified in the skull, can be inherited and for that matter they can be used in studies concerning the biological affinity of the human populations from the past.

Fig. 2. Subject C8, ♂, 20-25 years-old: porotic hyperostosis (gr. II) on the parietal and occipital bone.

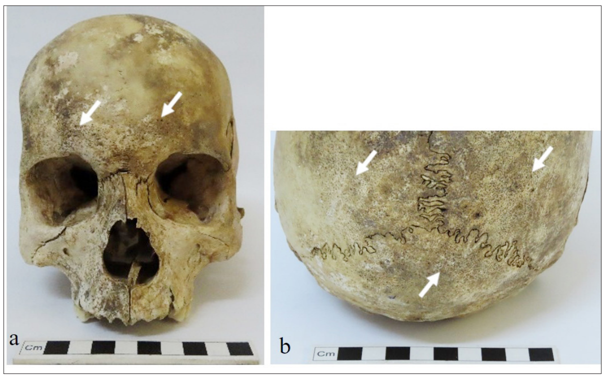

Fig. 3. Subject C9, ♂, 30 years-old: porotic hyperostosis (gr. II) on the parietal and occipital bone.

[47] A. Tomaszewskaa, J. Tomczyk, B. Kwiatkowskac, *Characterisation of the supraorbital foramen and notch as an exit route for the supraorbital nerve in populations from different climatic conditions*, in: HOMO – Journal of Comparative Human Biology, **64**, 2013, p. 58-70.

[48] *Ibidem*.

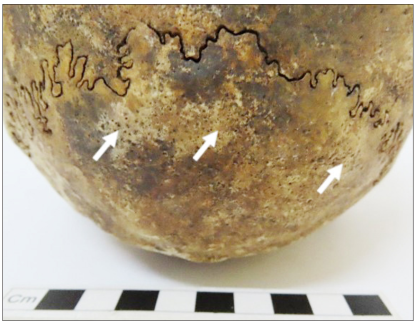

Fig. 4. Subject C12, ♂, 35-40 years-old: porotic hyperostosis (gr. II) on the parietal and occipital bone.

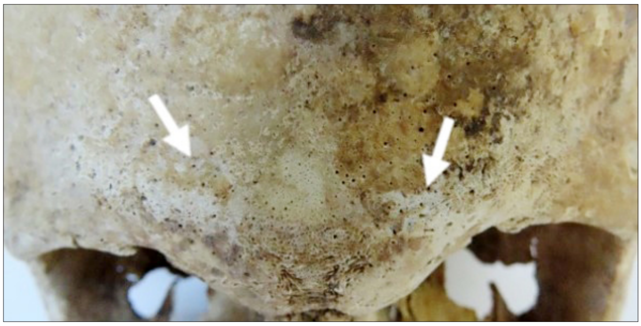

Fig. 5. Subject C24, ♂, 35-40 years-old: porotic hyperostosis (gr. II) on the frontal bone.

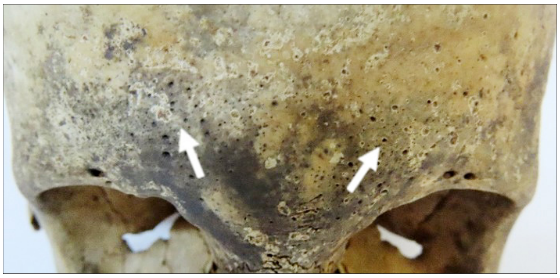

Fig. 6. Subject C26, ♂, 30 years-old: porotic hyperostosis (gr. II) on the frontal bone.

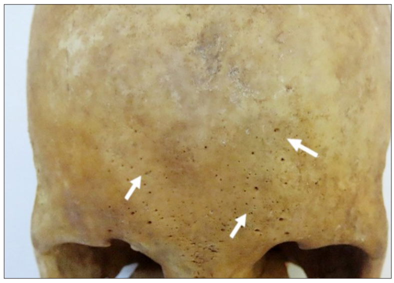

Fig. 7. Subject C30, ♂, 25-30 years-old: porotic hyperostosis (gr. II) on the frontal bone.

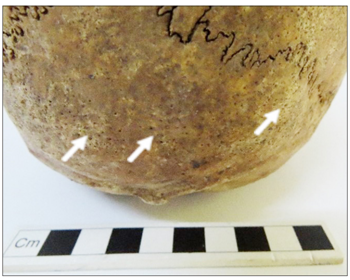

Fig. 8. Subject C42, ♂, 30-35 years-old: porotic hyperostosis (gr. II) on the occipital bone.

Fig. 9. Subject C44, ♂, 40-45 years-old: porotic hyperostosis (gr. II) on the parietals and occipital bone.

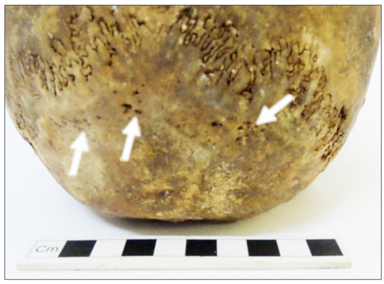

Fig. 10. Subject C46, ♂, 50 years-old: porotic hyperostosis (gr. II) on the occipital bone.

Fig. 11. Subject C3, ♂, 35-40 years-old: cribra orbitalia (gr. II) on the left orbit.

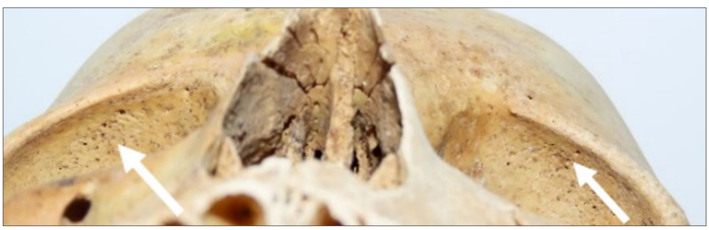

Fig. 12. Subject C19, ♂, 20-22 years-old: cribra orbitalia (gr. II) on the orbital roofs.

Fig. 13. Subject C24, ♂, 35-40 years-old: cribra orbitalia (gr. III) on the orbital roofs.

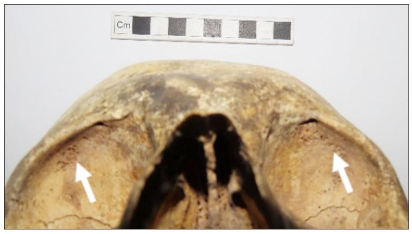

Fig. 14. Subject C26, ♂, 30 years-old: cribra orbitalia (gr. II) on the orbital roofs.

Fig. 15. Subject C42, ♂, 30-35 years-old: cribra orbitalia (gr. II) on the orbital roofs.

Fig. 16. Subject C12, ♂, 35-40 years-old: skull – vertical norm – premature fusion of the sagittal suture.

Fig. 17. Subject C35, ♂, 35-40 years-old: skull – vertical norm – premature fusion of the sagittal suture.

Fig. 18. Subject C36, ♂, 40-45 years-old: skull – vertical norm – premature fusion of the sagittal suture.

Fig. 19. Subject C16, ♂, 20 years-old: skull – facial norm; metopic suture in the frontal bone.

Fig. 20. Subject C39, ♂, 35-40 years-old: skull – facial norm; metopic suture in the frontal bone.

Fig. 21. Subject C20, ♂, 35-40 years-old: wormian bones within the lambdoid suture.

Fig. 22. Subject C22, ♂, 30-35 years-old: wormian bones within the lambdoid suture.

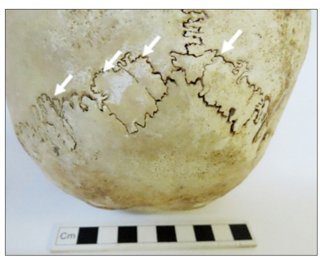

Fig. 23. Subject C38, ♀, 20-25 years-old: wormian bones within the lambdoid suture.

Fig. 24. Subject C19, ♂, 20-22 years-old: skull – vertical norm; trauma in the frontal bone.

Fig. 25. Subject C44, ♂, 40-45 years-old: skull – lateral norm; trauma in the frontal bone.

Fig. 26. Subject C48, ♂, 30-35 years-old: skull – facial norm; trauma in the frontal bone (L = 35 mm; l = 8 mm).

Fig. 27. Subject C18, ♂, 35-40 years-old: infection in the frontal bone.

Fig. 28. Subject C36, ♂, 40-45 years-old: infection in the parietal bone.

Fig. 29. Subject C10, ♂, 25-30 years-old: skull – facial norm; supraorbital foramen – bilateral.