Biparietal osteodystrophy: An archaeological, morphometric, and palaeopathological insight into a Mediaeval-Modern case from Romania

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Abstract. This study details a case of biparietal osteodystrophy (BTP), a rare cranial condition, identified in the skeletal remains of an adult female from the Mediaeval-Modern cemetery of Gherăseni–*Movila Cremenea*, located in Buzău County, Romania. The primary objective of this research is to provide a detailed analysis of BTP from a morphological and palaeopathological perspective, comparing observed characteristics with similar cases documented in the scientific literature and exploring the potential social and medical implications of the condition within its historical context. The methodology adopted involves a comprehensive skeletal analysis conducted according to established anthropological standards. This analysis identified relevant morphometric traits, dental and osseous anomalies, as well as specific pathological modifications. Particular attention was given to the individual's dental health, the identification of markers of occupational stress, and the presence of joints degeneration, all of which provide valuable insights into lifestyle and environmental conditions. The diagnosis of BTP was confirmed through macroscopic observation, supplemented by the technique of transillumination, which enabled visualisation of the thinned areas of the cranium. The subject of investigation is a female, estimated to be 45–50 years of age at the time of death, whose skeletal characteristics suggest a demanding lifestyle and poor hygienic conditions. The discussion regarding the aetiology of BTP encompasses genetic, hormonal, and environmental factors, as well as age-related bone degeneration. The presence of BTP is interpreted within the context of the individual's modest socio-economic status and the realities of rural life during the 18th and 19th centuries. The condition may have increased the individual's vulnerability to cranial injuries, given the precarious living conditions. The study's conclusions emphasise the importance of an interdisciplinary approach,

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integrating archaeology, anthropology, and medicine, for a comprehensive understanding of palaeopathological conditions. Further research is recommended to elucidate the causes and implications of BTP, as well as the utilisation of advanced diagnostic methods, such as modern medical imaging.
Keywords: biparietal osteodystrophy; Mediaeval-Modern archaeology; 18th–19th centuries; Gherăseni–*Movila* Cremenea; burial.

Osteodistrofia biparietală: o perspectivă arheologică, morfometrică și paleopatologică asupra unui caz medieval-modern din România. Acest studiu detaliază un caz de osteodistrofie biparietală (BTP), o afecțiune craniană rară, identificată pe scheletul unei femei adulte din cimitirul medieval-modern de la Gherăseni–*Movila Cremenea* (județul Buzău, România). Obiectivul principal al cercetării este analiza detaliată a BTP din perspectivă morfologică și paleopatologică, compararea caracteristicilor observate cu exemple similare documentate în literatura științifică și explorarea implicațiilor sociale și medicale potențiale ale afecțiunii în contextul istoric al descoperirii. Metodologia adoptată include analiza detaliată a scheletului, realizată conform standardelor antropologice consacrate. În cadrul acestei analize, au fost identificate trăsături morfometrice relevante, anomalii dentare și osoase, dar și modificări patologice specifice. O atenție deosebită a fost acordată stării de sănătate dentară a individului, identificării indicatorilor stresului ocupațional și a degenerărilor articulare, toate aceste aspecte oferind indicii despre stilul de viață și condițiile de mediu. Diagnosticul BTP a fost confirmat prin observație morfoscopică, completată de tehnica transluminiscenței, care a permis vizualizarea zonelor subțiate ale craniului. Subiectul investigației este o femeie cu vârsta de 45–50 de ani, ale cărei caracteristici scheletice sugerează un stil de viață solicitant și condiții de igienă precară. Discuția privind etiologia BTP include factori genetici, hormonali și de mediu, precum și degenerarea osoasă asociată cu vârsta. Prezența BTP este interpretată în contextul statutului socio-economic modest al individului și al realităților vieții rurale în perioada secolelor XVIII–XIX. Afecțiunea putea crește vulnerabilitatea individului la leziuni craniene, având în vedere condițiile de viață precare. Concluziile studiului subliniază importanța unei abordări interdisciplinare, care să integreze arheologia, antropologia și medicina, pentru o înțelegere comprehensivă a afecțiunilor paleopatologice. Se recomandă cercetări suplimentare pentru a elucida cauzele și implicațiile BTP, precum și utilizarea unor metode de diagnostic avansate, cum ar fi imagistica medicală modernă.
Cuvinte cheie: osteodistrofie biparietală; arheologie medieval-modernă; secolele XVIII–XIX; Gherăseni–*Movila Cremenea*; înhumare.

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The primary objective of this study is to present a novel case of biparietal osteodystrophy (hereinafter BTP, an abbreviation of the Anglo-Saxon term *Bilateral Thinning of the Parietals*), a rare cranial condition affecting the parietal bones. This disorder has been documented and defined since the 18th century and continues to be a topic of ongoing debate concerning its aetiological factors, pathophysiological mechanisms, prevalence, and clinical manifestations. Through this research, we aim to enhance the understanding and documentation of the variability of this condition and underscore the necessity for further investigation to elucidate its causes and palaeopathological implications.

The focus of this study is the skeletal remains of an adult female unearthed from a burial site at the late Mediaeval and Modern archaeological location of Gherăseni in Buzău County, Romania, dating to the 18th to 19th centuries. The skull of this individual offers a distinctive opportunity to examine the morphology of biparietal osteodystrophy within an osteoarchaeological context.

The objectives of this study are as follows: to identify and describe the morphometric characteristics of the osteodystrophic condition observed in the subject's skull; to compare this case with analogous examples documented in the scientific literature; to discuss the potential palaeopathological, medical, and social implications; and to contribute to the database concerning the incidence and manifestations of biparietal osteodystrophy within a Mediaeval context.

Definition and morphological manifestations

Biparietal osteodystrophy is a skeletal condition that occurs within the neurocranium, specifically affecting a distinct area of the parietal bones. This condition is localised in the upper portion of the median zone of the bone, precisely at the midpoint between the sagittal suture and parietal eminence. It is situated above the superior temporal line and extends in the fronto-occipital direction (**Fig. 1/1–4**).

Biparietal osteodystrophy is characterised by thinning and reduction of bone tissue density, as well as alterations in the shape and consistency of the bone (Lodge 1975; Cederlund, Andren, Olivecrona 1982; Cvetković *et alii* 2022). Thinning, which affects at most one-quarter of the parietal bone surface[4], is non-perforating and localised solely within the diploic layer. It progresses gradually from the margins or periphery of the depression toward its centre and partially involves the thickness of tabula cranii externa (which follows the trajectory of the diploe) while completely sparing tabula cranii interna[5]. On the endocranial surface, in the area corresponding to the depressions, the bone typically appears normal, smooth, and devoid of signs of indentation.

The depression may assume various geometric configurations, including oval, elliptical, triangular, and rectangular shapes. The areas where the bone was thinned were notably fragile, translucent, and distinctly observable. Predominantly, instances of symmetric bilateral depression have been documented. In contrast, unilateral depressions are infrequent, as are bilateral asymmetrical depressions, with the latter often exhibiting greater prominence on the right side than on the left (Ferré 1876 *apud* Greig 1926; Shepherd 1893; Camp, Nash 1944; Wilson 1947;

[4] According to Bruyn and Bots (1978), the degenerated or thinned region may extend up to 8–9 cm in the parasagittal direction and up to 4–6 cm in the coronal direction.

[5] Openings/perforations in skulls with BTP are most frequently caused by taphonomic factors or traumatic injuries.

Arnaud, Arnaud 1976; Barnes 1994, p. 146–148; 2012, p. 11; Mann, Hunt 2005; Cvetković *et alii* 2022; Tonnina *et alii* 2022).

Dystrophy or thinning does not extend beyond the temporal crests and typically spares the parietal foramina, leaving approximately 1 cm of unaffected bone in their vicinity (Humphry 1858; Cave 1927; Durward 1929; Lodge 1975; Mann, Hunt 2005; Cvetković *et alii* 2022).

From pioneers to modern terminology

The historical account of biparietal osteodystrophy (BTP) can be traced back to 1783, when Eduard Sandifort (1742–1814), a Dutch physician and anatomist, conducted comprehensive observations (**Fig. 1/1**). These findings were published in the collection "Exercitationes Academicae" where the condition is characterised as a *Sinu satis profundo, in utroque osse verticis observato. Notabilis observatur depressio, si ad superficiem externam calvariae adtendimus, absque ut tamen intra cerebri conceptaculum, in uno aut altero latere, os vel minimum protuberet. Superficies ossium verticis, ubique locorum, etiam ubi depressiones sunt, eandem habet aequabilitatem, nullibi arrosa est. Margines sunt aequabiles, rotunduli*[6] (Sandifort 1783, p. 74–77, 144).

In 1856, R. Virchow conducted one of the earliest histological examinations of this condition and introduced the term malum senile to describe it. Subsequently, R. Maier (1854) referred to osteoporosis senilis. In the latter half of the 20th century, technological advancements facilitated the adoption of increasingly precise and sophisticated diagnostic methods. Consequently, computed tomography (CT) has become a standard technique, allowing for the acquisition of detailed three-dimensional images of bone structures and soft tissues, thereby enhancing the accuracy and speed of diagnoses, including in cases of BTP. Additionally, magnetic resonance imaging (MRI) has emerged as a standard technology, offering images with superior contrast and eliminating the need for exposure to ionising radiation.

From the earliest descriptions to the present day, the terminology used to describe this condition has been extensive, reflecting the diversity of its manifestations and localisations: biparietal atrophy, senile atrophy, symmetrical atrophy, biparietal senile disease, depressio biparietalis circumscripta, symmetrical parietal depressions, biparietal osteoarticular dystrophy, biparietal osteodystrophic spongious hyperostosis, parietal/biparietal impressions, malum senile biparietale, morbus Rokitansky, parietal osteodystrophy, symmetrical biparietal osteodystrophy,

[6] "The cranial bone exhibits a relatively deep, bilateral, meandering sulcus. A significant depression was evident upon careful examination of the external surface of the skull, with no protrusions within the cranial cavity on either side. The surface of the cranial bones, including areas with depressions, was consistently uniform, smooth, devoid of porosity, and free from asperities. The margin was smooth and rounded." (translated and adapted by the authors).

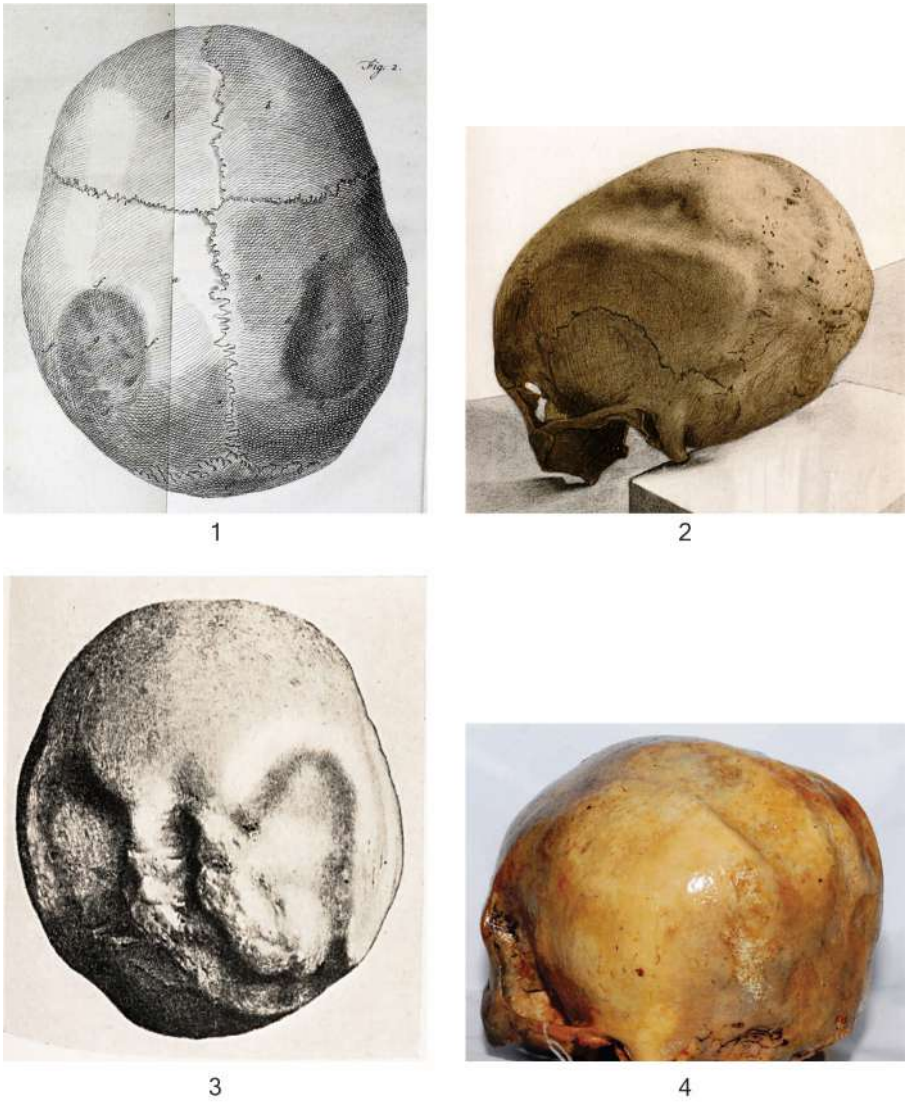


Fig. 1. 1. Skulls with BTP. 1. Illustrated by Sandifort (1783, Tabulæ VII, Fig. 2); 2–3. Illustrated by Greig (1926, Pl. III); 4. Illustrated by Mann, Hunt (2005, Pl. 22).
Fig. 1. 1. Cranii cu BTP. 1. Ilustrație de Sandifort (1783, Tabulæ VII, Fig. 2); 2–3. Ilustrație de Greig (1926, Pl. III, V/2); 4. Ilustrație de Mann, Hunt (2005, Pl. 22).

osteoporosis circumscripta, osteoporosis calvarii symmetrica, simmetrical osteoporosis, and other terms indicating parietal thinning, whether unilateral or bilateral (Breitinger 1983; Smith 1907; Greig 1926; Camp, Nash 1944; Epstein 1953; Steinbach, Obata 1957; Meema 1963; Lodge 1975; Bruyn, Bots 1978; Hauser, De

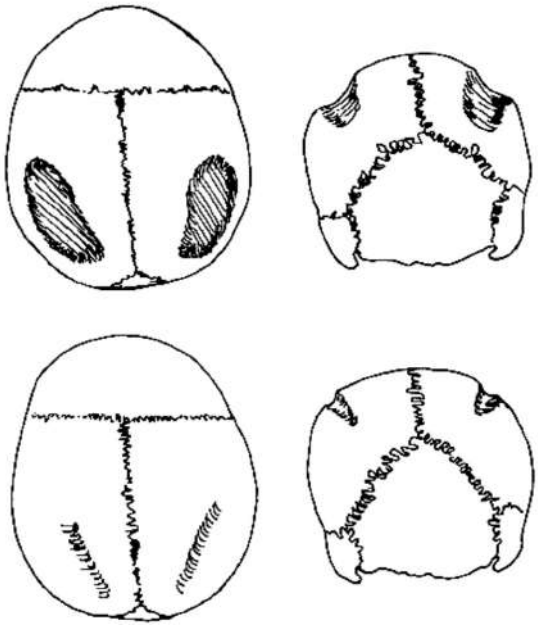


Fig. 2. Types of biparietal osteodystrophy (top – flat/simple, bottom – grooved/sulcus) (after Barnes 1994, Fig. 4.5).
Fig. 2. Tipuri de osteodistrofie biparietală (sus – plat/simplu, jos – canelat/sulcus) (după Barnes 1994, Fig. 4.5).

Stefano 1989; Malnasi 2005; Phillips 2007; Takata *et alii* 2008; Wilms *et alii* 1983; López, Sarkic, Solà 2017; Vasile 2022; Cvetković *et alii* 2022). This terminological diversity primarily reflects the challenges in clearly defining the condition and the variations in its clinical and morphological manifestations.

Currently, the most used term in both clinical and bioarchaeological studies – supported by morphoscopic, imaging, and histopathological evidence – is **biparietal osteodystrophy**.

According to the typology system proposed by Bruyn and Bots (1978), BTP can be morphologically categorised into two primary types: the flat/simple type and the grooved/sulcus type. The flat/simple type is characterised by the flattening or depression of the parietal bone and a reduction in its thickness (**Fig. 2, top**), making it the most prevalent type. In contrast, the grooved/sulcus type is distinguished by pronounced flattening accompanied by a visible groove (**Fig. 2, bottom**) and is encountered less frequently than the simple type.

According to the classification system proposed by Breitinger (1982), based on clinical and morphological manifestations, modifications can be categorised into four distinct stages:

- 1st stage (mild modifications): characterised by bilateral depressions with slight thinning of the diploe, without visible deficiencies on the external surface of the outer table.
- 2nd stage (moderate modifications): identified by bilateral depressions with a more flattened central zone on the outer table, yet lacking clear margins.
- 3rd stage (pronounced modifications): marked by saucer-shaped depressions with significant flattening of the bone, resembling a plate or crater.
- 4th stage (extreme, severe modifications): defined by discoid depressions with a saucer-shape or crater appearance, occasionally accompanied by central pseudobone formations on the inner table.

From a radiological standpoint, the progression of BTP can be delineated into three distinct stages (Cederlund, Andren, Olivecrona 1982):

- Initial stage: this phase is characterised by a slight thinning or flattening, yet distinctly visible, of the diploic layer in the upper parietal region, accompanied by the formation of a groove in the antero-posterior direction. At this stage, no more than half of the parietal bone thickness was lost. These alterations are challenging to detect using morphoscopic techniques.
- Moderate stage: this stage involves significant thinning of the diploic layer, with a loss exceeding 50% of its normal thickness. The groove became more pronounced, although the diploic layer was preserved to some extent in each depressed region.
- Advanced stage: this phase is marked by considerable flattening and thinning of both the outer table and diploic layer, potentially resulting in nearly complete loss of bone thickness, which also affects the inner table.

Perspectives on aetiology

In this chapter, we examine the principal hypotheses advanced in the scientific literature to elucidate the emergence of biparietal osteodystrophy (BTP). Given its complexity and multitude of contributing factors, the aetiology of this condition remains a topic of ongoing research and debate among anthropologists, physicians, and palaeopathologists. Over more than two centuries of discourse concerning the "thinned and dystrophic" biparietal bones, hypotheses regarding the causes of this condition have varied significantly. To elucidate the aetiology of BTP, genetic, metabolic, and hormonal factors have been considered, alongside environmental influences, lifestyle, and associated pathological conditions.

In the subsequent analysis, we concisely explore the primary theories and models proposed in the scientific literature to elucidate the onset of this condition, highlighting the degree of certainty and prevailing debates within the scientific community.

Skeletal degeneration is a natural, involutive process characterised by a reduction in bone mass, which undermines the integrity and strength of bones and contributes, in certain forms of BTP, to the formation of characteristic depressions. The parietal bone, in particular, owing to its relatively slow rate of bone remodelling, becomes increasingly vulnerable to progressive thinning with physiological aging of the skeletal system.

Bone degeneration resulting from physiological aging is frequently considered a significant factor in the occurrence of BTP. This process encompasses a series of structural and functional modifications in bone tissue, including osteopenia, which is characterised by degeneration and atrophy of the bone, marked by a decrease in bone mineral density. Typically, this reduction in bone density affects both the postcranial skeletal segment (including the depths of the ribs, iliac crest, diaphyses, and epiphyses of long bones of the limbs) and the cranial bones, with the parietal bones being particularly affected (Shepherd 1893; Epstein 1953; Mallegni 1976; Cederlund, Andren, Olivecrona 1982; Ortner, Putschar 1981; Aufderheide, Rodríguez-Martín 1998; Torres-Lagares *et alii* 2010).

A recent clinical study by Sanati-Mehrizy *et alii* (2020), which included a cohort of 43 women diagnosed with BTP, revealed a direct correlation between aging and the degree of parietal thinning. The authors concluded that aging is the primary risk factor for the progression of bone loss in the parietal region. This finding supports the hypothesis that involutive processes may partially determine the severe form of the condition, highlighting the significance of natural degenerative factors in the pathogenesis of BTP.

Progressive osteoporosis, a systemic condition marked by the gradual loss of bone mass and a decrease in mineral density, is a potential factor contributing to cranial bone thinning, particularly in the parietal bones. Although cranial bones are generally less affected by osteoporosis than other skeletal regions, parietal bone thinning becomes inevitable with advancing age, correlating with an acceleration of bone resorption (Camp, Nash 1944; Epstein 1953 *apud* Aufderheide, Rodríguez-Martin 1998, p. 315–316; Steinbach, Obata 1957; Dutta 1969; Cederlund, Andren, Olivecrona 1982; Takata *et alii* 2008). This reduction in bone density at the cranial level can primarily be attributed to an increased rate of bone resorption, a natural phenomenon that intensifies with age. Accelerated resorption and structural degradation lead to the weakening and thinning of parietal bones, phenomena evident in the advanced stages of generalised osteoporosis.

It is imperative to exercise caution when interpreting cranial bone thinning because this morphological alteration is not exclusively associated with the aging process. Sufficient documented instances have revealed the presence of biparietal osteodystrophy in young adults who exhibit no indications of systemic or generalised degenerative osteoporosis. These findings suggest that parietal thinning cannot be solely ascribed to age-related degenerative phenomena or to osteoporosis. Instead, developmental defects, genetic factors, mechanical influences, congenital dysplasias, and anomalies affecting the growth and maturation of cranial bones should also be considered. This implies a distinct aetiology from that of secondary osteoporosis (Arnaud, Arnaud 1976; Lodge 1967; Ericksen 1976).

Systemic factors, particularly those associated with hormonal changes due to aging, are equally important. Most clinical cases of BTP are observed in postmenopausal women, indicating a strong correlation between hormonal imbalances and reduced bone mass. During the postmenopausal period, there is a marked decrease in estrogen production, which disrupts the equilibrium between bone formation and resorption, leading to osteoporosis. A critical mechanism in this pathology is the cessation of osteoclast activity – cells specialised in bone resorption – which disrupts the normal remodelling process and may contribute to the thinning and fragility of cranial bones.

Histopathological investigations have provided substantial evidence supporting this hypothesis. Recent studies (Cederlund, Andren, Olivecrona 1982; Takata *et alii* 2008; Rossetti *et alii* 2024) have shown a cessation of osteoclast activity in thinned regions of the parietal bones. These findings suggest a direct correlation between reduced osteoclastic activity and the formation of characteristic BTP lesions, reinforcing the hypothesis that systemic osteoporosis induced by hormonal changes is a critical factor in the aetiology of this condition.

Congenital dysplasias. Numerous studies have classified BTP as a non-progressive congenital dysplasia of the calvarium. According to Barnes (1994; 2012), this condition may be regarded as a congenital dysplasia or a defect in growth and developmental processes. From an embryological perspective, it arises from a delay in the development of the diploe, a spongy layer located between the two tabulae of the skull. This delay results in hypoplasia or aplasia of the diploic layer, accounting for the thinning of the parietal bones, independent of aging or osteoporosis. Consequently, parietal bone thinning is not exclusively associated with advanced age and can occur in young individuals (under 30 years old) and very young children (Barnes 1994, p. 146–148; 2012, p. 11), including newborns (Humphry 1858, note 1).

Humphry (1858) documented an uncommon instance of parietal bone thinning in the skull of an orangutan. The depression on the right side of the skull exhibited an irregular oval configuration, whereas that on the left was circular and smaller.

Notably, both depressions lacked corresponding features on the endocranial surface, suggesting a localised morphological alteration of congenital origin, independent of normal growth processes or any pathological changes (Humphry 1858, p. 135, fig. 1.4).

Rohklin, Maklietzova (1968) posited that BTP is present at birth and persists throughout an individual's life, undergoing progressive evolution. Their research indicates that these osseous changes intensify and become more pronounced with advancing age, suggesting a pathologically progressive condition with a fundamentally congenital origin.

Numerous other studies and specialised investigations classify BTP as a developmental defect, whether embryological or related to growth (for details, see Greig 1926; Camp, Nash 1944; Wilson 1944; Lodge 1975; Bruyn, Bots 1978; Scheuer, Black 2000, p. 96–102). These interpretations support the hypothesis of an evolutionary congenital origin rather than a pathology acquired later in life within the context of normal aging.

Genetic predisposition. Several studies investigating the incidence of BTP in archaeological contexts have proposed a potential genetic predisposition to this condition. Instances identified in osteological collections from ancient Egypt and sites in Morocco suggest an anomaly with possible hereditary characteristics, interpreted as resulting from an autosomal transmission. These findings have led to the hypothesis that genetic predisposition may significantly influence the occurrence of this condition, particularly within specific populations or families (for studies on skeletal and clinical series, see Shepherd 1893, p. 503; Bloch 1897 *apud* Phillips 2007; Greig 1926; Gayrard 1938; Camp, Nash 1944; Wilson 1944; Nashold, Netsky 1959; Lodge 1967; Bruyn, Bots 1978; Breitinger 1983; Kaufman, Whitaker, McTavish 1997; Lacombe 2004; Phillips 2007; Fóthi, Bernert, Kőrösi 2010).

Smith (1907) documented several instances of BTP in mummies unearthed from dynastic cemeteries associated with the elite social class of ancient Egypt. Notably, broad and symmetrical depressions were observed on the skulls, specifically localised on the parietal bones, even in individuals approximately 30 years of age, supporting the hypothesis of a genetic aetiology. These cases, presented in his studies from 1907 and 1912, directly endorse the notion of hereditary predisposition (Smith 1907, Tab. 2.1). A century later, Phillips rigorously and empirically tested this hypothesis by examining a series of 1,041 ancient Egyptian skulls from 37 archaeological sites and museum collections. The study concluded that BTP predominantly manifests in adults over 50 years of age and is exceedingly rare among younger adults. Phillips (2007) did not identify any BTP cases in adolescents or children. This distribution suggests that the lesion does not have a generalised congenital cause (Phillips 2007, Tab. 10.6).

Despite being frequently overlooked, the hereditary origin of BTP remains a topic of scholarly debate. The increased incidence of BTP in individuals aged 50+ years, however, supports the argument that this lesion is primarily acquired. It appears to be more closely associated with degenerative factors and pathologies related to the aging process rather than with a hereditary genetic predisposition.

Non-metric traits. Furthermore, BTP has been classified as a non-metric trait of the skull and is regarded as a normal anatomical variant occasionally observed within the morphological diversity of parietal bones. This classification is based on the frequent occurrence of ossification defects in the parietal bones.

From this perspective, tissue thinning and the formation of parietal depressions, occasionally referred to as ossification defects, are considered natural manifestations of the morphological variability of cranial bones. Research and observations by various scholars (Gershon-Cohen, Schraer, Blumberg 1953; Hauser, De Stefano 1989; Lacombe 2004) have supported the hypothesis that certain forms of parietal thinning can be regarded as normal variants without pathological implications. Subsequently, this viewpoint was contested, and a distinction was made between these morphological variations and the pathological forms of BTP (Berry, Berry 1967; Cederlund, Andren, Olivecrona 1982, p. 32). This approach facilitates palaeopathological and anthropological interpretations, particularly in population studies, where morphological variations must be carefully evaluated to avoid confusion with pathological conditions.

Miscellaneous. In specialised literature, numerous additional pathologies and syndromes associated with BTP have been proposed, underscoring the complexity of the underlying pathophysiological mechanisms. For clarity, these have been categorised into several primary groups (for comprehensive information on all these hypotheses, see Rokitansky 1855, p. 137; Sauvage 1870; Humphry 1873; Hutchinson 1894; Rossbach 1890; Hollander 1901; Chiari 1910; Blair 1922; Schey 1973; Breitinger 1983; Smith 1907; Epstein 1953; Rowling 1961; Fournier, Vague, Lafon 1968; Dastugue 1973; Lodge 1975; Arnaud, Arnaud 1976; Bruyn, Bots 1978; Ortner, Putschar 1981, p. 291–293; Lenchik, Sartoris 1998; Ortner 2003, p. 412–415; Mulhern 2005; Mann, Hunt 2005, p. 52; Phillips 2007; Tsutsumi, Yasumoto, Ito 2008; Kulak, Dempster 2010; Yiu Luk *et alii* 2010; Yılmaz *et alii* 2013; López, Sarkic, Solà 2017; Watson, Hovav, Phua 2021; Tsukada *et alii* 2022; Gossner 2023).

– Hormonal imbalances and endocrine disorders, including hypogonadism, hyperparathyroidism, pituitary gigantism, acromegaly, age-related hormonal changes, and Gorham-Stout syndrome, as well as nutritional and metabolic deficiencies, such as vitamin D deficiency, anaemia, Paget's disease, aseptic necrosis, nutritional deficiencies, mineralisation impairments, and diabetes mellitus.

- Infectious factors: *Schistosomiasis* spp., which can induce skull alterations; *Treponema* spp., known to cause deforming and thinning of bone; osteomyelitis, a purulent infection caused by *Staphylococcus aureus*, either acute or chronic, resulting in bone tissue destruction and the formation of cavities or depressions; and granulomatous diseases, including tuberculosis and leprosy.
- Metastatic and primary tumours that may affect bone density and structure.
- Trauma experienced during childhood and trauma associated with inflammatory arthropathy.
- Vascular and degenerative alterations, such as internal frontal hyperostosis, vascular changes, and age-related pathologies affecting the temporal artery and bony aneurysms.
- Structural and anatomical conditions, including enlargement of the parietal foramina and metopism.
- Genetic diseases perpetuated through consanguinity, such as baldness, hydrocephalus, celiac disease, and thalassaemia.
- Behavioural disorders, including psychiatric conditions and melancholy.
- Constant external mechanical pressure exerted on the scalp and skull by heavy objects carried on the head, such as crowns, wigs, and massive hats, particularly in areas lacking muscular protection, such as the galea aponeurotica, has been suggested as a determining cause of symmetrical depressions.

Most researchers concur that biparietal osteodystrophy (BTP) is a condition characterised by a gradual, progressive trajectory, predominantly observed in middle-aged and elderly populations (e.g. Humphry 1873; Ferré 1876; Gershon-Cohen, Schraer, Blumberg 1953; Bruyn, Bots 1978; Cederlund, Andren, Olivecrona 1982; Grainger *et alii* 2001; Tsutsumi, Yasumoto, Ito 2008; Yiu Luk *et alii* 2010; Mann, Hunt, Lozanoff 2016, p. 236, fig. 299a–d; Mann, Kobayashi, Schiller 2017; Sanati-Mehrizy *et alii* 2020; Verma *et alii* 2024), primarily reflecting a patho-degenerative process associated with aging. This understanding contrasts with the notion that it is a non-metric trait, normal variation, congenital condition, or dysplasia.

Incidence

Biparietal osteodystrophy (BTP) is a condition with a broad distribution, documented across all continents and throughout various historical periods, from prehistory to the present. This widespread occurrence suggests that BTP is independent of geographic, climatic, socioeconomic, and cultural factors, as well as phenotypic variability. Numerous studies across diverse populations and epochs indicate that BTP is more likely a manifestation of the aging and bone degenerative

process rather than a condition specific to a particular environment or ethnic group (Yılmaz *et alii* 2013; Rossetti *et alii* 2024, with the corresponding bibliography).

A study by Ericksen (1976) highlights significant differences in the prevalence of BTP among different populations. According to the author, environmental factors, including nutrition and physical activity, exert a major influence. These variables may partially account for the observed differences between populations and ethnic groups, independent of geographic distributions.

One of the earliest investigations into the nuances of BTP prevalence within a population was conducted in 1874 by J. Carrière, who examined a series of 1,000 skulls. The reported frequency was 0.4% (Carrière 1874 *apud* Henneberg, Henneberg, Cipriani 2002).

The most reliable data on BTP prevalence are derived from radiological and CT studies. Cederlund, Andren, Olivecrona (1982) analysed 3,636 skulls, comprising 1,990 male and 1,646 female specimens, and reported a prevalence rate of 2.37%. Their findings indicated that 86 subjects exhibited BTP, with a slight predominance in women. The average age of the patients was 72 years for women (ranging from 34 to 93 years) and 63 years for men (ranging from 21 to 89 years). These data support the notion that BTP is more prevalent among older individuals. Furthermore, the predominant form of BTP was the flat type (78 skulls), while only eight skulls exhibited the grooved form. In some instances, progressive evolution was observed, occasionally leading to asymmetrical bilateral perforations.

An extensive study by Hauser, Guidotti, Vienna (1993) examined 579 skulls (279 female and 300 male) from the modern period (1895–1915), with ages ranging from 14 to 91 years. The study reported a prevalence of this condition of 3.2% in females and 1.7% in males and highlighted an increase in incidence with advancing age, particularly after 60 years.

Numerous authors have observed a tendency for BTP to be more prevalent among older populations, especially women (Durward 1929; Ericksen 1976; Breitinger 1982; Yilmaz *et alii* 2013; Pallua *et alii* 2024; Takata *et alii* 2008; Yiu Luk *et alii* 2010).

In a radiographic study, Gershon-Cohen, Schraer, Blumberg (1953) reported a prevalence rate of 3.8% in a cohort of 130 adults aged 67–93 years.

Conversely, a more recent study employing CT imaging conducted by Gossner (2023) identified an exceptionally low prevalence of 0.02% based on 947 examinations.

Other estimates, such as those by Bruyn, Bots (1978), suggest a prevalence ranging from 0.25% to 0.80%.

Some authors (Bruyn, Bots 1978; Malnasi 2005) have posited that prevalence is more pronounced among younger men and older women. The higher prevalence

in women, as BTP tends to manifest later in women (around 60 years) than in men (around 50 years), may potentially indicate a slightly different aetiology. However, interpretations vary depending on the population studied and the diagnostic methodology employed.

Camp, Nash (1944) conducted an analysis of 119 radiological cases, revealing that parietal thinning was more prevalent in males (80 individuals), typically manifesting at an average age of approximately 50 years. In contrast, in females (39 individuals), the condition appeared later, generally after the age of 60 years. In this study, the flat type of parietal thinning was predominant, observed in 98 cases, whereas the grooved form was identified in only nine individuals.

Fournier, Vague, Lafon (1968) reported an average male-to-female ratio of 3:1, suggesting a higher prevalence in males, potentially influenced by environmental and hormonal factors.

In the analysis and estimation of the prevalence of BTP, it is imperative to acknowledge that research over time has relied on diverse investigative and diagnostic methodologies, which have significantly affected the obtained results. Historically, after morphometry, the primary method for identifying BTP was conventional radiography, which provides two-dimensional images and is limited in its ability to detect certain subtle or early forms of parietal thinning. In contrast, contemporary advanced imaging techniques, such as high-resolution computed tomography (CT), facilitate three-dimensional visualisation of the calvaria, offering more precise morphological details and consequently identifying more cases of BTP, including subtle or early forms. This technological differentiation partially accounts for the variations in prevalence reported across different studies and underscores the necessity of standardising methodologies to enhance data comparability between studies. Furthermore, it highlights the critical role of technological advancements in shaping the modern understanding of this condition and advises that study results should be interpreted with caution, depending on the investigative methods employed.

In terms of sex ratio, BTP is more frequently observed in women aged over 60–70 years and men over 50–60 years. This observation suggests a potential association between BTP and the reduction or cessation of sex hormone activity.

According to a study by Arnaud, Arnaud (1976), approximately 80% of confirmed BTP cases occur in individuals aged between 50 and 87 years, while 20% are found in the 20 to 40-year age group. The average age at the time of BTP manifestation is approximately 51 years, indicating again its prevalence in the later stages of life.

Although BTP predominantly affects older adults, it has also been reported in young adults and children, albeit at a low incidence. In these instances, the

depressions are often inadequately explained and frequently occur in the context of associated pathologies – congenital, degenerative, or traumatic (Chiari 1910; Camp, Nash 1944; Steinbach, Obata 1957; Nashold, Netsky 1959; Deparis *et alii* 1968; Cederlund, Andren, Olivecrona 1982; Barnes 1994, p. 146–148; 2012, p. 11).

In examining the typology of BTP, the majority of studies indicate that over 90% of cases are of the flat type, characterised by smooth, superficial depressions that are readily identifiable using radiological methods. The remaining cases exhibited grooved types, which were deeper and possessed well-defined margins, resembling a trench or sulcus. This morphological distinction is significant for diagnostic and pathological interpretations (Bruyn, Bots 1978; Cederlund, Andren, Olivecrona 1982; Yılmaz *et alii* 2013; Mann, Kobayashi, Schiller 2017; Fusco *et alii* 2020; Watson, Hovav, Phua 2021).

Overall, current data suggest that BTP is a condition with a relatively low prevalence in the population; however, it exhibits a wide and variable distribution depending on biological age, sex, and investigative methodology. The increased sensitivity of modern imaging techniques, along with variations in diagnostic criteria, can significantly influence the prevalence estimates. Essentially, BTP is predominantly a condition of advanced age, more frequently observed in elderly women and men over 50 years of age, with prevalence values ranging from 0.02% to 3.8%.

Despite extensive research on osteological collections, including those derived from ancient archaeological excavations, BTP remains rare. The low prevalence of this deviation can be attributed to both the diagnostic challenges and the methodological variations and diagnostic criteria employed by researchers over time. Furthermore, significant discrepancies in statistical data and inconsistencies in the application of diagnostic techniques underscore their complexity and ambiguity.

Archaeological context

Location of the Gherăseni–*Movila Cremenea* site

The site is situated in northeastern Muntenia, within the plain region (**Fig. 3/1**), on the northern periphery of the former village of Cremenea, which is now incorporated into the village of Gherăseni (Gherăseni Commune, Buzău County, Romania). It is positioned on the right bank of the Călmățui River, approximately 200 m from the current river course (**Fig. 3/2**). The site is bordered to the north and east by Călmățui Street and to the west and south by private properties (gardens). In proximity to the mound, beyond the Șăngărău stream, approximately 70 m to the northwest, lies the archaeological site Gherăseni–*Grindul Cremenea*. This site has been the subject of archaeological investigation, albeit with some interruptions,

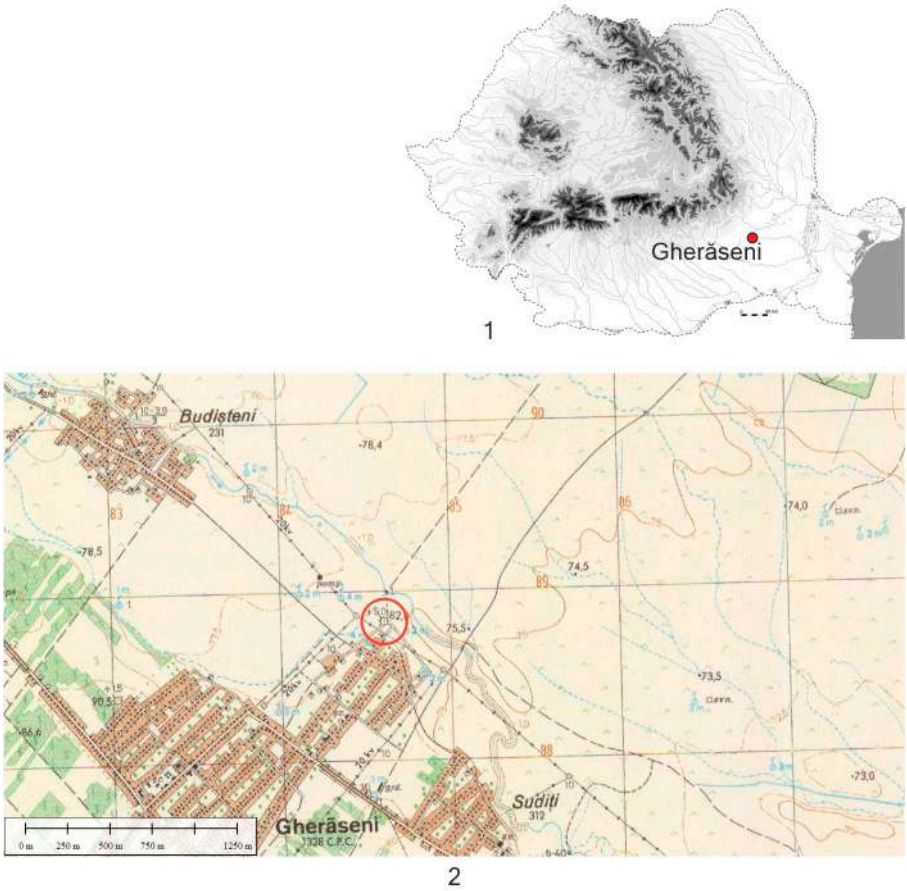


Fig. 3. The location of the archaeological site at Gherăseni–*Movila Cremenea*.
Fig. 3. Amplasarea sitului de la Gherăseni–*Movila Cremenea*.

from 1961 to 2008 (Diaconu 1977; Constantinescu, Grigoraș 2004; Garvăn, Simalcsik, Frînculeasa 2018).

"Movila Cremenea", also referred to as "Movila cu Cruci" in local toponymy, exhibits an elongated form, measuring approximately 40×20 meters at its base, with a height of 5 meters, and is oriented in a north-south direction. The edges of the mound are irregular, with a portion destroyed by clay extraction at its base.

Information about the cemetery

The earliest recorded mention of the mound is found in Basil Iorgulescu's Dictionary from 1892, which describes it as follows: «*m-lă însemnată în C. Gherăseni, puțin mai la Nord de c. Cremenea, în verful ei a fost în vechime o biserică,*

din care abia se mai cunosc ruinele; acum e acoperită cu mai multe cruci; servă de islaz»[7] (Iorgulescu 2005, p. 200).

The initial archaeological references were attributed to Victor Teodorescu, who visited this site during his research in the area (Teodorescu 1959). Two years later, the same archaeologist returned to the area, and in his notebook, at point 54, he noted: "*La marginea de N a satului, spre lacul Frîncului, la movila cu cruci, în afară de neolitic gumelnițean, şi o toartă din bronz sau hallstatt*"[8] (Teodorescu 1961).

In 1971, during excavations at Sudiți, V. Teodorescu and V. Drâmbocianu conducted more detailed surface surveys of the site. The information obtained regarding *Movila Cremenea* was recorded in the field journal of the Sudiți excavation site[9]. It is noted that the mound was approximately two-thirds destroyed (according to V. Drâmbocianu's assessment). It was divided into four zones corresponding to the cardinal points, from which archaeologically significant Chalcolithic, 1st millennium BC, as well as Mediaeval materials, were collected. A box containing the materials obtained during this excavation was identified at Buzău County Museum. All ceramic fragments are marked; some bear the label "Movila Cremenea, 1971, sondage, 0–0.40 m," suggesting that these materials do not solely originate from the surface.

Subsequent references pertain exclusively to the Chalcolithic findings, with *Movila Cremenea* being highlighted in a series of studies on this era.

The commencement of systematic excavations led to the discovery of the first human skeleton. During the 2017 excavation campaign, the scope was limited, with small sondages conducted along the mound's periphery, resulting in no complete skeletons being excavated (Garvăn *et alii* 2018).



Fig. 4. Aerial view of the mound and the position of the 2023 excavation section.
Fig. 4. Vedere aeriană asupra movilei și amplasarea secțiunii din anul 2023.

[7] A notable mound in Gherăseni Commune, slightly north of Cremenea Commune; on its summit was a church in ancient times, of which only the ruins are now known; now it is covered with several crosses; serves as a pasture (translated and adapted by the authors).

[8] On the northern edge of the village, towards Frîncului Lake, at the mound with crosses, besides Neolithic Gumelnița discoveries, there is also a Bronze Age or Hallstatt handle (translated and adapted by the authors).

[9] The journal is stored in the archive of the Buzău County Museum.

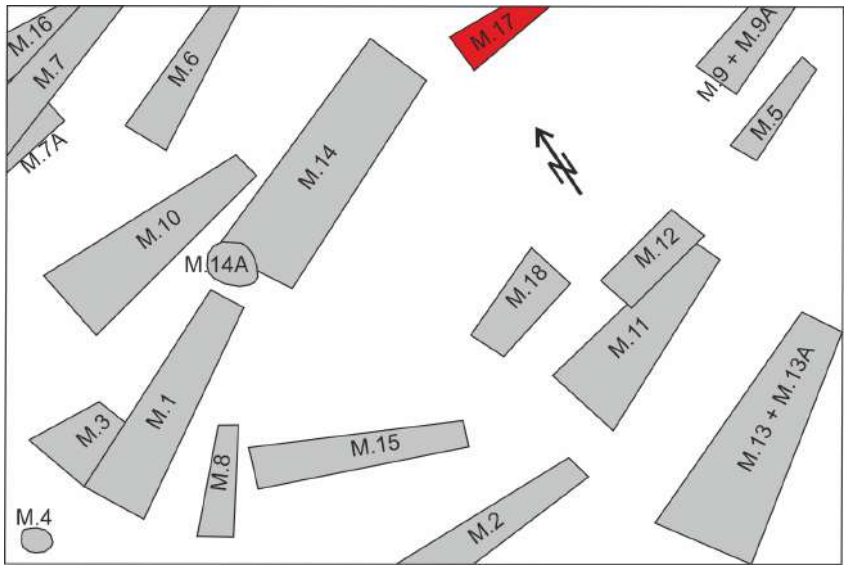


Fig. 5. Location of Gr.17 on the cemetery plan.
Fig. 5. Localizarea M17 pe planul cimitirului.

In the 2023 campaign, research concentrated on the northern side of *Movila Cremenea*, an area seemingly less impacted by the clay extractions of the 20th century, and characterised by a gentle slope from south to north (**Fig. 4**). Given the trench's placement on sloped terrain, the initial graves were identified at depths of 0.80 m on the southern side and 0.40 m on the northern side. A total of 22 skeletons were excavated. Owing to the cemetery's prolonged period of use, there are overlapping graves, reburials, and numerous scattered human bones within the stratigraphy. The grave inventory, though not extensive, includes a few coins (many of which are illegible), discovered either within the graves or outside the features, along with clothing accessories (Garvăn, Munteanu, Dinu 2024). The limited chronological indicators available thus far suggest that the cemetery dates to the 18th and 19th centuries.

Grave 17. Archaeological data

Grave 7 was uncovered in 2023 on the northeastern side of the section (**Fig. 5**), at a depth of 0.52 m. The excavation was partial, extending from the skull to the pelvic region, with lower limbs protruding beyond the trench boundaries (**Fig. 6**). The grave was oriented east-west, with the body positioned supine, arms aligned alongside the body, and the forearms bent over the pelvis. No artefacts were identified within the excavated grave.



Fig. 6. Gr.17 with the skeleton *in situ*.
Fig. 6. M17 cu scheletul *in situ*.

Biparietal osteodystrophy – case study

This research primarily aims to conduct a morphometric analysis of a biparietal osteodystrophy (BTP) case identified in the skull of an adult female, whose remains were unearthed at the cemetery of Gherăseni–*Movila Cremenea* (Buzău County, Romania). This investigation seeks to enhance the morphological and pathological comprehension of the condition and identify potential correlations between osteological characteristics and the archaeological and social context of the discovery. Furthermore, this study contributes to the understanding of possible social implications during the 18th and 19th centuries.

The morphometric description of the skeleton

Morphometric analysis of the skeleton was conducted at the "Olga Necrasov" Centre for Anthropological and Biomedical Research in Iași, employing standard methodologies endorsed by experts to ensure the validity and comparability of the findings.

During the examination, all skeletal features were meticulously documented, including those within normal morphological parameters as per established standards (White, Folkens 2005, p. 75–308), as well as deviations from the norm, such as bone anomalies, non-metric traits, pathological indicators, and lesions, in accordance with criteria developed by palaeopathology specialists (Aufderheide, Rodriguez-Martin 1998; Ortner 2003; Mann, Hunt 2005; Waldron 2009; Mann, Hunt, Lozanof 2016). Markers of occupational stress and biomechanical overload were also recorded (Pálfi, Dutour 1996; Robb 1998; Villotte *et alii* 2016; Molleson 2007), focusing on modifications in muscle attachment sites, which are prevalent among populations with active lifestyles, to provide a comprehensive

understanding of an individual's lifestyle. Consequently, the analysis was conducted within a rigorous methodological framework, facilitating thorough and in-depth morphological interpretation.

The preservation state of the analysed bones was reported to be good (Connell 2008). The skeletal representation is partial, with approximately 75% of the components present (Buikstra, Ubelaker 1994, p. 5–8), with the bones of the lower limbs absent from the skeletal inventory (**Fig. 7**).

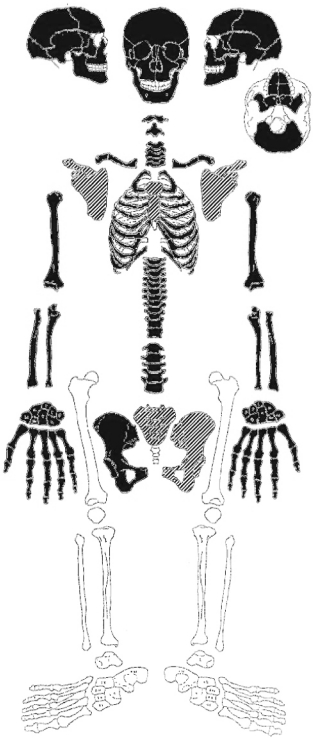


Fig. 7. Skeleton representation (white – absent; black – complete; hatched – incomplete).
Fig. 7. Reprezentarea scheletului (alb – absent; negru – complet; haşurat – incomplet).

The skeletal remains were identified as belonging to an individual of female anthropological sex, with a determination probability (DSP2, Brůžek *et alii* 2017) of 100% female. The biological age was estimated to be approximately 45–50 years, categorising the individual as a middle-aged adult or maturus II. This estimation is based on the morphometric analysis of the available skeletal elements, utilising reference standards and methodologies established in the literature (Ubelaker 1979, p. 72–80, 82–93, 93–114; Buikstra, Ubelaker 1994, p. 15–46; Brůžek 2002;

Walrath, Turner, Bruzek 2004, p. 132–137; Schmitt 2005; Latham, Finnegan 2010; Brůžek *et alii* 2017).

The morphometric study adhered to established classical methodologies (Martin 1928; Martin, Saller 1957–1966; Alexeev, Debetz 1964; Buikstra, Ubelaker 1994, p. 69–84).

Measurements were obtained using a caliper, cranial compass, and linear centimetre (**Table 1**).

The craniofacial morphoscopic features, defined by relative dimensions (**Fig. 8/1–5**), include: a very short, low, moderately wide neurocranium with an oval shape when viewed from a vertical plane; a moderately wide forehead; a moderately wide and moderately high occiput, curved in the upper third; a wide and moderately high face with a low upper facial tier; a short and narrow nose; narrow and low orbits; a short palate with limited width; a shallow canine fossa; a slightly deep mandible, moderately wide at the gonion area and wide at the condyles, with a short and thin body, a short and broad ramus, a prominent, button-like symphysis; attenuated cranial relief; short, gracile, frontalised zygomatic bones; a small, gracile mastoid process; a gracile skeleton; and an estimated stature of approximately 163–164 cm (large female category), calculated based on the maximum length of the humerus, radius, and ulna (Trotter 1970).

The absolute measurements revealed a brachycranic, hipsicranic, and tapeinocranic skull; an oval forehead with intermediate ridges, eurimetopic; a harmonious occiput; a hypereuriprosopic face, eurienic, macropsid; mesoconchi orbits; mezorhinic nose; brachistaphaline palate; and a robust-body mandible (**Fig. 8/1–5**).

Based on these characteristics, the individual is identified as possessing a Mediterranoid[10] phenotypic profile with Mongoloid[11] elements, predominantly expressed in the lower facial segment, particularly in the subnasal region (*zm1-ssp-zm1*).

[10] The Mediterranoid anthropological type, a subset of the broader Europoid phenotipic group, manifests in various forms in European populations. It appears in its classic form or as a palaeo-Mediterranoid (or proto-Mediterranoid) or a Pontic (Danubian) variant. This type is distinguished by a specific combination of craniofacial and postcranial characteristics, including marked gracility of the skeletal system; a dolichocephalic (elongated and narrow) skull cap; orthocranic and mesocranic shape; an eurimetopic forehead with parallel ridges; a mid-to-wide and convex occiput; lightly expressed bony relief; and a mesene (middle) or leptene (high and narrow) facial skeleton, characterised by an oval, elongated, medium-to-narrow face. The orbits are of medium or high size (mesoconchi or hipsiconchi); the nose is straight or slightly convex, medium (mesorin), or high and narrow (leptorin); the zygomatic region (cheekbones) is narrow and positioned intermediately or parasagittally/temporally; the mandible is gracile and low, with a prominent symphysis. The overall stature is generally small, but it varies within the limits of submedium to above medium categories (Boev 1972).

[11] The Mongoloid anthropological type is distinguished by a brachycranic skull, pronounced prognathism in the subnasal region, broad and flattened facial skeleton, superficial canine fossae, frontalised zygomatic region, broad and flattened nose, low orbits, large interorbital distance, robust mandible, well-expressed mandibular torus, upper incisors of the 'shovel-shape', and stature ranging from above medium to tall (Boev 1972).

Table 1. Main absolute craniofacial and postcranial dimensions (in mm, including stature).
Tab. 1. Principalele dimensiuni cefalo-faciale și postcraniene absolute (în mm, inclusiv statura).

Martin No.	Dimensions (in mm)	
1.	*g-op*	160
2.	*g-i*	155
3.	*g-l*	156
8.	*eu-eu*	134
9.	*ft-ft*	93
10.	*co-co*	106?
11.	*au-au*	116
12.	*ast-ast*	103
13.	*ms-ms*	98
20.	*po-b*	105
24.	*po-po*	290
25.	arch *n-o*	340
26.	arch *n-b*	114
27.	arch *b-l*	110
28.	arch *l-o*	109
281.	arch *l-i*	48
282.	arch *i-o*	50
29.	chord *n-b*	102
30.	chord *b-l*	99
31.	chord *l-o*	97
311.	chord *l-i*	53
312.	chord *i-o*	50
	chord *l-op*	9
	chord *op-o*	87
43.	*fmt-fmt*	98,5
431.	*fmo-fmo*	91
44.	*ek-ek*	93
45.	*zy-zy*	128
46.	*zm-zm*	54
	zm1-zm1	88

Martin No.	Dimensions (in mm)	
47.	*n-gn*	109
48.	*n-pr*	60
50.	*mf-mf*	20
51.	*mf-ek*	38
52.	orbital height	29
54.	*al-al*	23
55.	*n-ns*	47
57.	width of nasal bridge	6
571.	maximum nasal width	17
62.	*ol-sta*	41
63.	*enm2-enm2*	36
63a.	the width of the palate	60
	fmo-n-fmo	15
	zm1-ssp-zm1	25
65.	*kdl-kdl*	116
66.	*go-go*	91
68.	mandible depth	63
69.	*id-gn*	24
691.	height of the mandibular body at the level of the *foramen mentale*	23
693.	thickness of the mandibular body at the level of the *foramen mentale*	10,5
70.	height of the mandibular ramus	49
703.	height of the sigmoid notch	12,5
71.	width of the vertical branch	29
711.	width of the sigmoid notch	29,5
Humerus	maximum length	300
Radius	maximum length	222
Cubitus	maximum length	243
	Skeletal stature	1630-1640



Fig. 8. The skull seen from the facial (1), lateral (2–3), occipital (4) and vertical (5) views.
Fig. 8. Craniul văzut din planurile facial (1), lateral (2–3), occipital (4) și vertical (5).

Subject's health status

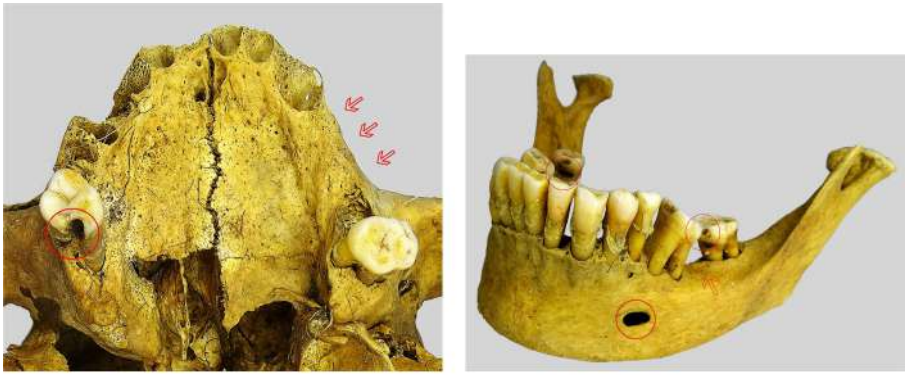
The dental health condition of the subject was extremely poor, suggesting an age of over 60 years. This contrasts with other indicators of biological age, such as moderate joint degeneration, partially aerated metaepiphyseal spongy tissue, and sutural synostosis on the endocranium, which suggest that the age at death of this woman was within the 45–50-year range.

The presence of carious lesions on the crown and crown-root junction, supragingival calculus, and antemortem tooth loss (**Fig. 9/1–2**) observed in the dental arches provides compelling evidence of chronic conditions and a degradation process influenced by the social and hygienic conditions of the period. In both dental arches, the alveolar tissue exhibited signs of inflammation with retraction of the alveolar line. This process is more pronounced in the maxilla, where tissue resorption is evident, which is a characteristic feature of periodontal disease. These diseases involve the destruction of alveolar structures and weakening of the bony support of the teeth.

Dental crown wear is characterised by a combination of attrition and abrasion. Attrition refers to the physiological wear that occurs during mastication, whereas abrasion is attributed to external factors, such as grinding of teeth against hard objects, compulsive habits, or inadequate oral hygiene. In this instance, abrasion is most likely attributable to tooth loss, which results in malocclusions and an uneven distribution of masticatory forces, thereby exacerbating the wear of certain teeth.

Antemortem tooth loss is attributable to advanced caries, severe periodontal disease, or trauma, each of which significantly affects the structure and function of the masticatory apparatus. Tooth loss disrupts occlusal balance, resulting in destabilisation of tooth alignment, which leads to improper contact between teeth and, consequently, intense and uneven wear. This disruption affects the distribution of masticatory forces and exacerbates the pathological process (Anderson 2004; DeWitte, Bekvalac 2010; Pedergnana, Huber 2024).

Anatomical variation identified in the mandible, classified as a non-metric/epigenetic trait, is the enlargement of the mental foramen (**Fig. 9/2**). This foramen is located bilaterally on the anterior aspect of the mandibular body in the median region of the lower third of the face. The diameters were approximately equal, measuring 6×3 mm on the left side and 6×4 mm on the right side. Anatomically and morphologically, this foramen serves as a passage for the mandibular neurovascular bundle, which is responsible for the vascularisation and innervation of the dental alveoli, gums, oral mucosa, and chin tissues. Some authors interpret the enlargement of this canal as a morphological adaptation to environmental conditions, positing it as an organism's adaptive response to harsh climatic conditions, such as low temperatures and high humidity (Tomaszewska, Tomczyk, Kwiatkowska 2013).



1 2

Fig. 9. 1. Dental pathologies on the upper dental arch; 2. Oversized mental foramen and dental pathologies on the lower dental arch.
Fig. 9. 1. Patologii dentare pe arcada dentară superioară; 2. *Foramen mentale* supradimensionat și patologii dentare pe arcada dentară inferioară.



Fig. 10. Mandibular torus expressed bilaterally.
Fig. 10. *Torus mandibularis* exprimat bilateral.

Enlargement of the mental canal is thought to reflect adaptation to thermal stress, aiding efficient thermoregulation and maintenance of body temperature. Conversely, this morphological variation may be associated with other variations in the mandibular bone structure or with certain congenital craniofacial anomalies or bone pathologies (Friedrich, Matschke, Wilczak 2019; Mortazavi *et alii* 2019).

Located along the lingual border of the mandible, specifically on the alveolar margin near the roots of the second premolar and first molar, adjacent to the mental foramina, are bulbous bony protuberances (**Fig. 10**) known as the mandibular tori (Mann, Hunt, Lozanoff 2016, p. 486, Fig. 643a–b). When these features are observed in conjunction with shovel-shaped' incisors and the extension of enamel onto the lower molars, they collectively form a distinctive set of characteristics indicative of Mongoloid typological traits (Mann, Murphy 1990, p. 30; Hassett, 2006).



Fig. 11. Degenerative changes on the mandibular condyles (1) and cervical vertebrae (2).
Fig. 11. Modificări degenerative pe condilii mandibulari (1) și vertebrele cervicale (2).

The vertebral column of the subject exhibited signs of degeneration, as evidenced by the corrosion (**Fig. 11/2**) and presence of osteophytes along the margins of the cervical, thoracic, and lumbar vertebral bodies. These bony growths develop in response to wear and mechanical stress and may exert pressure on nerve roots or, in more severe instances, on the spinal cord, resulting in clinical manifestations such as neuralgia and compressive myelopathy. In the cervical region, alterations in the articular process surfaces were noted, indicating secondary osteoarthritis associated with the degenerative process, which exacerbates mobility dysfunction and contributes to segmental instability.

Spinal osteoarthritis, also known as degenerative spondyloarthritis, is attributed to a range of aetiological factors, including intensive and repetitive physical exertion, the natural aging process, traumatic injuries, hereditary predisposition, and obesity. These factors activate and accelerate the mechanisms of articular surface wear, leading to the development of osteophytes, reduction of intervertebral spaces, and formation of ankyloses, which can impair spinal function and cause

pain or neuralgia (Waldron 1995). In a palaeopathological context, these signs indicate prolonged strenuous physical exertion and accelerated aging conditions, serving as valuable indicators for understanding lifestyle and health status.

Degenerative changes are also observed at the cranial level, specifically on the surface of the temporomandibular joint, manifested by porosity on the condyles and a reduction in their size (**Fig. 11/1**). This type of osteoarthritic change results from excessive mastication, malposition of the mandible, bruxism, or local and repetitive trauma, which leads to limited mandibular movement.

Furthermore, on several crowns of the incisors and molars, multiple microtraumas to the enamel were identified, occurring antemortem due to mechanical stress. The affected crowns exhibit irregular and rough edges, potentially resulting from accidents during daily activities or episodes of violence. Additionally, the consumption of hard foods such as nuts, root vegetables, and coarsely ground grasses exerts mechanical forces on dental crowns, contributing to microtrauma. Chewing these foods, in conjunction with malocclusion, can lead to abrasion-type wear and chipping of the crowns, particularly if they are already compromised by other factors such as caries.

Pacchionian or arachnoid granulations are present on the parietal bones, near the sagittal suture, on the inner surface of the skull table, and are visible even in transillumination images (**Fig. 13**). These granulations appear as excavations and are structures of physiological or pathological origin, produced by the arachnoid membrane through a process of migration into the sinus space, facilitating the absorption of cerebrospinal fluid into the cerebral venous system. The formation of such granulations may be induced by intracranial hypertension, ventricular expansion, hydrocephalus, or other pathologies, serving as indicators of adaptation to increased pressure within the central nervous system (Cooper 1958; Mehta, Mehta 2023).

The manifestation pattern of biparietal osteodystrophy

Two depressions characteristic of BTP were observed on the parietal bones. The diagnosis was established through morphoscopic[12] analysis using both unaided visual inspection and a binocular magnifier. The factors considered included the individual's age and sex, presence of associated modifications, and localisation, shape, size, and depth of the depressions. The transillumination method employed corroborated the diagnosis, precisely identifying thinned areas of the diploic layer.

[12] In the future, we will undertake a comprehensive, non-invasive study utilising imaging techniques. This decision was based on the understanding that modalities such as computed tomography, radiography, and magnetic resonance imaging represent the most accurate methods for determining the presence or absence of bone alterations.

Thinning was evident in both parietal bones. The depressions are located in the posterior medial region of each bone, positioned between the parietal eminences and the sagittal suture, and are visible to the naked eye and palpable on the tabula externa of the cranium (**Fig. 12/1–2**). There are no corresponding features on the endocranial surface, as this inner layer remains unaffected. Although there was a slight variation in the shape and size between the two depressions, they were sufficiently similar to be considered symmetrical. The surface was slightly undulated, with roughness attributable to taphonomic factors. The edges were smooth and indistinct.

Both concavities were oriented in the anteroposterior direction and situated between the temporal line and sagittal suture. The curvature extending from the affected area to the normal region was smooth. No protrusions were observed on the surface of the depressions, indicating the absence of diploic residues during the thinning process. Thinning is progressive, extending from the edges toward the centre, and transillumination suggests that the bone is translucent at the centre of each depression (**Fig. 13/1–2**). The depth of the depression did not exceed 2–3 mm.



Fig. 12. Parietal depressions seen from inclined semi-profile (1) and semi-vertical (2) views.
Fig. 12. Depresiunile parietale văzute din semiprofil înclinat (1) și plan semivertical (2).

Both parietal foramina were present, appeared normal, and were not enlarged. There were no signs of inflammation or other alterations in the bone tissue, and the depressed areas were surrounded by normal tissue without bone defects or other lesions on the skull.

The dimensions of the depression on the right parietal bone were 40 mm sagittally and 33 mm coronally, located 35 mm from the sagittal suture, 40 mm from the lambdoid suture, and 40 mm from the coronal suture. For the left parietal bone, the depression measured 40 mm sagittally and 35 mm coronally, situated 30 mm from the sagittal suture, 40 mm from the lambdoid suture, and 35 mm from the coronal suture. Both have irregular ellipsoidal contours.

Bone thinning observed in the affected regions was uneven, with the diploe on the left side exhibiting greater thinning than that on the right side. Biparietal thinning (BTP) is classified as flat, (according to Bruyn, Bots 1978), and is categorised as 2nd–3rd stages (according to Breitinger 1982). This classification indicates that by the time of death, the thinning of the parietal bones had advanced to a moderate degree, corresponding to 2nd stage (according to Cederlund, Andren, Olivecrona 1982).

Despite the absence of radiographic and CT imaging, the diagnosis is evident, primarily based on the characteristics of the depressions: bilaterality, symmetry, and the absence of other cranial modifications of different origins, such as congenital anomalies, developmental irregularities, trauma, tumours, or infectious processes. Additionally, the historical context and morphometric data allow for the exclusion of artificial deformation. Furthermore, the sex and age at death of the individual, along with acquired degenerative processes observed in the available skeletal elements for analysis in this study, support the hypothesis that biparietal thinning is associated with the natural aging process.

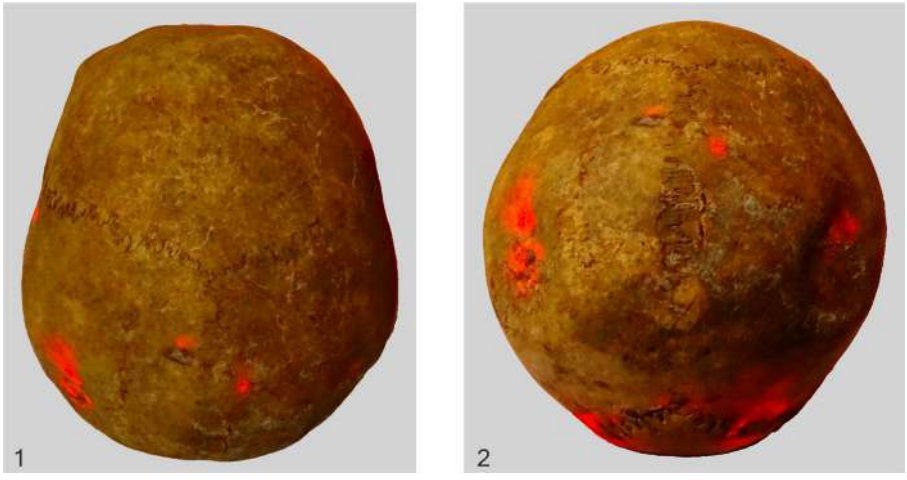


Fig. 13. Thinned areas highlighted by the transluminescence method.
Fig. 13. Zonele subțiate evidențiate prin metoda transluminiscenței.

Some findings from the archaeological context

Biparietal osteodystrophy is a rare anomaly observed in osteological collections from archaeological excavations and clinical cases. The challenge in identifying BTP, often due to the preservation state and the degree of representation of the skeletal material – particularly in prehistoric collections – renders it a difficult subject of study and partially accounts for the infrequent detection of this anomaly in the literature.

Over time, numerous reviews and syntheses of the literature have been published to provide a comprehensive perspective on the incidence, geographical distribution, and aetiology of BTP across different eras. Among the most significant works are those authored by Pozzi (1879), Chiari (1910), Meyer (1917), Greig (1926), Cave (1927), Durward (1929), Wilson (1944), Camp, Nash (1944), Epstein (1953), Nashold, Netsky (1959), Mikic (1976), Bruyn, Bots (1978), Phillips (2007).

Phillips (2007) represents the most detailed and comprehensive examination of the BTP phenomenon approached from multiple perspectives. This research is grounded in a complex analysis encompassing the concept of deviation, a historical review of research, and an evaluation of the geographic and palaeoanthropological distribution of cases. A significant portion of the study involved the examination of 1,041 skulls from ancient Egypt, sourced from 37 archaeological sites and collected from various museums and collections both within Egypt and internationally. The author meticulously details the provenance and age and anthropological sex of each case and the context of the discoveries. Within this cranial series, 51 skulls (4.9%) exhibited BTP: one individual was a young adult, two were middle-aged adults (4%), and the remaining 48 individuals (94%) were adults over 50 years old. The sex ratio in this sample was approximately 1:1.43, with a higher prevalence in females, supporting the hypothesis that this pathology is more common in women, particularly during physiological aging (Phillips 2007, Tab. 10.6). This thesis further explores the aetiology of the deviation, questioning whether the thinning of the parietal bones should be interpreted as a morphological anomaly, a pathology, or a variant of normality and human morphological diversity. In this context, aspects such as epidemiology, prevalence, genetic and hereditary factors, histological features of bone structures, and potential pathological or physiological causes that may determine BTP were analysed and discussed. This critical approach aims to elucidate the morphological and pathogenetic nature of the phenomenon, thereby contributing to a more nuanced interpretation of skeletal manifestations in anthropological and palaeopathological studies.

The most recent literature review by Rossetti *et alii* (2024) encompasses an analysis of 26 studies, selected based on several criteria, including the language of publication. Consequently, cases published in languages unfamiliar to the authors

were excluded from the statistical analysis (Rossetti *et alii* 2024, p. 119, Tab. 1). Among these cases is a skull from the Eneolithic necropolis of Gaudo (Paestum, Italy), exhibiting a bilateral, symmetrical manifestation of BTP (Mallegni 1976), as well as another pertinent example for our case study: a female approximately 42 years of age, interred in the Middle Byzantine necropolis of Noviodunum–Isaccea (Tulcea County, Romania) (Vasile 2022), which will be revisited with further details.

Tornberg (2018; 2022) documents a case from a Scandinavian prehistoric site, specifically the necropolis at Kyhlbjersbacken (Håslöv, Sweden), excavated in 1934–1935 and dated to the Late Neolithic–Early Bronze Age. The skeleton is attributed to a female over 85.2 years old, a precise estimate obtained through an advanced statistical method known as TA3/Transition Analysis 3[13].

An additional significant case involves a female approximately 45 years of age, interred in the Bronze Age necropolis of Harappa (Punjab, India), dated to c. 2300 BC. Her cranium displayed broad, irregular apertures on each parietal bone, supplanting the depressions where the bone tissue was thin – a postmortem origin attributed to taphonomic factors (Dutta 1969).

Lacombe (2004) documented several crania from archaeological sites dating to the Neolithic and Chalcolithic eras. Herein, we present a few examples. From the Neolithic site of Skhirat (Morocco), dated between 6500 and 6200 BC, the author reports three crania exhibiting BTP: two manifesting bilaterally and one unilaterally, illustrating the morphological variability and anatomical distribution of this condition. The same Lacombe (2004) reported two crania from the Neolithic settlement of l'Abri Pendimoun (France), dated to 7700–7400 BP, as well as two additional crania from subsequent Chalcolithic sites, namely Merdeplau and Montpellier-le-Vieux, both located in France. These instances underscore the presence of BTP across diverse temporal and geographical contexts, suggesting a widespread distribution of this condition (Lacombe 2004, p. 157–158, Tab. 1).

Phillips (2007, p. 25–28), in his doctoral thesis, which we have frequently referenced, also identifies additional noteworthy cases, including:

– A skull from a dolmen at Roknia (Algeria), dated to the Neolithic (according to Dastugue, 1973, p. 65).

[13] TA3/Transition Analysis 3 is a software program specifically designed for forensic scientists, bioarchaeologists, and palaeoanthropologists to facilitate the accurate estimation of age at death for individuals over 50 years of age based on skeletal remains. This estimation process is noninvasive, as it relies on a set of morphoscopically recorded traits. Notably, among the 74 characteristics included in this set, which comprised both binary and ordinal variables, was depression or thinning of the parietal bones. For further information, please refer to https://nij.ojp.gov/events/transition-analysis-3-age-death-estimation-past-present-and-future#detailed-learning-objectives.

- A female skull (age at death – over 70 years) discovered at Santa Venera (Italy), exhibiting BTP of the sulcus type, dated to the 5th century BC (according to Henneberg, Henneberg, Cipriani 2002, p. 1115).
- A middle-aged female skull found in a burial mound at Dunstable, England, dated to the Bronze Age (as reported by Smith, 1927, p. 25–27).
- Other skulls from tumulus graves and flat necropolises in Great Britain – an adult female from a tumulus grave in the necropolis near Garton (Yorkshire), a middle-aged female from a Roman cemetery at Frilford (Berkshire), and an elderly female from a Saxon cemetery at Great Chesterford (Cambridgeshire) (as documented by Brothwell 1967, p. 413–416).
- An elderly female skull from a feature dated to the 6th century AD, discovered in an Anglo-Saxon cemetery at Norton (Cleveland) (as noted by Birkett 1992, p. 119).

The research conducted by Smith (1907, Tab. 2.1; 1912), previously referenced in the section addressing the intricate aetiology of BTP, is notable for documenting numerous cases identified in mummies from the dynastic cemeteries of ancient Egypt. BTP manifestations have been observed across various age groups, including younger individuals. A significant contribution to the understanding of BTP epidemiology in ancient Egypt was also made by Phillips (2007, Tab. 10.6), who, through the examination of 1,041 skulls from museum collections and archaeological sites, reported a prevalence of 4.9% for this condition, indicating its considerable presence in the ancient Egyptian population. Breitinger's (1983) study identifies four additional skulls discovered in the Great Pyramid of Khufu, all exhibiting characteristic features of BTP, with three being female and one male. Similarly, Rowling (1961) observed analogous depressions on the skulls of mummies of Pharaoh Thutmose III and Queen Meritamen from the New Kingdom period, supporting the notion that bilateral parietal depressions are characteristic of certain eras and social elites.

The most abundant instances of skulls exhibiting biparietal osteodystrophy (BTP) have been identified through archaeological findings from the Palaeo-Christian, Mediaeval, and Modern periods. These cases have been diagnosed using a range of methodologies, including morphometric, histological, and imaging techniques (radiological and CT), which underscore the variable manifestations and severities of the anomaly. All such cases are derived from adults of middle and advanced age, encompassing both male and female, thereby reinforcing the hypothesis that BTP is a prevalent manifestation among populations within the maturus (30–60 years) and senilis (60+ years) age groups (see, for example, Topinard 1881; Greig 1926; Hill 1931; Arnaud, Arnaud 1976; Mikic 1976; Mallegni 1976; Breitinger 1982; Ortner,

Putschcar 1981, p. 292; Günay 2005; Baggieri 2007; Sağır 2009; Çırak 2009; Çırak, Tarhan, Köroğlu 2021; Kokotović 2021; Tonnina *et alii* 2022; Rossetti *et alii* 2024).

Vasile (2022) documented the inaugural and singular instance of BTP identified within Romanian literature so far. The cranium was unearthed from an archaeological site situated in the Mediaeval Byzantine necropolis of Noviodunum–Isaccea (Tulcea County, Romania), specifically at the *Așezare Civilă Est* point, a burial area broadly dated between the 11th and 18th centuries (Stănică, Vasile 2018 *apud* Vasile 2022, note 2). The author examined a relatively complete and well-preserved skeleton, attributed to a female with an estimated age at death of approximately 42 years. The manifestation of BTP identified by the author was severe, classified as 4th stage (according to Breitinger 1982). The observed features included two symmetric, relatively equal depressions located posteromedially on the cranial vault. The depression on the left parietal lobe measured approximately 63 mm in the sagittal direction, while that on the right parietal lobe measured approximately 58 mm. These depressions are indicative of advanced disease severity, as evidenced by the severe thinning of the cranial bone, which the author spectacularly illustrated through transillumination (Vasile 2022, p. 320, 330–331; Figs. 8–9). Additional pathological findings noted by the author included Pacchionian depressions, several antemortem tooth losses, thoracic intervertebral hernia, and periosteal lesions on the tibiae and fibulae, reflecting a state of chronic illness and multiple osteoarticular degeneration. These pathological deviations provide both morphological and pathogenetic contexts, contributing to a more comprehensive understanding of the health status of the analysed subject (Vasile 2022).

Another instance of BTP from Romania, referenced solely in a recent bioarchaeological profile publication without additional details, involves a skull from grave 126, unearthed in the Mediaeval-Modern cemetery of Răchiteni (Iași County, Romania), dated to the 17th–20th centuries. The skeleton associated with this skull was in a satisfactory state of preservation and was attributed to a female approximately 60 years of age, classified as a very old adult. Morphometric analysis revealed the following characteristics: moderately robust skeletal structure, hyperbrachycephalic cranial index, oval cranial cap, attenuated cranial relief, deep canine fossa, medium-sized zygomatics, moderately convex and moderately high occiput, very gracile (edentulous) mandible with pyramidal symphysis, high and moderately wide ramus. The skeletal stature was categorised as large, approximately 159 cm. Phenotypically, it is characterised as a Dinaroid-Mediterranoid. Associated pathologies include attrition of dental crowns, periodontitis, numerous antemortem tooth losses, dental caries, and advanced osteoarthritis of the mandibular condyles. Additionally, occupational stress markers, such as a prominent deltoid ridge and broad supratrochlear aperture on the humeri, moderate subtrochanteric relief

on the femurs, and facets of hyperdorsiflexion on the tibiae, were identified. These morphological indicators may suggest an active lifestyle that demands the musculoskeletal system. In this case, BTP manifests bilaterally and approximately symmetrically, with thinned depressions being completely destroyed by taphonomic factors (Simalcsik, Simalcsik, Fedor 2025, p. 164–165, note 201, Pl. XV).

These recent cases, along with the one from Gheräseni (see note 12), will be incorporated into a comprehensive interdisciplinary study. This study will involve detailed imaging (X-ray and CT) and morpho-structural analyses to elucidate the clinical, morphological, and pathological manifestations of BTP.

Risks and social implications

Clinically, the majority of biparietal osteodystrophy (BTP) cases are asymptomatic and are typically identified incidentally through imaging studies or during autopsies (Mann, Kobayashi, Schiller 2017). Recent research indicates that some individuals, in addition to experiencing palpable concave depressions of the scalp, exhibit nonspecific symptoms such as headaches, dizziness, vertigo, and tinnitus, without manifesting clear neurological or severe neuropathological symptoms (Verma *et alii* 2024; Pallua *et alii* 2024).

Previous research has identified symptoms such as hearing loss, visual disturbances, and memory impairments (Virchow 1856; Greig 1926) or has posited that BTP lacks significant clinical relevance (Verga 1896).

It is widely accepted that BTP is a potential risk factor for skull vault injuries, although it is not considered a pathology with major clinical manifestations.

The thinned regions of the parietal bones exhibit reduced mechanical resistance, rendering them susceptible to severe bone injuries, including open fractures, even from minor impacts. In certain instances, such injuries may lead to the migration of bone fragments towards the dura mater, resulting in serious intracranial damage.

The clinical literature documents instances of patients with incidental discovered parietal thinning who experienced epidural haematomas or other intracranial injuries following minor trauma.

As individuals age, this susceptibility becomes increasingly pronounced, thereby elevating the risk of injuries in the context of accidents or traumatic events (Scheuer, Black 2000, p. 98; Yılmaz *et alii* 2013; Mann, Kobayashi, Schiller 2017; Tonina *et alii* 2022; Vasile 2022; Rossetti *et alii* 2024; Ruzman *et alii* 2025).

Based on these observations, we posit that, during the Mediaeval-Modern period, a condition such as BTP could have constituted an elevated risk factor, particularly given that populations from lower social strata – such as rural communities – engaged in demanding lifestyles characterised by intense physical activity, manual labour, and increased exposure to accidents and to trauma. Under

these circumstances, the heightened fragility of thin bones likely increases the probability of severe injuries.

In clinical research, the identification and interpretation of BTP serve as valuable methodologies for elucidating pathogenic patterns. Concurrently, in palaeopathological studies, BTP has emerged as a crucial tool for investigating the genetic diversity of ancient populations and understanding the influence of human-environment interactions, as well as cultural and social factors, on the morphological characteristics of the skeleton.

Identified within an archaeological framework, variations in cranial architecture, such as BTP, may have diverse social, cultural, and medical implications. Such a shape deviation might be perceived as an indicator of differentiation or a distinctive characteristic, potentially conferring a special status on the individual, especially if this deformation of the vertex is visible.

In certain cultures, anatomical variations are regarded as symbols of wisdom or unique spiritual connections, often linked to specific roles or responsibilities. Individuals with atypical cranial shapes may have symbolic significance. Conversely, an uncommon or distinctive cranial shape – evident to other community members – might bear negative connotations, perceived as a sign of infirmity or a significant defect. In such instances, individuals may face marginalisation, stigmatisation, or exclusion from particular community activities (for more information, see Bienert 1991; Mednikova 2004; Nieuwhof 2015; Georgieva, Russeva 2016; Gresky, Haelm, Clare 2017; Kogălniceanu, Simalcsik 2018; Zielo 2018; Thomson *et alii* 2025).

In this study we focused on a female individual. During the Mediaeval period, women's physical differentiation was frequently signified by their attire and hair accessories (Bartlett 1994; Ashby 2014). While facial hair served as a distinct marker for men, long hair was emblematic of women, contributing to the cultural perceptions of femininity and masculinity during that era (Milliken 2019, p. 9, 13). Moreover, long hair often obscures the shape of the skull, thereby diminishing the visibility of any potential deformities.

Women customarily covered their heads (Milliken 2019, p. 19–20), which would have concealed any cranial abnormalities. Nonetheless, a pronounced depression might have been noticeable to community members, particularly if it altered the shape of the head, which would be visible when not obscured by hair. In the case of the woman from Gherăseni–*Movila Cremenea*, however, the cranial depression appears to be minimal, likely rendering it less visible and, consequently, less influential in her societal acceptance.

From a sociological perspective, the population of the Mediaeval to Modern period, as exemplified by Gherăseni, allows for multiple interpretations. By examining factors such as the socio-cultural environment of rural societies in

the 18th and 19th centuries, alongside the poor health condition of the individual under study – evidenced by severe dental diseases, osteoarthritis, microtraumas to dental crowns, and markers of daily physical exertion – it can be inferred that this woman led an active and demanding lifestyle. Furthermore, she likely lived under poor sanitary conditions, which were common in rural, Mediaeval communities.

Current archaeological investigations at the Mediaeval–Modern site of Gheräseni–*Movila Cremenea* reveal that the majority of burials within this funerary area are devoid of associated artefacts, suggesting a community characterised by modest socio-economic status. In the case of the woman in question, the presence of BTP does not appear to be indicative of elevated social status or veneration; rather, it reflects the challenging living conditions typical of rural communities in the region. The lack of artefacts and the absence of any privileged positioning within the grave further support the hypothesis of a lower social standing, where pathologies are interpreted as consequences of lifestyle and socioeconomic conditions.

The woman with BTP interred in the necropolis at Gheräseni can be understood as an individual of modest social status, whose pathological profile reflects her living conditions, including intense physical activity, potential poverty, and limited access to hygiene and healthcare resources, all within the context of the Mediaeval rural environment.

Conclusions

The study confirmed the presence of biparietal osteodystrophy in an adult female individual whose skeleton was exhumed from the Mediaeval-Modern cemetery at Gheräseni–*Movila Cremenea*, Romania. This finding offers valuable insights into this rare condition in ancient populations and contributes to expanding the database on the incidence and manifestations of BTP, providing a relevant comparison with similar cases from the specialised literature.

However, the interpretation of biparietal osteodystrophy (BTP) remains a significant scientific challenge, as it cannot be explained by a single factor alone. Instead, it necessitates a multidisciplinary approach and an integrated understanding of various pathological, genetic, social, and ecological elements. Numerous bioarchaeological and clinical studies have highlighted the prevalence and antiquity of this condition, which dates back thousands of years and has been identified in populations worldwide. This suggests that BTP is a widespread abnormality deeply rooted in human evolution.

Nevertheless, despite scientific advances, there is still no clear and universally accepted explanation: is it a morphological anomaly, pathology, or an adaptive variant of normality?

The present analysis highlighted the complexity and multifactorial nature of the aetiology of BTP, which involves a range of interconnected factors. In addition to genetic predisposition, metabolic and hormonal influences, environmental factors also significantly contribute to the pathogenesis of this condition. Concurrently, skeletal degeneration associated with aging and systemic osteoporosis appears to play a substantial role in the onset and progression of BTP, indicating a complex interplay between biological processes and environmental factors in determining this disorder.

The statement, "Neither senility, nor senescence, nor chronic trauma, nor muscular traction, nor inflammation sufficiently explains the lesion, its symmetry, its location, or its age and predisposition," as cited from Bruyn, Bots (1978, p. 125), emphasises the challenges in elucidating the aetiology of the BTP phenomenon and underscores the necessity for ongoing research to uncover its origin, function, and evolutionary significance.

The archaeological context of the discovery, situated within a cemetery characterised by a limited funerary inventory, indicates the individual's modest socio-economic status. The challenging lifestyle and intense physical activity, as evidenced by the observed bone and dental pathologies, may have contributed to the development of BTP in this case. This bioarchaeological perspective enhances our understanding of the impact of living conditions on health and allows for an assessment of the role of social and economic factors in determining the distribution and manifestation of BTP in historical populations.

Our study underscores the significance of an interdisciplinary approach to the examination of palaeopathological conditions, integrating archaeology, anthropology, and medicine to achieve a comprehensive understanding of the health and lifestyle of ancient populations.

Finally, we emphasise the necessity for further research to thoroughly elucidate the causes and implications of BTP in palaeopathology and to gain a deeper understanding of the risk factors and impact of this condition on the quality of life in antiquity. Future investigations will focus on a comparative analysis of a larger number of cases and on employing more advanced diagnostic methods, such as imaging analysis (X-rays or CT scans), to accurately confirm the BTP diagnosis and better evaluate the degree of parietal bone thinning. Additionally, continued archaeological research at the Gherăseni–*Movila Cremenea* cemetery could provide further insights into the social and economic context of the community and help identify other cases of BTP, thereby offering a broader perspective on the prevalence of this condition in the past.

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