

Biological reconstruction of the Late Neolithic Lengyel Culture

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Abstract of PhD thesis submitted in 2013 to the Doctoral School of Biology, Eötvös Loránd University, Budapest under the supervision of Gyula Gyenis.

Between 2006 and 2009 rescue excavations preceding the construction of M6 Motorway were carried out, in the course of which a settlement and a related cemetery of more than two thousand graves of the Late Neolithic-Early Copper Age Lengyel culture have been excavated at the site of Alsónyék-Bátaszék, in Southeastern Transdanubia (Tolna county). Present study considers the northern, so-called 010/B part of the site (cemetery), comprising 862 graves. According to the current archaeological consensus earlier Central European Linearbandkeramik culture (LBK) played a crucial role in the formation of the Lengyel culture, but an infiltration or migration of new populations during this time period cannot be excluded. Present dissertation has been designed to investigate this fundamental question. In addition, I completed a detailed demographic analysis and published the frequency data of several pathological and dental alterations. In the course of the still ongoing investigation a case showing the classic symptoms of tuberculosis had been found.

Introduction

The physical anthropological characteristics of the Transdanubian Late Neolithic-Early Copper Age Lengyel culture are well known due to its numerous excavated cemeteries (Fig 1), which were investigated by physical anthropologists, and the majority of them was published by K. Zoffmann.¹ According to current archaeological consensus the earlier Central European *Linearbandkeramik* culture (LBK) played a crucial role in the formation of the culture, which is supported by their identical geographical distribution.² However, southern and southeastern influences archaeologically detected in the material culture suggest an infiltration of new populations during this time period.³ Considering the origin of Lengyel people the physical anthropological literature identifies multiple scenarios that differ in the assumed ratios of indigenous and infiltrated populations.⁴ Present dissertation has been designed to investigate this fundamental question, based on the morphometric, taxonomic and craniometric comparative analyses of the human remains unearthed at the site of Alsónyék-Bátaszék. In addition, pathology and the dental alterations were also observed and frequency data published, which will contribute to further comparative investigations.⁵

1 K. ZOFFMANN 1968; 1969-1970; 2004, 2012.

2 KALICZ 1988.

3 KALICZ 2001.

4 SZATHMÁRY 1980; 1981; ZOFFMANN 2004; KÓVÁRI – SZATHMÁRY 2001; KÓVÁRI 2008.

5 PAP 2012.

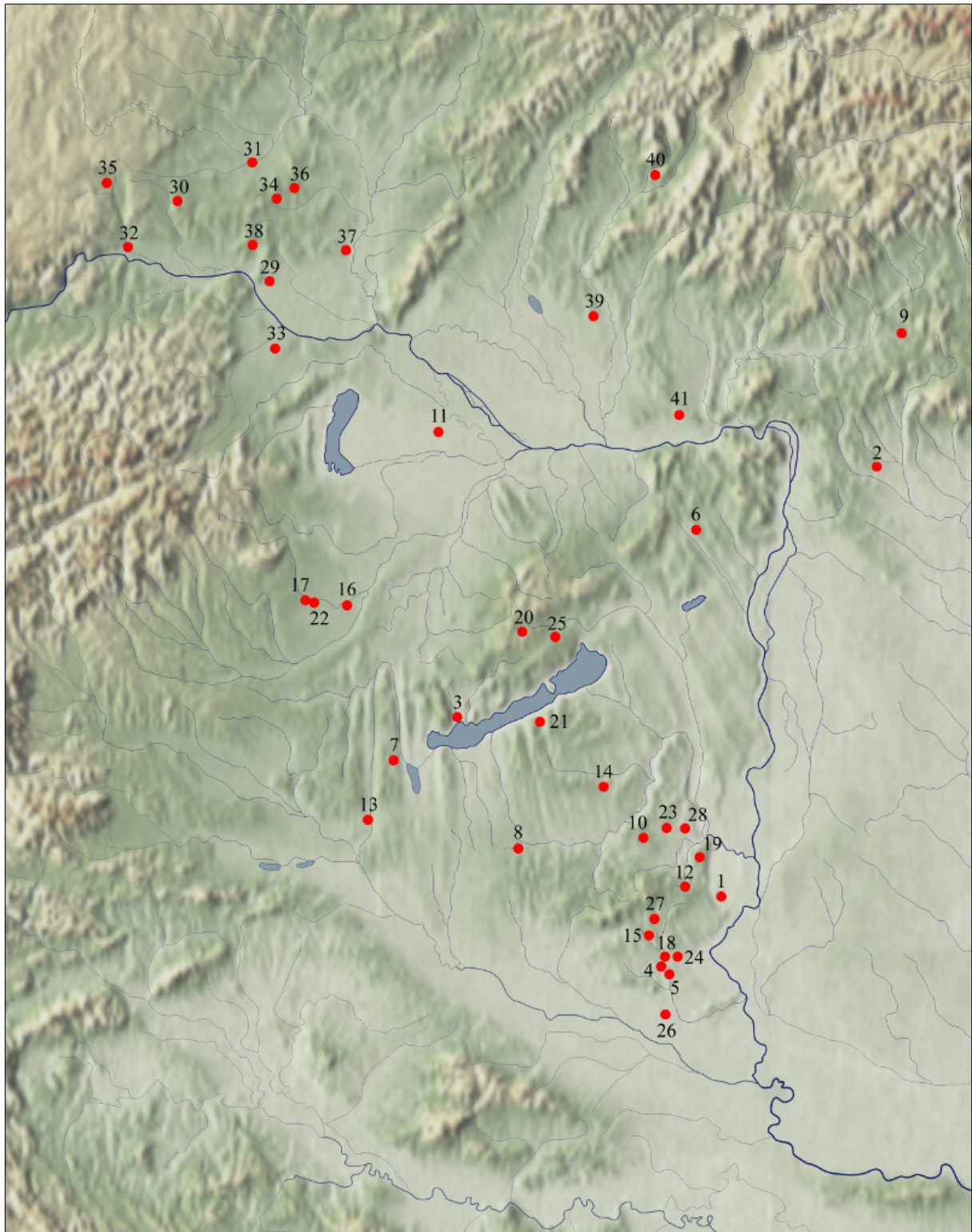


Fig. 1. Anthropologically known Lengyel sites in the Carpathian Basin (Cs. Peterdi – Zs. Réti – K. Köhler).

| Sites | Inf. | ♂ | ♀ | ? | Total | Literature |
|---------------------------------|------|-----|-----|-----|------------|--|
| Hungary | | | | | | |
| 1. Alsónyék-Bátaszék | 147 | 248 | 336 | 131 | 862 | Present thesis |
| 2. Aszód-Papi földek | 78 | 48 | 72 | 2 | 204 | K. ZOFFMANN 2012. |
| 3. Balatonederics-Döme barlang | - | 1 | - | - | 1 | BERNERT ET AL. 2002. |
| 4. Belvárdgyula-Szarkahegy | 6 | 3 | 7 | - | 16 | K. ZOFFMANN, unpublished. |
| 5. Borjád-Kenderföld | - | - | 1 | - | 1 | K. ZOFFMANN, unpublished. |
| 6. Csabdi-Télizöldes | 11 | 7 | 15 | 1 | 34 | KÖHLER 2004. |
| 7. Esztergályhorváti | - | 38 | - | - | 38 | K. ZOFFMANN 2007. |
| 8. Kaposújlak-Várdomb | - | - | 1 | - | 1 | K. ZOFFMANN 2011. |
| 9. Karancsság | - | - | 2 | - | 2 | KÖHLER 2003. |
| 10. Lengyel | 1 | 5 | - | - | 6 | VIRCHOW 1890; MALÁN 1929. |
| 11. Lébény-Kaszásdomb | - | 1 | - | - | 1 | K. ZOFFMANN 1998-1999. |
| 12. Mórágypuszta-Tűzkődomb B.1 | 34 | 14 | 31 | 3 | 82 | K. ZOFFMANN 2004. |
| Mórágypuszta-Tűzkődomb B.2 | 12 | 5 | 9 | - | 26 | K. ZOFFMANN 2013. |
| 13. Nagykanizsa-Palán | 1 | 1 | 2 | 2 | 6 | TÓTH 2009; 2011. |
| 14. Pári-Altacker | 3 | 4 | 4 | - | 11 | KISZELY 1973. |
| 15. Pécsvárad-Aranyhegy | ? | ? | ? | ? | 8 | K. ZOFFMANN 1998-1999. |
| 16. Sárvár, elkerülő út, 5. lh. | - | 1 | - | - | 1 | TÓTH 2002. |
| 17. Sé-Malomi dűlő és -Doberdó | 1 | 1 | - | - | 2 | TÓTH 1996-1997, 2002. |
| 18. Szederkény-Kukorica-dűlő | 1 | 2 | 1 | - | 4 | K. ZOFFMANN, unpublished. |
| 19. Szekszárd-Ágostonpuszta | 1 | 13 | 6 | 2 | 22 | NEMESKÉRI 1955. |
| 20. Szentgál-Füzikút | - | - | 1 | 1 | 2 | K. ZOFFMANN 1998-1999. |
| 21. Szőlád-Kisaszó | 2 | - | 1 | - | 3 | KÖHLER, unpublished. |
| 22. Szombathely, Metró Áruház | 1 | - | - | - | 1 | TÓTH 2002. |
| 23. Tevel-Zsidóhegy | - | 1 | 1 | - | 2 | K. ZOFFMANN 1998-1999. |
| 24. Versend-Gilencsa | - | - | 2 | - | 2 | K. ZOFFMANN, unpublished. |
| 25. Veszprém, Jutasi út | 2 | 5 | 5 | 1 | 13 | KÖHLER 2006. |
| 26. Villánykövesd | 9 | 9 | 4 | 1 | 23 | K. ZOFFMANN 1968. |
| 27. Zengővárkony | 4 | 25 | 33 | 2 | 64 | K. ZOFFMANN 1969-1970. |
| 28. Zomba-Paradicsompuszta | ? | ? | ? | ? | 4 | NEMESKÉRI 1955. |
| Austria | | | | | | |
| 29. Bisamberg | - | - | 1 | - | 1 | JUNGWIRTH 1956. |
| 30. Eggenburg | - | 1 | - | - | 1 | EHGARTNER 1956. |
| 31. Friebritz-Süd | 5 | 5 | 1 | 1 | 12 | NEUGEBAUER – MARESCH – TESCHLER-NICOLA 2006. |
| 32. Langenlois | - | - | 2 | - | 2 | ZIMMERMANN 1935. |
| 33. Mauer | 2 | 2 | 3 | - | 7 | STROUHAL – JUNGWIRTH 1970. |
| 34. Mödling | - | - | 2 | - | 2 | RUTKAY – TESCHLER-NICOLA 1985. |
| 35. Poigen | 1 | 1 | 3 | - | 5 | EHGARTNER – JUNGWIRTH 1956. |
| 36. Poysdorf | - | 2 | - | - | 2 | JUNGWIRTH 1967. |

| Sites | Inf. | ♂ | ♀ | ? | Total | Literature |
|--------------------|------|----|----|---|-------|---------------------------|
| 37. Stillfried | - | 1 | - | - | 1 | SCHÜRER V. WALDHEIM 1919. |
| 38. Wetzleinsdorf | - | - | 1 | - | 1 | JUNGWIRTH 1973. |
| Slovakia | | | | | | |
| 39. Lužianky | 1 | 1 | 1 | 2 | 5 | VLČEK 1961. |
| 40. Malé Krštenany | - | - | 1 | - | 1 | VLČEK – BARTA 1950. |
| 41. Svodín | 42 | 23 | 27 | 6 | 98 | JAKAB 1986. |

Material

Between 2006 and 2009 rescue excavations preceding the construction of M6 Motorway were carried out, in the course of which a Lengyel settlement and a related cemetery of nearly 2400 graves have been excavated at the site of Alsónyék-Bátaszék, in Southeastern Transdanubia.⁶ Since the total size of the site and the correlation of different parts of the cemetery and adjacent settlement was not yet known at the time when I worked on my dissertation and only became clear later, the physical anthropological analysis and evaluation of the whole community was not feasible within the frames of the dissertation. Therefore, present study considers the northern, so-called 010/B part of the cemetery comprising 862 graves (Fig. 2-3). The results of this analysis, despite the fact that it was not based on the whole series, may significantly modify our recent knowledge on the population of the Lengyel culture.

Methods

For the biological age estimation of the subadults I used methodologies outlined by Schour and Masser, Stloukal and Hanáková, Ferembach et al., Schinz et al., Ubelaker and Bernert et al.⁷ The age estimation of adults was carried out on the basis of Todd, Nemeskéri et al., Szilvássy, Işcan et al. and Meindl – Lovejoy.⁸ The morphological sex was described by the method of Éry et al.⁹ The demographic analysis was carried out on the basis of Acsádi and Nemeskéri.¹⁰ The anatomical variation was examined according to Finnegan, Hauser – De Stefano and Saunders.¹¹ The metric and the morphological evaluation was based on Martin – Saller and Alekseiev – Debets' method.¹² Stature was estimated using the work of Pearson-Rösing, Sjøvold and Bernert.¹³ Taxonomical analyses were mainly carried out by the method of Lipták.¹⁴ The craniometric comparative examinations of the male and female series were based on 10 measurements of the skulls, which were standardized with the average standard deviations of Alekseiev and Debets.¹⁵ I applied the direct distance values between the examined series in the course of the comparison, and used the Euclidean, Chebyshev, Penrose distance and the Pearson's correlation coefficient.¹⁶ I analyzed the limit of the significant similarity at 0.1, 0.5 and 1% significance level in every distance calculating method. The

6 ZALAI-GAÁL – OSZTÁS 2009; GALLINA ET AL. 2010.

7 SCHOUR – MASSER 1941; STLOUKAL – HANÁKOVÁ 1978; FEREMBACH ET AL. 1979; SCHINZ ET AL. 1952; UBELAKER 1989; BERNERT ET AL. 2007.

8 TODD 1920; NEMESKÉRI ET AL. 1960; MILES 1963; SZILVÁSSY 1978; IŞCAN ET AL. 1985; MEINDL – LOVEJOY 1985.

9 ÉRY ET AL. 1963.

10 ACSÁDI – NEMESKÉRI 1970.

11 FINNEGAN 1972; HAUSER – DE STEFANO 1989; SAUNDERS 1978.

12 MARTIN – SALLER 1957; ALEKSEIEV – DEBETS 1964.

13 PEARSON – RÖSING 1988; SJØVOLD 1990; BERNERT 2005.

14 LIPTÁK 1962; 1965.

15 ALEKSEIEV – DEBETS 1964.

16 PENROSE 1954; RAHMANN 1962.

pathological investigation was based on the systematization according to Steinbock.¹⁷ During the analysis of oral pathologies I recorded the number of premortem tooth loss, cavities, alveolar abscesses and dental hypoplasia.

Objectives

In the dissertation I sought to answer the following questions:

- How did the demographic composition of the community of Alsónyék look like? Do the demographic characteristics of the analyzed sample resemble those observed in other series of the Lengyel culture?
- As a characteristic of the Lengyel mortuary practices, graves are usually found in smaller or larger grave groups occupying unused territories of the settlement. The research assumes that such spatial distributional patterns may correlate with affinal relations between the deceased.¹⁸ Based on the demographic characteristics and on the heritable anatomical variations of the skeletal remains, is it possible to verify the family relationships of the deceased in these groups?
- What was the anthropological image characterizing the populations of the Lengyel culture? How does the physical anthropological analysis of this large sample affect or alter our recent knowledge of the Lengyel populations?
- Is it possible to demonstrate an anthropological continuity between the population of the Lengyel culture and the earlier inhabitants that occupied the same territory? Can we verify the assumed continuity between populations of earlier Neolithic periods, or do we need to calculate with a population infiltration or migration during the Late Neolithic in Transdanubia?
- What are the differences or similarities between the anthropological physiognomy of populations occupying the Eastern and Western Carpathian Basin and living in the same Late Neolithic period?
- What was the general state of health of the community of Alsónyék? What diseases occurred most frequently within the population? How does it inform us about their lifestyle?
- What was the oral pathological status of the community of Alsónyék? How does it inform us about their diet and way of life?
- Do the anthropological characteristics of individuals buried in graves resting on four wooden pillars and containing a large amount of high quality grave-goods show any difference from the average individuals buried in simple graves? Can we see any anthropological physiognomy or pathological difference suggesting alternative lifestyle, diet, or different origin marking their distinctive position within the community?

¹⁷ STEINBOCK 1976.

¹⁸ But it is imaginable that it has been arranged on domestic units, or they were created simply by burying next to each other those who died around the same time at the same place.

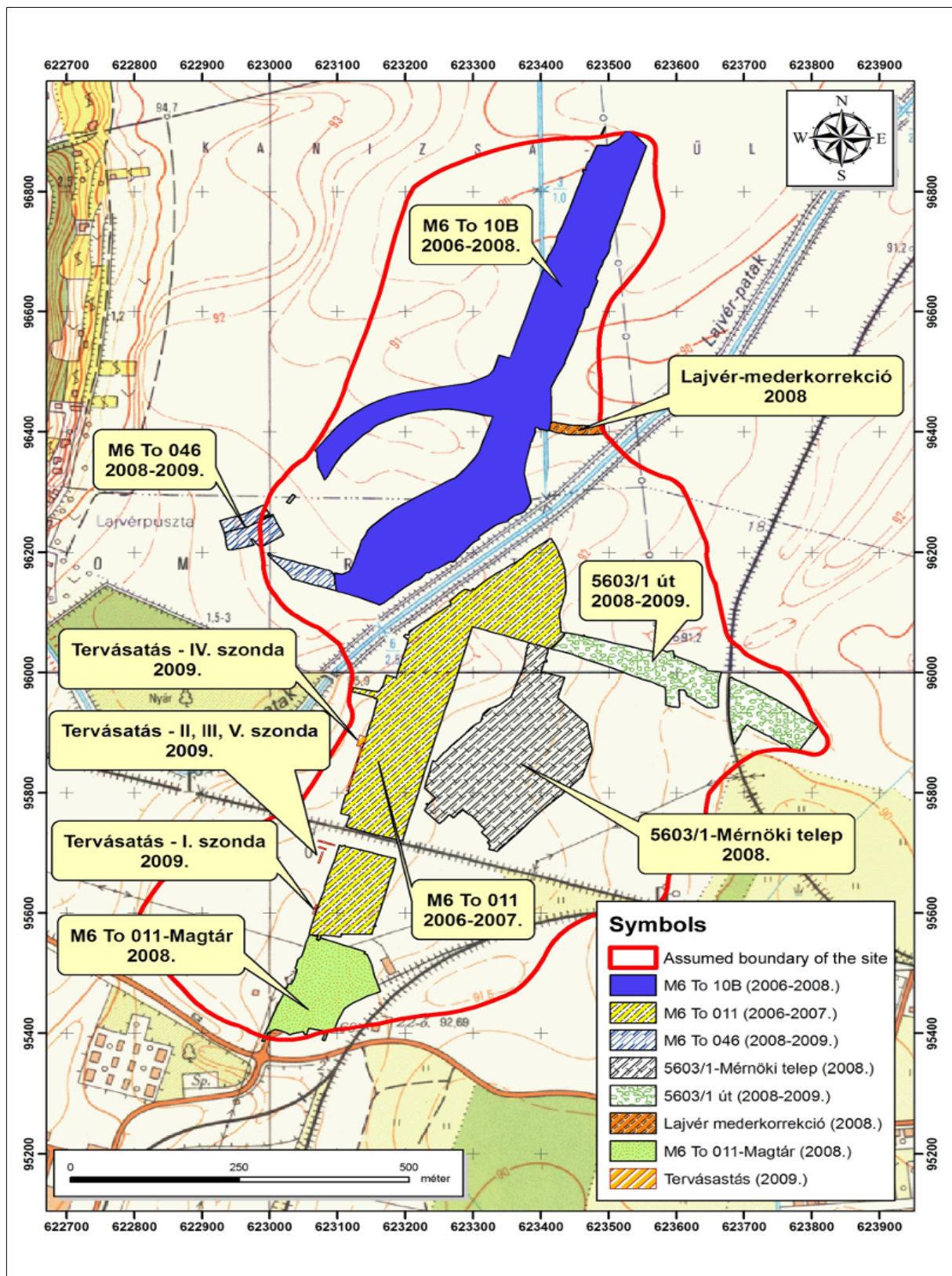


Fig. 2. Map of the site with the so-called 010/B part of the cemetery marked in blue (Archaeosztráda Ltd.).

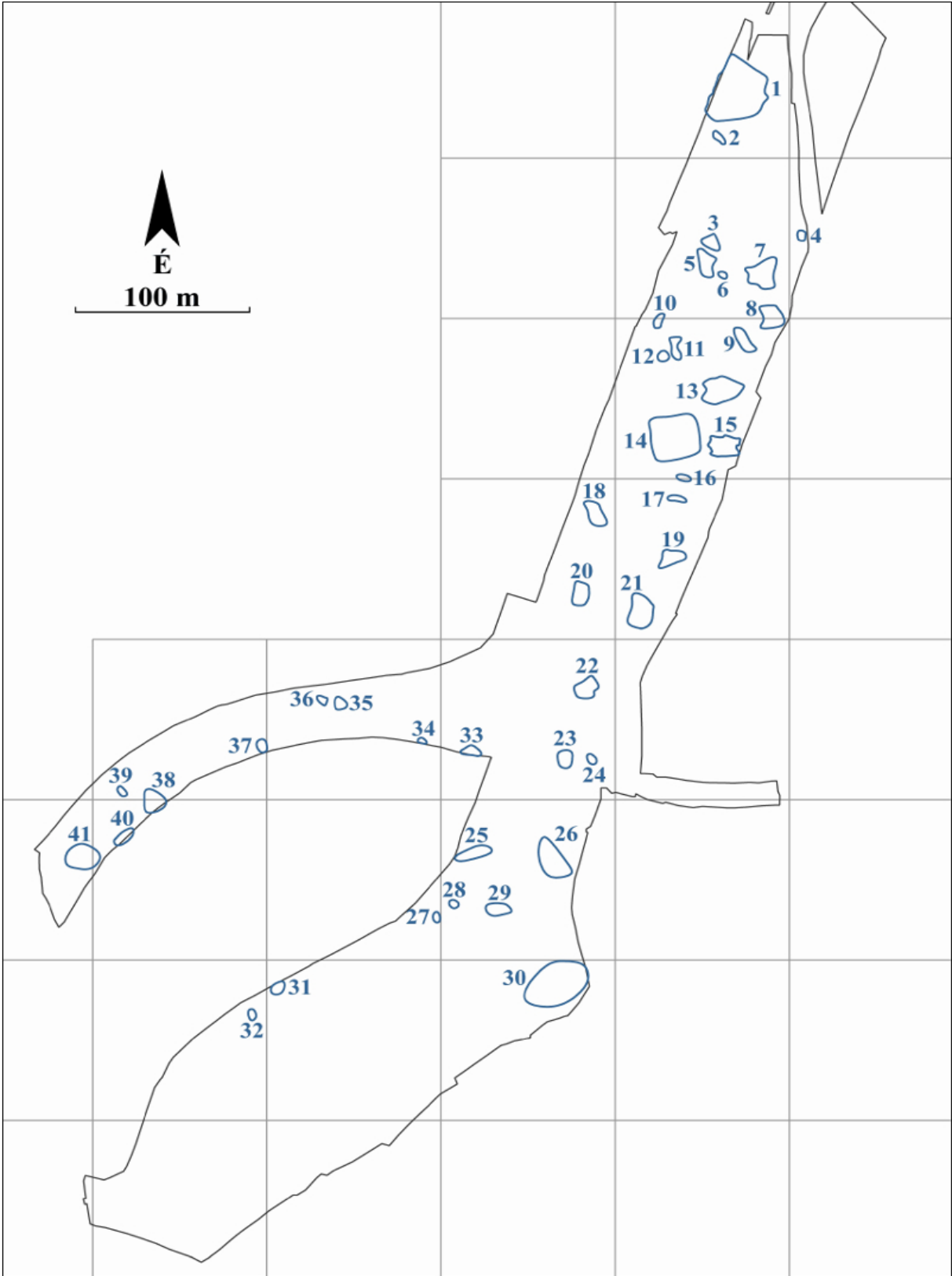


Fig. 3. Burial groups in the excavated 10/B area (Á. Marton).

Results and conclusions

Following the questions and goals of the present dissertation the results of the physical anthropological analysis of the skeletal material from Alsónyék can be summarized as follows.

According to the demographic analysis, the population of the Alsónyék community was blessed with unrealistic mortality parameters. Despite to previous expectations, the ratio of neonates (± 0) is merely 1%, consequently the life expectancy at birth (exo) is rather high (32.61 years). The proportion of infant I. and II. is also low (9.1% and 8.0%). In the meantime, contrary to the expected value, the ratio of adult and mature-aged individuals is almost equal (36.7% and 36.8% respectively), while senile-aged individuals are practically missing from the cemetery (0.2%) (Fig. 4).

| Age/Sex | ? | Male | Female | Total |
|---------------------|------------|------------|------------|------------|
| Neonatus | 9 | 0 | 0 | 9 |
| Infans I. | 65 | 0 | 0 | 65 |
| Infans I.-II. | 7 | 0 | 0 | 7 |
| Infans II. | 65 | 0 | 0 | 65 |
| Infans II. -Juvenis | 2 | 0 | 0 | 2 |
| Juvenis | 38 | 7 | 12 | 57 |
| Juvenis-Adultus | 3 | 3 | 6 | 12 |
| Adultus | 27 | 95 | 140 | 262 |
| Adultus-Maturus | 19 | 32 | 46 | 97 |
| Maturus | 28 | 109 | 130 | 267 |
| Maturus-Senilis | 0 | 1 | 2 | 3 |
| Senilis | 0 | 0 | 0 | 0 |
| Adultus-Senilis | 9 | 1 | 0 | 10 |
| ? | 6 | 0 | 0 | 6 |
| Total | 278 | 248 | 336 | 862 |

| Age/Sex | ? | Male | Female | Total | |
|-----------------|--------------------|---------------------|--------------------|------------|---------|
| Infans I. | 78 | 0 | 0 | 78 | (9,1%) |
| Infans II. | 69 | 0 | 0 | 69 | (8,0%) |
| Juvenis | 41 | 9 | 15 | 65 | (7,5%) |
| Adultus | 38 | 112 | 166 | 316 | (36,7%) |
| Maturus | 37 | 126 | 154 | 317 | (36,8%) |
| Senilis | 0 | 1 | 1 | 2 | (0,2%) |
| Adultus-Senilis | 9 | 0 | 0 | 9 | (1,0%) |
| ? | 6 | 0 | 0 | 6 | (0,7%) |
| Total | 278 (32,2%) | 248 (28,8 %) | 336 (39,0%) | 862 | |

Fig. 4. Age and sex distribution of the buried individuals. Alsónyék-Bátaszék.

The very low ratio of neonates in the cemeteries of the Lengyel (and other prehistoric) communities is usual, and the data from Alsónyék suggest no difference. However, in the case of other Lengyel samples, infant mortality is generally higher. The moderate number of children at the site of Alsónyék is a general phenomenon in other, later prehistoric series, which can be explained by the poor preservation of their small bones. Furthermore, child burials were perhaps placed in shallow graves, which were destroyed by erosion, agricultural work, etc.

Based on demographic observations of historical populations, a general trend can be assumed, showing higher mortality rates among adult aged individuals, and relatively lower mortality among mature-aged individuals. In contrast, series of the Lengyel culture display higher mortality rate among mature-aged individuals. The explanation of this phenomenon is still unclear (*Fig. 5*).

| Series/cultures | ? | Inf. I. | Inf. II. | Juv. | Ad. | Mat. | Sen. | Literature |
|-------------------------------------|------|---------|----------|------|------|------|------|----------------------------------|
| Alsónyék, Lengyel c. | 1.7 | 9.1 | 8.0 | 7.5 | 36.7 | 36.8 | 0.2 | Present thesis |
| Bruchstedt, Central European LBK | - | 14.8 | 18.0 | 11.5 | 22.9 | 11.5 | 3.3 | BACH 1978. |
| Sondershausen, Central European LBK | - | 10.6 | 14.9 | 6.4 | 40.5 | 25.5 | 2.1 | BACH 1978. |
| Aszód-Papi földek, Lengyel c. | - | 21.0 | 18.2 | 5.0 | 24.3 | 27.6 | 3.9 | K. ZOFFMANN 2012. |
| Zengővárkony, Lengyel c. | - | 4.7 | 1.6 | 5.5 | 24.5 | 48.9 | 14.8 | K. ZOFFMANN 1969-1970. |
| Villánykövesd, Lengyel c. | - | 24.0 | 16.0 | 4.0 | 28.0 | 24.0 | 4.0 | K. ZOFFMANN 1968. |
| Mórágy B.1., Lengyel c. | - | 21.9 | 19.5 | 11.0 | 11.0 | 25.6 | 11.0 | K. ZOFFMANN 2004. |
| Mórágy B.2., Lengyel c. | - | 19.2 | 23.1 | 15.4 | 25.0 | 17.3 | - | K. ZOFFMANN 2013. |
| Csabdi-Télizöldes, Lengyel c. | - | 8.8 | 23.5 | 8.8 | 32.4 | 26.5 | - | KÖHLER 2004. |
| Szegvár-Tüzköves, Tisza c. | 4.8 | 15.8 | 4.8 | 9.5 | 28.6 | 27.0 | 9.5 | FARKAS ET AL. 1993; FARKAS 1994. |
| Tápé-Széntégláégető, Tisza c. | 25.2 | 7.9 | 15.4 | 5.7 | 29.9 | 13.5 | 2.4 | FARKAS – LIPTÁK 1971; 1975. |
| Durankulak, Hamangia c. | 13.8 | 2.3 | 2.1 | 1.0 | 66.1 | 14.7 | - | YORDANOV – DIMITROVA 2002. |
| Durankulak, Varna c. | 4.3 | 11.0 | 5.0 | 5.5 | 64.9 | 8.8 | 0.5 | YORDANOV – DIMITROVA 2002. |
| Khirokitia, Neolithic period | - | 34.1 | 3.3 | 0.8 | 50.0 | 11.8 | 0.0 | ANGEL 1953. |
| Chamblandes c., Neolithic period | - | 15.4 | 3.8 | 26.9 | 15.4 | 30.9 | 7.6 | ACSÁDI – NEMESKÉRI 1970. |
| La Barmaz, Neolithic period | - | 18.4 | 23.7 | 5.3 | 26.3 | 26.2 | - | MOESCHLER 1971. |
| Vovnigi, Dnjepro-Donjec c. | - | 67.1 | | 2.5 | 13.0 | 17.4 | 0.0 | KONDUKTOROVA 1973. |
| Cernavoda, Hamangia c. | 14.9 | 2.3 | 2.9 | 2.9 | 11.7 | 63.7 | 2.5 | NECRASOV ET AL. 1990. |
| Cernica, Boian c. | 2.6 | 2.3 | 4.3 | 5.6 | 22.2 | 57.9 | 4.9 | NECRASOV ET AL. 1990. |

Fig. 5. Age and sex distribution of the buried individuals in other prehistoric cemeteries.

The ratio of male and female is not even in any known Lengyel cemetery; almost all of them are characterized by female dominance. The higher proportion of females may be attributed to flaws in the traditional sexing method, mortuary practices, polygamy, the death of males far from the community, etc. The demographic structure observed in the archaeologically outlined grave groups does not correlate with the assumed family relationship. Based on the low ratio of children, the unequal proportion of male and female burials, and the spatial distribution of child and adult burials next to each other, these groups do not seem to be representations of kinship-based organizations (*Fig. 6*).

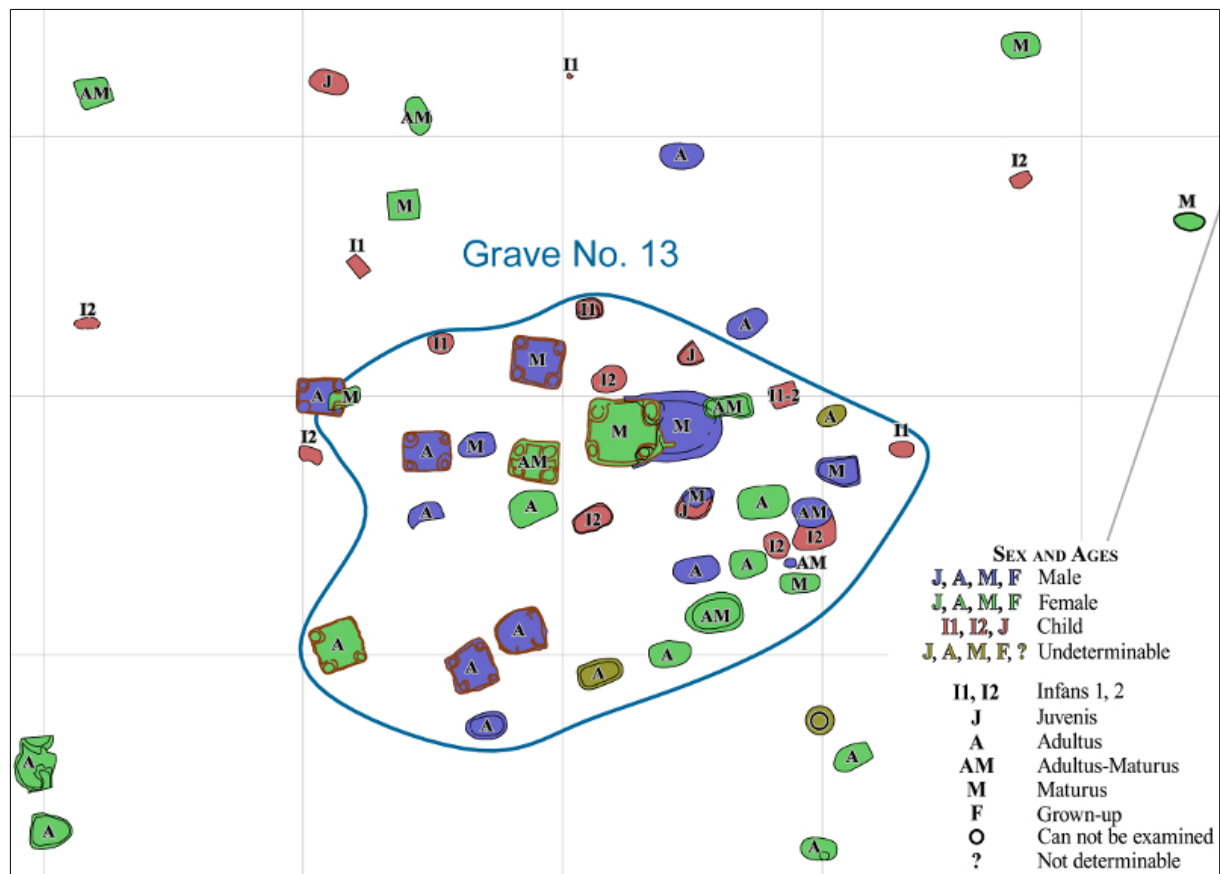


Fig. 6. Distribution according to sex and age in the case of burial group No. 13. (Zs. Réti – Á. Marton).

The analysis of anatomical variations on skeletal remains somewhat may modify the above described picture. In some cases, the manifestation of certain hereditary traits on the skulls of the individuals buried next to each other suggests affinity; however, the disproportionate demographic characteristics make it rather unlikely. Further verification of the kinship ties may become possible by the determination of the relative and absolute chronology of the burials, and by biomolecular analyses of the human remains.¹⁹

The morphometric analysis of the Alsónyék population presents a significant heterogeneity with the dominance of dolicho-, and hyperdolichocran-headed and leptoprosop-faced individuals. Due to the mosaic-like distribution of individual sizes and indices, their classification into concrete variants was not possible.

Results of the taxonomic analysis of the series from Alsónyék compared to earlier analyzed series from other Lengyel cemeteries produced some novel information on the anthropological composition of the culture.²⁰ It can be established that the previous assumption of the dominance of the Atlanto-Mediterranean and Nordoid types cannot be maintained any longer. Present analysis of the Alsónyék population suggests the dominance of the Gracile Mediterranean variant within the Lengyel population (Fig. 8). These results have fundamental effects on our understanding on the anthropological composition of the Lengyel population.

19 The first DNA analysis was carried out in the Laboratory of Archaeogenetics of the Research Center for the Humanities, HAS, Archaeological Institute. Although the first analysis was unsuccessful, it will be repeated in the future.

20 NEMESKÉRI 1961; SZATHMÁRY 1981; K. ZOFFMANN 1968; 1969-1970; 2001.



In order to answer questions concerning the origin of the human populations of the Lengyel culture, I conducted a comparative craniometric analysis incorporating Penrose, Euclidean and Chebyshev distance measurements and Pearson's correlation matrix. Based on the series of 38 males and 26 females sampled from Carpathian Basin, North-, East-, Central-, South-, and Southeast-European, and Near Eastern Neolithic and Copper Age populations, the series of Alsónyék represents significant relations with only a few (*Fig. 7*). In the case of females, within a low significance level (0.1% and 0.5%) all calculating methods show significant connections with the Lengyel series from the cemetery of Mórág, the LBK series from the Bruchstedt cemetery in Germany, and the pooled LBK series from Bohemia. In the case of males, using the Penrose and Euclidean distance, there are no significant similarities with any series, not even at a generous, 1% significance rate. On the other hand, employing Chebyshev distance and Pearson's correlation matrix, the male sample presents many connections that cannot be explained on the basis of archaeological and anthropological literature. In total, the comparative craniometric analysis of the Alsónyék series reinforces Zoffmann's earlier Penrose results, which suggested an indigenous (LBK) biological origin for the population of the culture.²¹

| Series | Penrose | | Euclidean | | Chebyshev | | Pearson | |
|-------------------------------------|---------|-------|-----------|-------|-----------|-------|---------|--------|
| | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ |
| Lengyel c., Aszód-Papi földek | 0.361 | 0.149 | 1.881 | 1.485 | 1.500 | 0.947 | 0.9947 | 0.9980 |
| Lengyel c., Mórág B.1 | 0.566 | 0.136 | 2.802 | 1.191 | 1.980 | 0.667 | 0.9924 | 0.9979 |
| Lengyel c., South Transdanubia | 0.388 | 0.169 | 2.040 | 1.391 | 1.275 | 0.646 | 0.9943 | 0.9982 |
| Lengyeli c., Lower Austria | - | 0.388 | - | 1.970 | - | 1.118 | - | 0.9962 |
| Starčevo c. | 0.675 | 0.309 | 2.766 | 1.890 | 2.367 | 0.979 | 0.9890 | 0.9956 |
| Körös c. | - | 1.023 | - | 3.650 | - | 1.789 | - | 0.9884 |
| Early LBK + Bükk c. | 1.097 | - | 1.744 | - | 2.137 | - | 0.9865 | - |
| Central European LBK, Transdanubia | 0.257 | 0.253 | 3.822 | 1.594 | 1.167 | 0.958 | 0.9964 | 0.9965 |
| Vinča c., Hrtkovci-Gomolava | 0.317 | - | 1.833 | - | 0.944 | - | 0.9959 | - |
| Tisza c. | 0.501 | 0.227 | 2.248 | 1.529 | 1.556 | 1.176 | 0.9944 | 0.9971 |
| Tiszapolgár c. | 0.426 | - | 2.118 | - | 1.163 | - | 0.9958 | - |
| Bodrogkeresztúr c. | 0.240 | - | 1.581 | - | 1.061 | - | 0.9976 | - |
| Baden c., Budakalász | 0.457 | - | 2.164 | - | 1.260 | - | 0.9933 | - |
| Baden c., Budapest Region | 0.507 | 0.251 | 2.285 | 2.221 | 1.360 | 1.259 | 0.9921 | 0.9976 |
| Baden c., Balaton Region | 0.484 | 0.703 | 2.223 | 2.657 | 1.167 | 2.000 | 0.9927 | 0.9908 |
| Central European LBK, Germany | 0.257 | - | 2.244 | - | 1.526 | - | 0.9973 | - |
| Central European LBK, Bohemia | 0.432 | 0.155 | 2.283 | 1.271 | 1.176 | 0.765 | 0.9943 | 0.9977 |
| Central European LBK, Bruchstedt | - | 0.060 | - | 0.891 | - | 0.535 | - | 0.9994 |
| Central European LBK, Sondershausen | 0.333 | 0.238 | 2.501 | 1.594 | 1.722 | 0.941 | 0.9967 | 0.9964 |
| Corded Ware c., Bohemia | 0.332 | - | 1.926 | - | 1.000 | - | 0.9954 | - |
| Corded Ware c., Poland | 0.958 | 0.289 | 3.436 | 1.708 | 2.278 | 1.118 | 0.9869 | 0.9955 |
| Corded Ware c., Germany | 0.320 | 0.471 | 1.912 | 2.217 | 1.500 | 1.706 | 0.9959 | 0.9933 |

21 K.ZOFFMANN 1984; 1992; 2004.

| Series | Penrose | | Euclidean | | Chebyshev | | Pearson | |
|--|---------|-------|-----------|-------|-----------|-------|---------|--------|
| | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ |
| Złota c., Poland | 1.010 | 0.718 | 3.183 | 2.710 | 2.000 | 1.447 | 0.9859 | 0.9890 |
| Jordanovc., Brzesc Kujawski | 0.662 | - | 2.577 | - | 1.395 | - | 0.9898 | - |
| Waltern.-Bernb. c., Schönstedt | 0.243 | 0.470 | 1.599 | 2.495 | 0.944 | 1.647 | 0.9967 | 0.9938 |
| Fatjanovo c., Russia | 1.009 | 0.907 | 3.372 | 3.151 | 2.389 | 2.353 | 0.9853 | 0.9864 |
| Tripolje c., Ukraina | 0.658 | 0.817 | 2.557 | 2.859 | 1.667 | 2.235 | 0.9920 | 0.9877 |
| Tripolje c., Bilcze Złote | 0.46 | - | 2.124 | - | 1.222 | - | 0.9952 | - |
| Dnjepr-Donjec c., Vovnigi | 1.738 | - | 5.691 | - | - | - | 0.9821 | - |
| Dnjepr-Donjec c., Volnoje | 2.114 | 1.549 | 6.715 | 6.003 | 4.056 | 3.521 | 0.9815 | 0.9866 |
| Dnjepr-Donjec c., Dereivka | 1.428 | - | 5.415 | - | 3.294 | - | 0.9865 | - |
| Dnjepr-Donjec c., Nikolskoje | 2.001 | - | 6.042 | - | - | - | 0.9788 | - |
| Dnjepr-Donjec c., Ukraina+Russia | 1.756 | 1.296 | 5.781 | 4.835 | 3.627 | 3.229 | 0.9824 | 0.9856 |
| Lepenski Vir c., Serbia | 0.968 | 1.213 | 4.222 | 4.845 | 2.765 | 3.104 | 0.9894 | 0.9885 |
| Boian c., Cernica | 0.336 | 0.401 | 1.820 | 2.361 | 1.000 | 1.294 | 0.9973 | 0.9957 |
| Gumelnița c., Ruse | 0.563 | 0.489 | 2.372 | 2.268 | 1.944 | 1.138 | 0.9919 | 0.9925 |
| Nea Nikomedeia, Neolithic | - | 0.347 | - | 2.050 | - | 1.588 | - | 0.9960 |
| Al'Ubaid, Neolithic | 0.812 | - | 3.226 | - | 1.833 | - | 0.9908 | - |
| Troy I-V, Neolithic | 2.401 | - | 5.372 | - | 4.517 | - | 0.9680 | - |
| Greek, Neolithic+Early Helladic | 0.485 | - | 2.254 | - | 1.469 | - | 0.9940 | - |
| Central and Eastern Anatolia, Chalcolithic | 0.475 | - | 2.302 | - | 1.510 | - | 0.9934 | - |
| Tepe Hissar II., Chalcolithic | 0.662 | 0.360 | 2.576 | 2.046 | 1.653 | 1.383 | 0.9934 | 0.9963 |

Fig. 7. The results of the craniometric analysis incorporating Penrose, Euclidean and Chebyshev distance measurements and Pearson's correlation matrix.

Anthropological differences and similarities between populations of the Eastern and Western Carpathian Basin during this time period have been long debated. While Szathmáry partially originates the Late Neolithic population of the Tisza culture from the south,²² Zoffmann dismisses this possibility.²³ According to Zoffmann's opinion, the populations of the Tisza and Lengyel cultures were in close genetic relations with each other. This may suggest small-scale or more significant population shifts within the Carpathian Basin during the Late Neolithic. Using the Penrose and Euclidean distance calculations, the female series from Alsónyék, does not represent significant similarities with the population of the Tisza culture. However, significant connections occurred between these populations at the significance level of 0.5%, using the Chebyshev distance and Pearson correlation matrix. Meanwhile, there is absolutely no observable correlation between the male series from Alsónyék and the population of the Tisza culture irrespectively of the distance measuring methodology. We have to admit, however, that beyond a narrow significance level (!), the population of the Tisza culture provides the closest relation to the population of the Alsónyék cemetery.

²² SZATHMÁRY 1981.

²³ K. ZOFFMANN 1992; 2004.

The detailed paleopathological analysis of the skeletal population of the cemetery shows a relatively low ratio of traumatic deformations, non-specific inflammations, and degenerative articular diseases (*Fig. 9-10*). As for the hematological disorders, cribra orbitale occurred with a high incidence among children, which likely reflects iron deficient diet. At the same time, among adults the most frequent alterations were enthesopathic deformities, primarily on the calcaneum, which are generally considered to be markers of a rather active lifestyle (*Fig. 11-12*). Beside these above-mentioned alterations some rare or significant diseases occurred, too. These include cases of benign tumor and of so-called pathological birth. Two cases of deformities affecting the frontal ligaments of the spinal column and suggesting DISH-syndrome also occurred.

Beside these the most important pathological alteration occurred in the case of an individual buried in a post-framed grave construction **b** (Grave No. 4027). On the spinal column of this person the very typical morphological lesions (collapse and fusion of vertebral bodies) caused by tuberculosis could be observed (*Fig. 13*). Further on, apart from a person showing classic symptoms of the disease, we decided to examine the presence of the atypical syndrome on all of the skeletal finds excavated in this group (No. 13) of graves, in cooperation with the Department of Anthropology of the University of Szeged. Beside this, we were also going to investigate whether the DNA remnants of the pathogen can be detected on the bones.²⁴ The significance of this find is that beside the presence of the disease on the Great Hungarian Plain during the Neolithic Period (Hódmezővásárhely-Gorzsa, Vésztő-Mágor)²⁵ this is the first recognizable TB infection in Transdanubia.

The oral pathological examinations revealed a general low frequency of carious lesions, alveolar abscesses and cysts, which suggests an adequate dental hygiene. However, the frequent appearance of dental hypoplasia suggests unpredictable food supply in the early childhood.







I had the opportunity to analyze 68 individuals who were buried in post-framed grave constructions. The demographic and morphometric characteristics of them show overall similarities to the rest of the population of the Alsónyék community. The frequency of different pathological alterations and dental diseases is also similar to that of the rest of the population buried in simple graves. Based on these, the archaeologically manifested socio-economic differentiation cannot be supported by the physical anthropological characteristics and by the lifestyle among the members of the Alsónyék community.







The verification of the above outlined results and interpretations, as well as the clarification of unanswered questions will be possible only through the physical anthropological analysis of the full population of the Alsónyék cemetery. Proceedings in the physical anthropological investigations considering the Lengyel culture require further burial excavations, which may give us a better understanding on the Early- and Middle Neolithic of the region and of the other contemporary, Late Neolithic populations of Western Transdanubia.




24 The ongoing DNA research is realized in the framework of the OTKA K 81230 project at the EURAC Institute for Mummies and the Iceman in Bolzano. The good state of preservation of the material, the important chronological period of the series and the presence of classical TB symptoms encouraged us to carry out a DNA test of TB-related lesions in grave group No. 13. According to its preliminary results, further TB-infected individuals occurred in the group (KÖHLER ET AL. 2013; PÓSA ET AL. 2013).



25 MASSON 2011; SPEKKER ET AL. 2012.







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Fig. 8. The dominate skulls in the Alsónyék series (F. Fazekas). 1. Skull No. 115. (Gracile Mediterranean type)
2. Skull No. 768. (Gracile Mediterranean type).

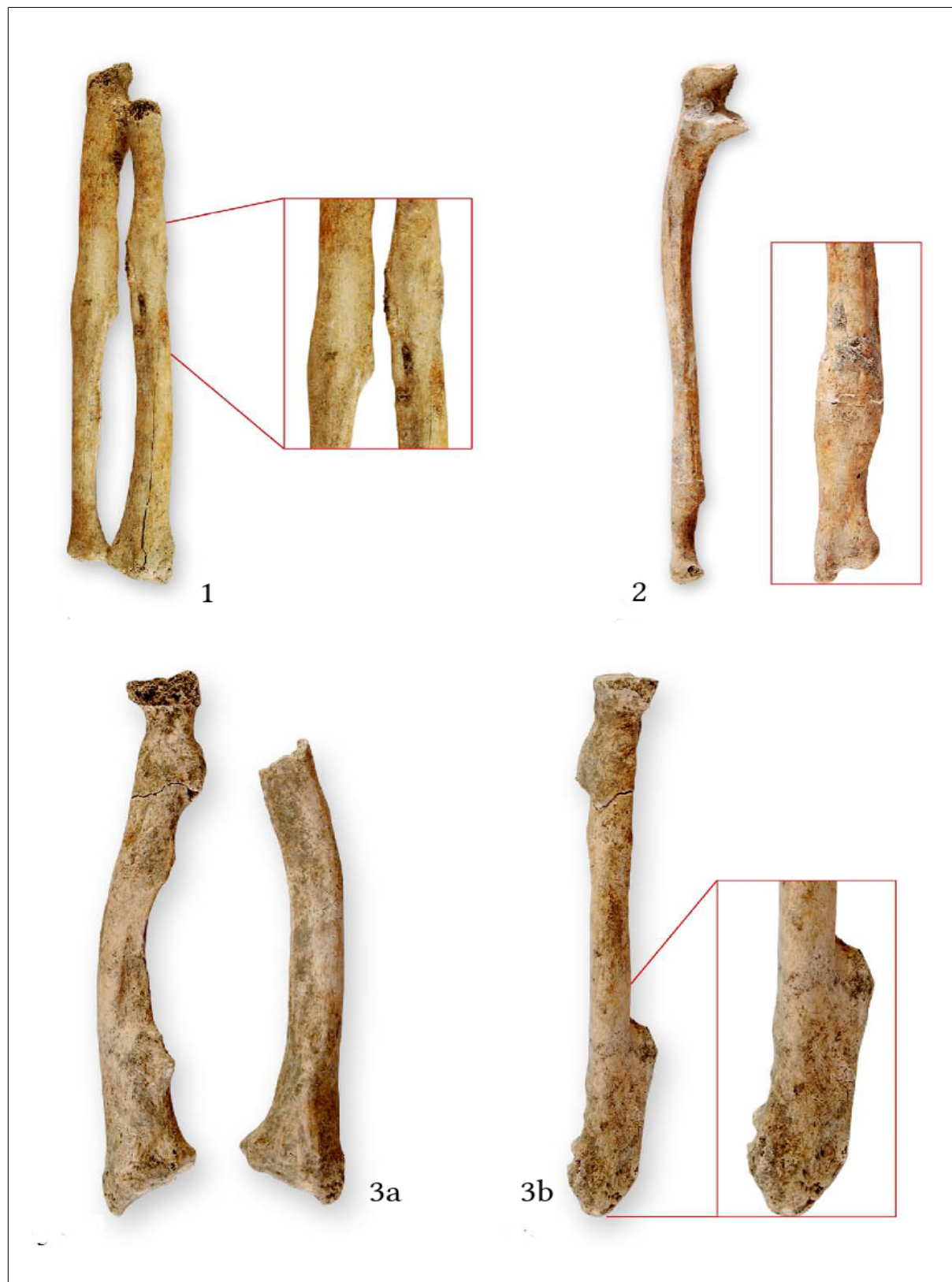


Fig. 9. Rare pathological alterations: Fractures (F. Fazekas). 1. Left sided ulna and radius (Grave No. 369). 2. Right sided ulna (Grave No 848). 3. a-b. Right sided radius (Grave No. 6052).

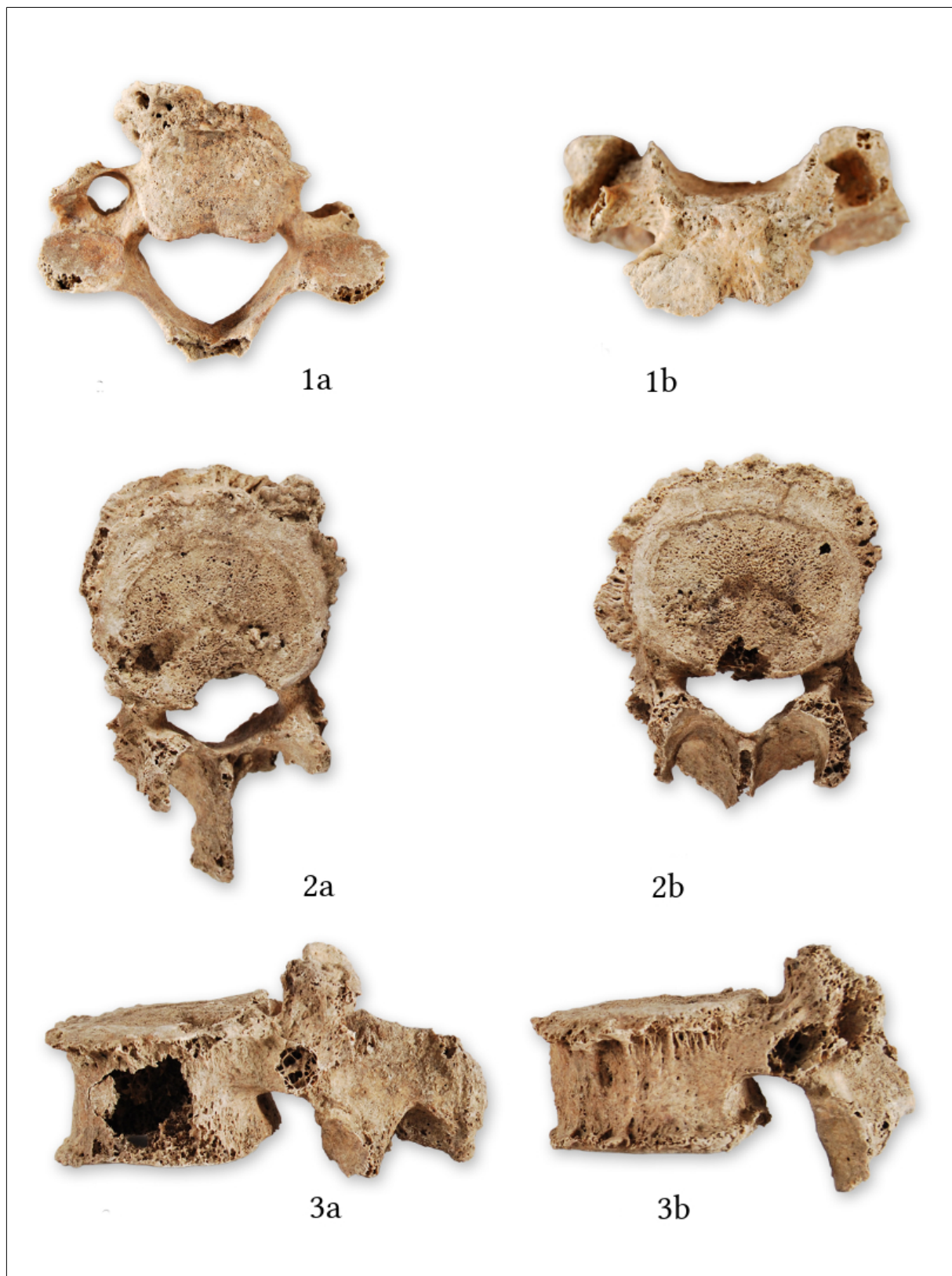


Fig. 10. Rare pathological alterations: Spondylosis deformans (F. Fazekas). 1.a-b. Severe osteophyte formation on the cervical vertebrae (Grave No. 715). 2. a-b. Moderate osteophyte formation on the lumbar vertebrae. Top view (Grave No. 715). 3. a-b. Moderate osteophyte formation on the lumbar vertebrae. Lateral view (Grave No. 715).



Fig. 11. Frequently occurred diseases: Porotic Hyperostosis (F. Fazekas). 1. Cribra orbitalia in the upper part of the orbita (Grave No. 813). 2. Porotic Hyperostosis on the left sided neck of the femur (Grave No. 4981). 3. Porotic Hyperostosis on the left sided neck of the femur (Grave No. 767).

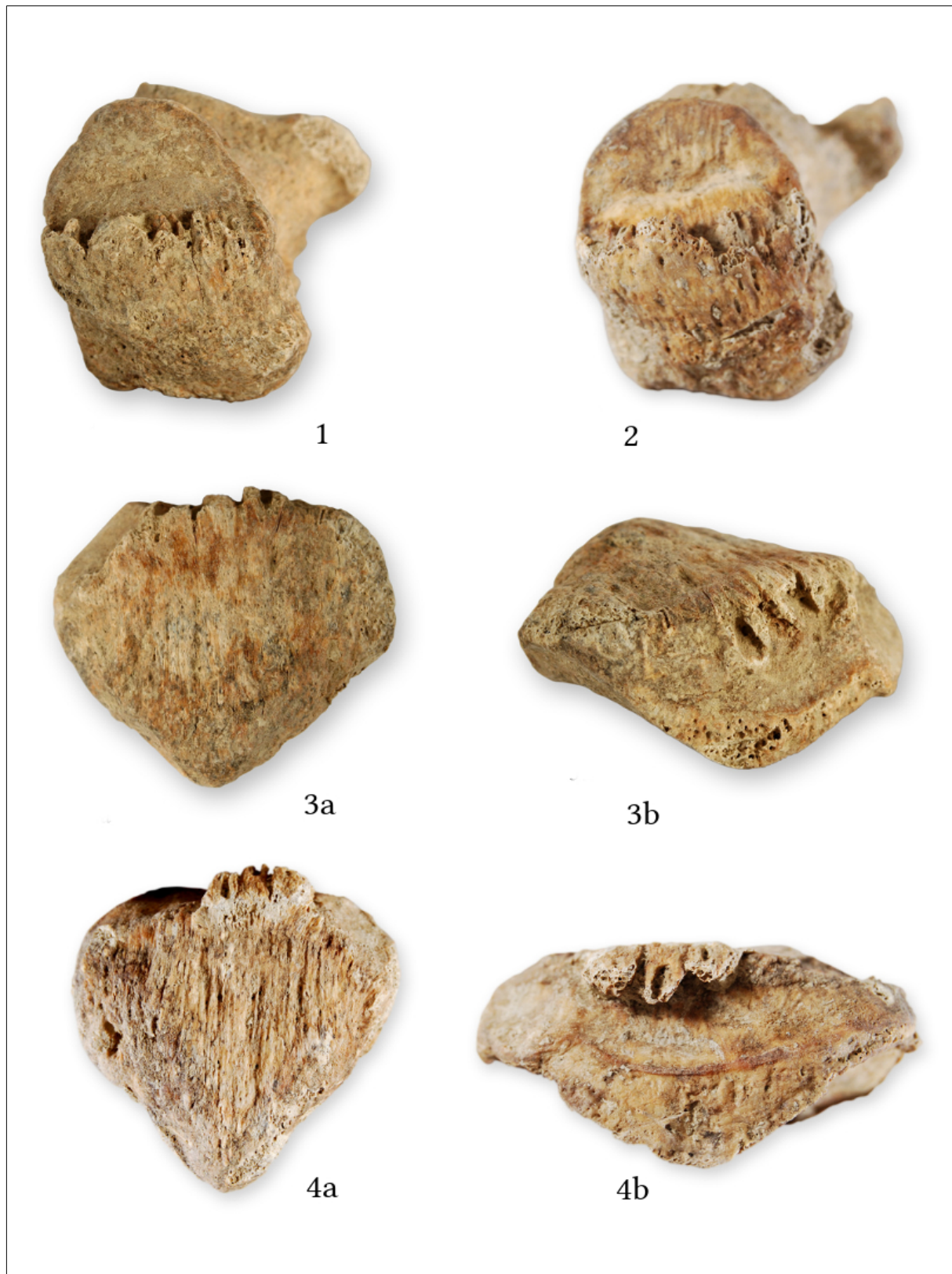


Fig. 12. Frequently occurred diseases: Enthesopathic deformities (F. Fazekas). 1. Moderate enthesopathy on a calcaneum (Grave No. 500). 2. Moderate enthesopathy on a calcaneum (Grave No. 880). 3. Severe enthesopathy on a patella (Grave No. 500). 4. Severe enthesopathy on a patella (Grave No. 880).



Fig. 13. Tuberculosis, Grave No. 4027. (Archeosztráda Ltd – F. Fazekas) Excavation photo (above). The severe curve of the spine is well observable. The TB affected spine (below), where the curve, the collapse and the fusion of the affected vertebrae (Pott-gibbus) are well observable.