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BONE DISEASES AT THE LENGYEL CULTURE BURIAL SITE IN ZENGÖVÁRKONY, HUNGARY

ABSTRACT: Lengyel culture was named after the eponymous type site, the enclosed settlement of Lengyel in Hungary, east of the Danube. To the South of this site, the burial site Zengövárkony was discovered by Dombay (1939, 1960).

In our paper, we present the first preliminary data of the gradual research of the Zengövárkony burial site in Hungary. We want to present this burial site of the Lengyel culture in the view of palaeopathological approach. The first stage, we investigated the 31 graves with complete skeletons. The research will be continued and the remaining 20 graves where only skulls or headless skeletons were buried will be completed during the second stage of our research. Our objective is to compare with the Lengyel culture in Moravia, Czech Republic (Moravian Painted Ware culture).

In Moravia, the Neolithic Lengyel culture (4800 BC – 4500 BC) spread as the Moravian Painted Ware culture (discovered by J. Palliardi in 1888). In Bohemia it was closely followed by the Jordanov/Jordansmühl culture. (The number of skeletons found in Moravia by now cannot match the quantity of burials in Hungary.) The Zengövárkony burial site originally comprised 368 graves in 14 grave groups (of which only 64 graves less than 18%, were excavated). At the Zengövárkony site, a reversible palaeopathological research was performed, based on macroscopic description and photographic documentation. The first palaeopathological description of the skeletons there was carried out by Gy. Regöly-Merei in 1960 and another by L. Bartucz in 1966, and resulting opinions of the two researchers differed. The survey of pathological findings at the Lengyel culture burial site in Zengövárkony comprised of congenital anomalies, arthritic deformations, traumas, inflammations, tumours, anaemia and changes due to excessive work strain. Regarding congenital anomalies, congenital amputation of both hands in forearms and scaphocephaly-type cranial synostosis.

Individual findings of arthrosis deformations occurred in the region of the jaw joint and knee joint. Spondylosis changes in the form of vertebral osteophytosis mainly affected the thoracic ($N = 1$) and lumbar spine ($N = 3$), and the size of osteophytes in the thoracic portion of the spine were up to 2 mm and in the lumbar portion up to 5 mm.

One special group of traumas comprised head injuries, both penetrating ($N = 1$) and non-penetrating ($N = 1$), and an unhealed fracture of the upper part of the femur ($N = 1$).

Regarding inflammations, a specific tuberculosis inflammation of tarsal bones, type "spina ventosa" ($N = 1$) was found, as well as periostoses on a rib ($N = 1$) and on the tibia ($N = 1$).

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Regarding tumours, a case of meningioma (N1) in the occipital region occurred. Signs of anaemia in the vault of the orbit included bilateral "cribra orbitalia" (N = 3), once type 1 and twice type 2. Due to excessive load on the interosseous and lumbrical muscles of the hand, 2-mm borders on the edges of the proximal phalanges (N = 2) arose. The anthropological research was performed by Zs. Zoffmann in 1969–1970. In terms of body height, the Lengyel culture was one of lowest body height Neolithic population in Europe. According to Manouvrier, K.-Zs. Zoffmann measured the average height of 164 cm in 14 male skeletons and 151 cm in 16 female skeletons, but women who were only 145 cm tall were no exception.

KEY WORDS: Hungary - Neolithic period - Lengyel culture - Skeletal evidence - Morbidity

INTRODUCTION

The Lengyel culture (LC) includes the population migrating to Central Europe from South-East at the end of the Neolithic and the turn of Eneolithic (Chalcolithic) period. The Lengyel culture was named after the eponymous type site, the enclosed settlement of Lengyel in Hungary, right of the Danube. To the South of this site, the burial site Zengövárkony was

discovered by Dombay (1939, 1960) (Figure 1). In our paper, we present the first preliminary data of the gradual research of the Zengövárkony burial site in Hungary. We want to present this burial site of the Lengyel culture in the view of palaeopathological approach. The first stage, we investigated the 31 graves with complete skeletons. The research will be continued and the remaining 20 graves where only skulls or headless skeletons were buried will be

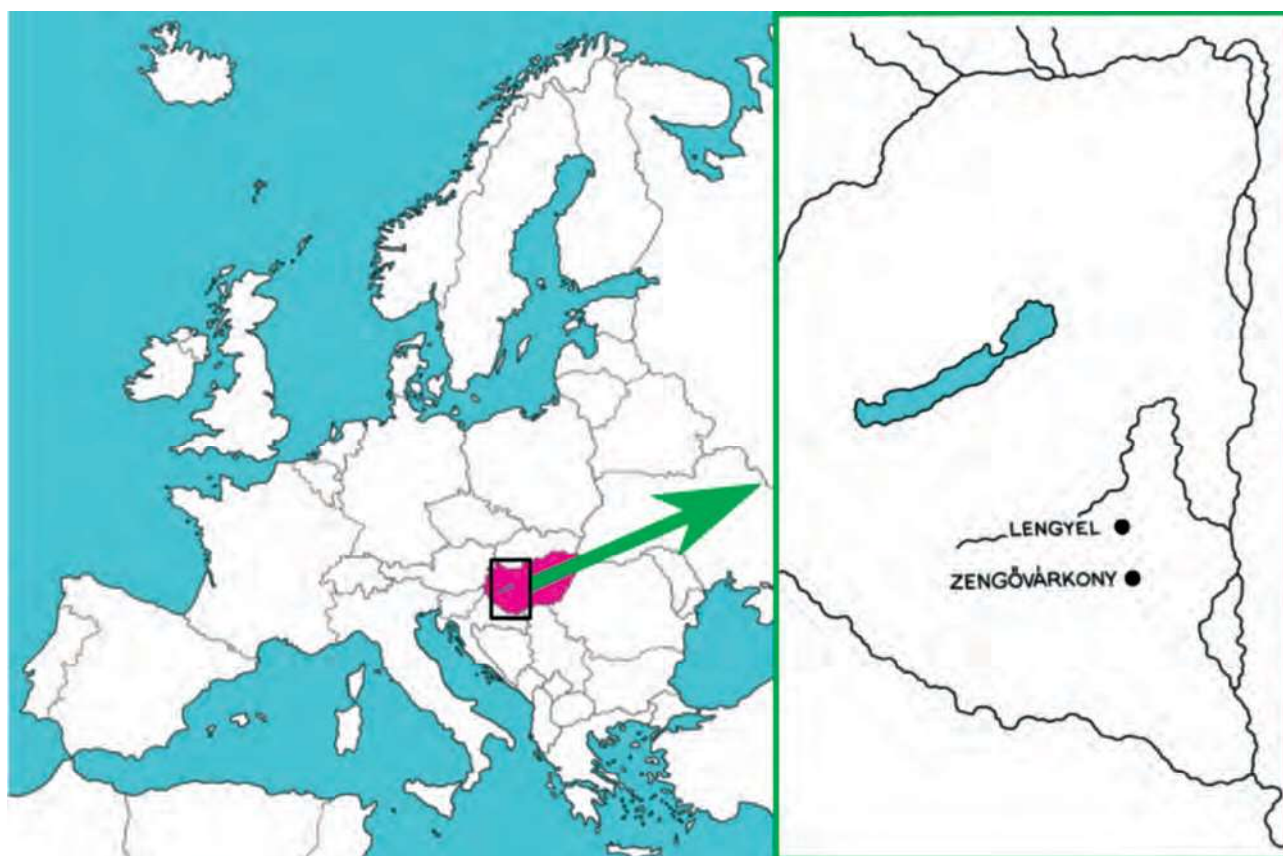


FIGURE 1: Relation of the burial site Zengövárkony, the enclosed settlement of Lengyel.

completed during the second stage of our research. Our objective is to compare with the Lengyel culture in Moravia, Czech Republic (Moravian Painted Ware culture).

Our aim was to establish, using the skeletal material, a set of signs of diseases that would characterize the Lengyel population and could serve as a tool of comparison to Moravian Painted Ware culture in Moravia (Smrčka, Tvrđý 2009).

In Moravia, the Neolithic Lengyel culture (4800 BC – 4500 BC) spread as the Moravian Painted Ware culture (MPWC), discovered by J. Palliardi in 1888, in Bohemia it was closely followed by the Jordanov/Jordansmühl culture. The number of skeletons found in Moravia, Czech Republic, by now cannot match the quantity of burials in Hungary. The Zengővárkony burial site alone originally comprised 368 graves in 14 grave groups, (of which only 64 graves less than 18 per cent, were excavated).

In the skeletons, the extremities were well preserved, but the skulls and particularly their facial parts were preserved rather worse.

From the skeletons available (N = 51), we chose 31 skeletons where both the skull and postcranial skeleton were preserved. One exception was the finding of a congenital malformation (scaphocephaly, grave number 7), where only the skull was preserved. The other incomplete burials that only contained the skull or postcranial skeleton were left for the prospective second stage of the research, including their detailed statistics.

In terms of body height, **the Lengyel culture was one of lowest body height Neolithic population in Europe.** According to Manouvrier, K.-Zs. Zoffmann measured the average height of 164 cm in 14 male skeletons and 151 cm in 16 female skeletons, but women who were only 145 cm tall were no exception.

For palaeopathological research we selected only complete skeletons, of which there were 31. In other more than twenty graves, either separate skulls or headless skeletons were buried. This corresponds to what is known of the populations of the Moravian Painted Ware culture in Moravia, in which the skulls of ancestors were exhibited and buried separately. This custom was likely preserved in all migrating population of the Lengyel culture, both in the territory of what now is Hungary and in the follow-up population with Moravian Painted Ware Culture (Podborský 1993).

MATERIAL AND METHODS

The research into the Lengyel culture burial site at Zengővárkony was carried out at the depository of Janus Pannonius Museum in Pécs, Hungary. During the exploratory research and literature search we found that the research done at Zengővárkony was a reversible palaeopathological research. The first palaeopathological description of the skeletons there was conducted by Gy. Regöly-Merei in 1960 and another by L. Bartucz in 1966, and resulting opinions of the two researchers differed. Thus it was necessary to revise and specify the diagnoses and perform a new classification according to the diseases.

The skeletons were studied macroscopically. The detected pathologic lesions were recorded in charts and documented in photographs. Together with description of the pathologies, we assessed the state of preservation of bones in the studied specimens.

The studied set of 31 skeletons at the Zengővárkony burial site included the remains of 14 men, 15 women and 2 children. Each skeleton was matched to the basic anthropologic data (age, sex and body height) taken from the publication of Zsuzsanna K. Zoffmann (1969).

RESULTS

Palaeopathological characteristics

Congenital anomalies

In one man (aged 30–59, grave number 345) atrophied and markedly deformed distal ends of bones of both forearms were found (*Figure 2, 3*). In preserved materials of the first anthropological description of the skeleton, made in 1960 (Dombay), there was no mention of metacarpals and small bones of the hands.

From the above it follows that it was a case of amputation of both hands in the wrists.

In our assessment, the hypoplasia and dish-shaped bend suggest congenital amputation, a transverse defect in the distal portion of the forearm (classification by Swanson 1976, Ogino 2000, Oberg *et al.* 2010). This type of congenital amputation, once called meromelia (Barnes 2012), is rare. More often amputations occur in the proximal or medial thirds, and the bone end are often connected (Gładykowska-Rzeczycka and Mazurek 2009). The social environment of this Neolithic culture allowed this individual with bilateral congenital amputation of



FIGURE 3: Narrowing and dish-shaped deformation of distal ends of bones of forearms.

FIGURE 2: Bilateral amputation of bones of forearms in a man aged 30–59, grave number 345.

hands to survive to adulthood. However, amputation in early childhood cannot be excluded either, when the distal deformations of the bones of the forearm would be shaped in the period of accelerated growth.

In this culture, a good number of skeletons lack the postcranial skeleton. This may correspond with Prof. Podborský's opinion that in Lengyel houses, the

skulls of ancestors were exhibited and buried separately. This might be the case of grave 7, containing a separate skull of a woman, aged ca 23. It shows cranial synostosis, scaphocephaly with a prematurely closed sagittal suture (*Figures 4–9*). Thanks to the preserved coronal and lambdoid sutures, the skull could grow lengthwise (*Figure 6*).



FIGURE 4: Scaphocephaly in a 23-year-old woman grave number 7 – anterior aspect.



FIGURE 5: Scaphocephaly – left aspect.



FIGURE 7: Scaphocephaly – right aspect.

FIGURE 6: Scaphocephaly with agenesia of the sagittal suture in a 23-year-old woman from grave number 7. Arrows indicate the preserved coronal and lambdoid sutures, directing the lengthwise growth.

Arthrosis deformations

Arthrosis changes in the area of temporomandibular joint (male, aged 30–50, from grave number 355) was caused by asymmetry on the head of the jaw articulation. On the same skeleton, alabaster gloss was seen on the medial condyle of the right femur (*Figure 10*) and on the medial part of the right tibia, in whose surroundings 3-mm osteophytes are found.

A spondylosis with 2-mm osteophytes was found on thoracic vertebrae of a man, aged 52–55 (in grave number 338). Osteophytes, sized 3 mm, were on the vertebrae of the lower lumbar spine in a woman, aged 50–56 (in grave number 337) and also, measuring over 5 mm, on the last five lumbar vertebrae on another woman, aged 62–75 (in grave number 341). In the same woman we found rhizoarthrosis on a phalanx of the thumb.



FIGURE 8: Scaphocephaly – view of the occipital region with the preserved lambdoid suture.



FIGURE 9: Scaphocephaly – view of the inner part of the calvaria with blood vessel imprints.

The most marked spondylosis changes (vertebral osteophytosis) were found in a man, aged 48–58 (in grave number 5).

Traumata

On the skull of a man, aged 36–42 (in grave number 314), a 25×12 mm hole is found in the left parietal region, by Regöly-Merei in 1960 ascribed to a post-mortem trepanation. On a new examination in 1966, L. Bártucz found "chippings" on the internal lamina of the compact bone and arrived to the conclusion that the injury was inflicted before the death, probably with a stone axe (*Figures 11, 12*).

On the inner side of the skull around the hole, distinct chippings characteristic of a hit were found

(*Figure 13*). Location of the wound hole in the left parietal region suggests a right-handed attacker. In the photo of the edge of the hole in the oblique aspect, a one-millimetre reparation rim on the wound edge is visible (*Figure 14*), which indicates at least several weeks survival. The injury was probably caused by a Lengyel slender hammer axe.

In a man, aged 30–39 (in grave number 84), an unhealed fracture of the upper part of the right femur (*Figure 15*) was documented.

Inflammations

In the calcaneus and tarsal bones of the man, aged 38–48 (from grave number 325), Regöly-Merei presumed arthritic changes. On comparison with



FIGURE 10: Arthrosis alabaster gloss on the right femur grave number 355.



FIGURE 11: Injury in the left parietal region in a man, aged 36–42, in grave number 314.



FIGURE 12: Injury in grave number 314, a 25 × 12 mm hole, probably caused by a slender hammer axe of a right-handed attacker.



FIGURE 13: Injury in grave number 314, fragments broken off on the inner side of the skull wall.



FIGURE 14: Injury in grave number 314, the one-millimetre reparation rim on the edge of the hole indicates at least 3-month survival.

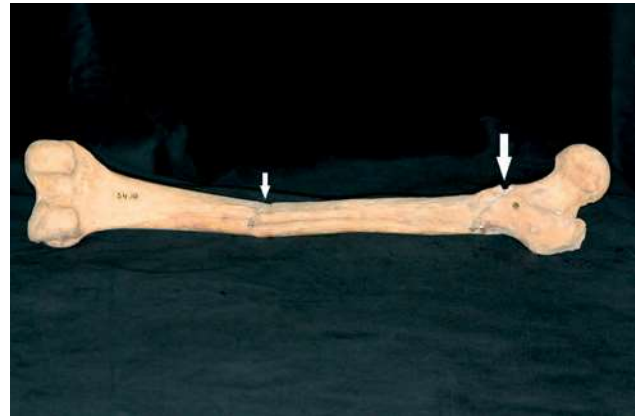


FIGURE 15: Injury in grave number 84, an unhealed fracture of the upper part of the right femur.

a similar finding in our atlas (Smrčka *et al.* 2009) it is obvious that this is a specific tuberculous inflammation (Figures 16, 17) with short fistulae, without complicated sinuses (Hoppe, Polivka 1968: 108), and with spina ventosa type changes. In the 7 or 8-year-old child (in grave number 316), periostitis was found in the outer part of a rib. Another periostitis, 80×35 mm, was seen on the upper part of the left tibia in the woman in grave number 13, aged 46–55.

Tumours

In a woman, aged 62–75 (grave number 341), the blood vessel imprints and large pacchionian granulations in the occipital region (Figure 18) are marked intracranially. These changes were classified as

a tumour by Regöly-Merei. Considering our finding of the medieval trepanation with this type of meningioma in the "Calvaria" of Sedlčany (Smrčka *et al.* 2003), we concluded that this, too, is a case of development of meningioma at elderly age.

Anaemia

In the vault of the orbit, *cribra orbitalia* occurred three times. In a woman, aged 26–32 (grave number 320), the finding suggested the type 1 cribra, like in the man aged 40–80 (grave number 99), which was mainly found in the right orbit. In the woman aged 39–45 (grave number 34), a type 2 cribra occurred (Figure 19).



FIGURE 16: Specific inflammation, probably of TB nature, affecting the calcaneus bone of a man, aged 38–48, in grave number 325.



FIGURE 17: Tuberculosis in grave number 325, short and straight fistulas with a "spina ventosa" type tuberculous lesion of the tarsal bone.

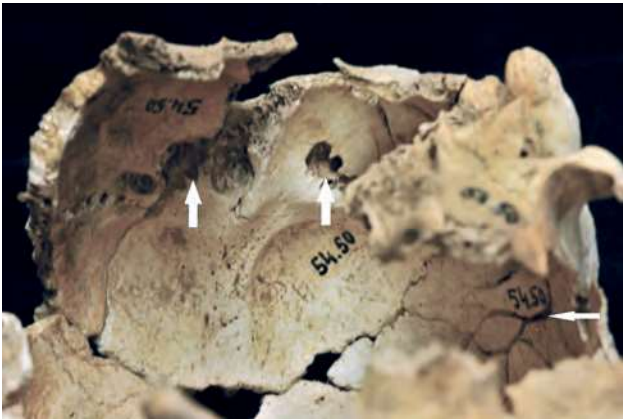


FIGURE 18: Meningioma in the occipital region in a woman, aged 62–75, in grave number 341.



FIGURE 19: Type 2 cribra orbitalia in a woman, aged 39–45, in grave number 34.

Excessive work strain

On proximal phalanges of fingers in graves number 90, 99, 88a and 336, 2-mm rims on the borders occurred (Figure 20). They were caused by excessive strain on short muscles of the hand, interosseous and lumbrical ones, probably on weaving.

DISCUSSION

Dental abrasion and diet

The diet contained an ingredient that caused increased grinding of the teeth. It is possible that it was changing with the person's age and differed according to the sex.

On our information that: "At the Zengövárkony burial site, dental abrasion were the most marked in

elderly women, and greatest in a woman aged 62 to 75 (grave 341) (Figure 21)." An anonymous reviewer commented that: "it is possibly related to leather processing." In this case we have to admit that our interest was captured by the concave shape of abrasions of teeth in the upper jaw.

Abrasions can be observed in elderly women (N = 2) and men (N = 1). It is larger in the teeth of the upper jaw, where the surfaces of the teeth are concave in shape and compressed at the edges. The cusps of the teeth ground off showed dark brown colouring, mainly in the upper jaw. On the surfaces of the teeth, no signs of nicks or notches due to abrasive particles of food were seen. Dental abrasion occurred in the following individuals:

Grave 341 (woman aged 62–75), abrasion of upper as well as lower teeth, 2nd degree abrasion



FIGURE 20: The 2-mm rims on the borders of proximal phalanges of fingers in the woman in grave number 99.



FIGURE 21: Dental grinding caused by very abrasive substances in food in the woman in grave number 341.

Grave 87 (woman aged 51–57), 2nd degree abrasion
Grave 135 (man aged 40–80), dental abrasion # 2

Metal jewellery in women

Women wore earrings, and necklaces or collar-like decorations on their necks. On tuberosities of the skulls (mastoidal processes) we found traces of **greenish patina** in several cases (graves number 88a, 88b and 87). On the first three cervical vertebrae, where a collar decoration was probably placed, **greenish patina** was detected in grave number 88.

Weaving of fabrics

Female activities must have included weaving, considering the marked bone rims on the borders of the palmar side of proximal phalanges.

In grave 336 (woman aged 33–39) we found 2–4 mm bone rims on the base phalanges of the fingers, which we ascribe to excessive activity of short muscles of the hand (lumbrical and interosseous). These bone evidence may show of excessive activity e.g. weaving.

CONCLUSION

The survey of pathological findings (N = 17) on 31 skeletons at the Lengyel culture burial site in Zengővárkony comprised of congenital defects, arthritic deformations, traumas, inflammations, tumours, anaemia and changes due to excessive work strain. Of inborn defects, congenital amputation of both hands in forearms and scaphocephaly-type cranial synostosis.

Arthrosis deformations occurred in the region of the jaw joint (N = 1) and knee joint (N = 2).

Spondylosis changes in the form of vertebral osteophytosis mainly affected the thoracic (N = 2) and lumbar spine (N = 4). The size of osteophytes in the thoracic portion of the spine was up to 2 mm and in the lumbar portion up to 5 mm.

Regarding traumas, a special group comprised head injuries, both penetrating (N = 1) and non-penetrating (N = 1), and an unhealed fracture of the upper part of the femur (N = 1).

Regarding inflammations, a specific tuberculosis inflammation of tarsal bones, type "spina ventosa" (N = 1) was found, as well as periostoses on a rib (N = 1) and on the tibia (N = 1).

Regarding tumours, a case of meningioma (N1) in the occipital region occurred. Signs of anaemia in the vault of the orbit included bilateral "cribra orbitalia" (N = 3), once type 1 and twice type 2.

Due to excessive load on the interosseous and lumbrical muscles of the hand, 2-mm borders on the edges of the proximal phalanges of fingers (N = 4) arose.

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REFERENCES

- BARNES E., 2012: *Atlas of Developmental Field Anomalies of the Human Skeleton: a Paleopathology Perspective*. Wiley-Blackwell.
- BARTUCZ L., 1966: *A praehistoricus trepanáció és orvostörténeti vonatkozású sírleletek (Prehistoric trephining and unearthed skeletons with bearings on medical history)*. Palaeopathologia III. Budapest.
- DOMBAY J.-A., 1939: *Zengővárkonyi őskori telep és temető - The Prehistoric Settlement and Cemetery at Zengővárkony*. Arch. Hung. 37.
- DOMBAY J.-A., 1960: *Die Siedlung und das Gräberfeld in Zengővárkony. [The settlement and burial site at Zengővárkony]* Arch. Hung. 37.
- GLADYKOWSKA-RZECZYCKA J. J., MAZUREK T. A., 2009: Rare case of forearm hypoplasia from 18th century Gdansk, Poland. *International Journal of Osteoarchaeology* 19: 726–734.
- HOPPE V., POLÍVKA D., 1968: TBC ossium et articulationum pedis. *Tuberkulóza pohybového ústrojí. [Tuberculosis of the locomotor apparatus]*. Státní zdravotnické nakladatelství. Praha.
- PALLIARDI J., 1888: *Předhistorické památky města Znojma. [Prehistoric heritage of the city of Znojmo]*. Časopis

- Vlasteneckého musejního spolku Olomouc* 5, 53–58, 115–121, 150–157.
- PODBORSKÝ V., 1993: Lid s moravskou malovanou keramikou. [The population with Moravian Painted Ware Culture]. In: V. Podborský (Ed.): *Pravěké dějiny Moravy*. Pp. 108–145. Brno.
- REGOLY-MÉREI G.-Y., 1960: *Palaeopathologiai vizsgálatok a Janus Pannonius Múzeum aeneolith-korból Származo emberi csontletet anyagán. Palaeopathologische Untersuchungen im Janus Pannonius Museum an Menschlichen Skelettfunde aus dem Aeneolithikum. [Palaeopathological research into chalcolithic findings of human skeletons in Janus Pannonius Museum]*. Pp. 75–83. Janus Pannonius Múzeum Évkönyve.
- SMRČKA V., KUŽELKA V., MELKOVÁ J. 2003: Meningioma probable reason for trephination. *International Journal of Osteoarchaeology* 13, 5: 325–330.
- SMRČKA V., TVRDÝ Z., 2009: Skeletal evidence for diseases in the Neolithic of Moravia. *Anthropologie (Brno)* 47, 3: 295–303.
- SMRČKA V., KUŽELKA V., POVÝŠIL C., 2009: *Atlas of Diseases on Dry Bones*. 1st ed. Prague Academia.
- SWANSON A.-B., 1976: A classification for congenital limb malformations. *J. Hand Surg.* 1: 8–22.
- ZOFFMANN K.-ZS., 1969–70: *Anthropological Analysis of the Cemetery at Zengővárkony and the Neolithic Lengyel Culture in SW-Hungary*. Pp. 53–73. Janus Pannonius Múzeum Évkönyve.

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