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## Paleodemography of the Late Iron Age Cemetery from Fântânele–Dealul Iușului, Transylvania

### ABSTRACT

In the Late Iron Age biritual cemetery from Fântânele–Dealul Iușului / La Gâța the remains of 43 individuals from 41 graves have been excavated to this day. The analysis of inhumation and cremation burials allowed for a paleodemographic study of this community settled on the fringes of the Celtic world. In addition to data on the sex and age or intravital body height of the deceased, pathological changes and epigenetic traits were also observed in some cases. Furthermore, analyses of the cremated human remains also brought to light different characteristics of burial habits, such as burning temperature or the rate of collection of the remains from the pyre.

### KEYWORDS

Late Iron Age, Celts, cemetery, cremation, inhumation, physical anthropology, paleodemography



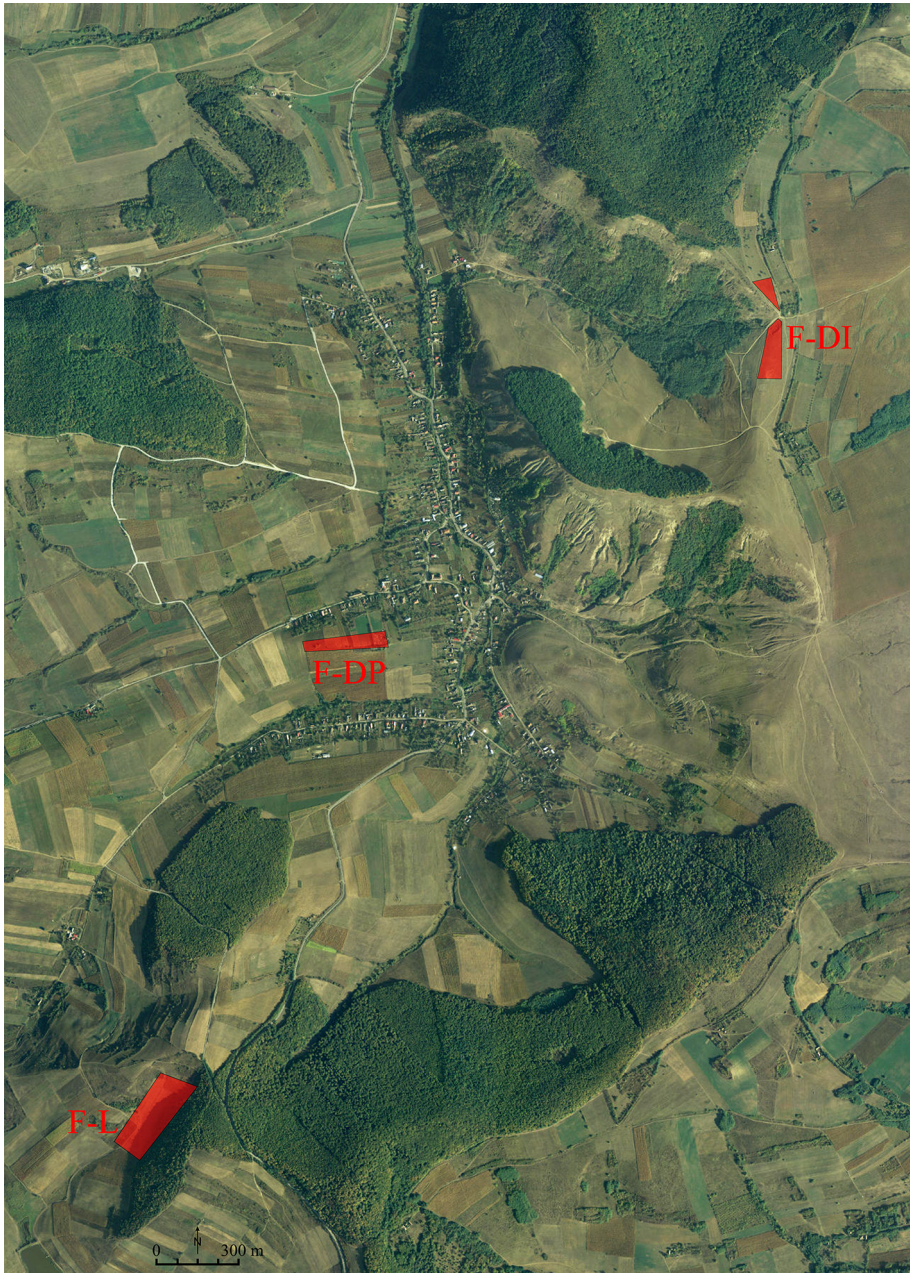
## I. LOCATION OF THE SITE

Fântânele village (Matei commune, Bistrița Năsăud County, Romania, Szászújós in Hungarian) is situated in northern Transylvania's region known as the Transylvanian Plain, in the upper valley of the Meleş Creek, a tributary of the Someșul Mare river. Here, on a territory of 4 km<sup>2</sup> a number of three cemeteries were identified (Fig. 1): the first one, Dâmbu Popii, on a small hill in the valley, near the present-day village, another one, Livada, on a terrace with gentle slopes and a third, Dealul Iușului / La Gâța, on the top of the highest hill, on the eastern edge of the village (Vaida 2006a; 2006b; 2008; Berecki 2015, 118–127; Berecki 2021, 41, fig. 14). A fourth biritual cemetery has recently been identified and partially researched in the nearby Sălcuța (Fűzkút in Hungarian) (Vaida, Marinescu 2017, 237–238; Vaida, Marinescu 2020).

The first three graves at Fântânele–Dealul Iușului / La Gâța, a high plateau with steep slopes towards west and east, were discovered by chance in a sand quarry in 1999. Starting from 1999, systematic excavations conducted by D. L. Vaida on this site have brought to light an Early Iron Age ('Scythian') and a Late Iron Age ('Celtic', LT B and LT C) cemetery and several LT D ('Dacian') pits, probably used for ritual purposes (Fig. 2).

Villagers discovered the first graves incidentally during sand quarrying, and collected only their metal inventory, yet they reported the presence of cremated human remains. The human bones found in the first archaeological campaigns from 1999–2001 (graves no. 4–12) were taken to the Bistrița–Năsăud Museum Complex, where most of them got lost. Since 2002 the host institution of the systematic archaeological surveys has been the Năsăud Border Museum. Unfortunately, some of the human remains from these surveys could not be collected from the field, or in other cases, they were not identified in the deposit, therefore anthropological information about graves no. 1–2, 4–9, 11–15, 23 and 37 is lacking.

As seen in the aerial photograph (Fig. 2), the Late Iron Age cemetery was discovered on either side of a country road. This road, which can also be seen on the First Military Survey maps of the Habsburg Empire (1769–1773), seems to be an important access and communication route over the hilltop between the Lechința river basin and the Meleş brook, where the archaeological site is located. The cemetery is situated at the very point where the road reaches the top of the hill, forming a small valley between the two terraces with funerary discoveries. The distribution of the graves from the Late Iron Age, as well as the geomorphology of this hilltop show that the Celtic cemetery consists of



**FIG. 1.** The location of the three Late Iron Age cemeteries at Fântânele. F-DI: Fântânele–Dealul Iușului, F-DP: Fântânele–Dâmbu Popii, F-L: Fântânele–Livada



**FIG. 2.** Chronological sequences in the use of the funerary site from Fântânele-Dealul Iușului (aerial photo: S. Berecki, September 2014). a. Late Iron Age ‘Dacian’ pits, b. Early Iron Age ‘Scythian’ graves, c–d. Late Iron Age ‘Celtic’ graves

two separate sectors: one south of the current road, on a large terrace with a smoother slope, and a second sector to its north, on a slightly steeper slope of the hill. If in the southern sector some possible graves in the vicinity of the road were destroyed by the quarry, to the north of the road, an area systematically researched, it was shown that the first graves were about 40 meters from it. It is therefore not excluded that the current country road was an access route in antiquity to the top of the hill and implicitly to the cemetery.

## II. ANTHROPOLOGICAL ANALYSIS OF THE HUMAN BONES

### Cremation grave no. 3

The 52 bone fragments were between 2 and 31 mm long and weighed 90 grams. Approximately 10% of the burned bones were placed in the pit. Their colour varied between light grey, blueish white and brownish white, indicating a burning temperature of the human body of 525-645°C. Most of the bones are part of the postcranial skeleton: small fragments from the diaphysis of ribs and diaphysis of the humerus, femur and tibia could be identified. From the skull, small fragments of the mandible were found. According to the

dimensions of the long bones, M<sub>3</sub> was the grave of an adult. The available data does not make it possible to determine the sex of the individual.

### Inhumation grave no. 10

The state of preservation of the human skeleton is relatively good. From the skull, small fragments of the neurocranium (frontal bone, parietal bones, occipital bone, temporal bones) and facial bones (small fragments of the mandible and the maxilla; dental formula: 2123) have been kept. From the postcranial skeleton, fragments of the cervical vertebrae (atlas and axis vertebrae), thoracic vertebrae, the right clavicle without sternal epiphysis end, small fragments from the diaphysis part of the ribs, fragments of the upper limbs (humerus, radius, ulna, phalanges), pelvis girdle (iliac bones, ischium bones and sacrum) have been preserved.

The eruption phases of the teeth (M<sub>3</sub>), the ecto- and endocranial sutures, the ossification phases of the upper epiphysis end of the femur indicate a 17-23 years old *Iuvenis*. According to the character of the skull (the occipital protuberance is robust, the mastoid process is developed), the dimension and robust construction of the long bones (linea aspera, caput femoris) and the pelvis girdle, the individual buried in M<sub>10</sub> was male.

**TABLE 1.** Dental formula in grave no. 10

D.	S.
C, I <sub>2</sub>	I <sub>1</sub> , M <sub>1</sub> , M <sub>3</sub> (the root is not completed)
D.	S.
M <sub>1</sub> , PM <sub>2</sub> , PM <sub>1</sub>	PM <sub>1</sub> , PM <sub>2</sub> , M <sub>1</sub>

### Inhumation graves no. 12 and 14

The human remains could not be found in the deposits, yet, it can be seen from the photographs that both are adults.

### Cremation grave no. 16

Although 95% of the skeleton is missing, a number of 90 bone fragments measuring between 2 and 32 mm in length and 205 g in weight, together

with a small quantity of bone fragments smaller than 1 mm, were placed in the pit. The bones show a variety of colours ranging from white to white-grey, white-blue and white-brown, indicating a burning temperature around 525-645°C. Small fragments of the neurocranium (parietal bones, occipital bone, frontal bone, left orbit) and teeth (root of a premolar and a canine) were identified, while most of the bone fragments belong to the postcranial skeleton: diaphysis part of upper limbs (humerus) and lower limbs (femur, tibia, talus). The dimension of long bones, the eruption phases of the teeth show signs of a 12-15 years old *Infans II*. Sex determination was not possible.

### Cremation grave no. 17

The 27 bone fragments measuring between 2 and 32 mm in length and 43.5 g in weight, together with a small quantity of bone fragments smaller than 1 mm represent less than 2% of the average remains of a cremation. The white, grey, greyish-white, white-blue and brown colour of the cremated bones indicate a burning temperature of 525-645°C. Small fragments from the neurocranium and two deciduous teeth (DM1 and DM2), along with bones from the postcranial skeleton (diaphysis part of the ribs and small fragments from the upper limbs) could be recognized. The dimension of the bones, the length of the cortical layer, and the deciduous teeth show signs of an *Infans I*, 4-6 years old child. Sex determination was not possible.

### Inhumation grave no. 18

The bones are well preserved; some parts of the skeleton are missing. From the skull, small fragments of the neurocranium (frontal bone, parietal bones, occipital bone, temporal bones) and facial bones (small fragments of the mandible and zygomatic bones; situation of the teeth/ dental formula: 2122) have been kept.

**TABLE 2.** Dental formula in grave no. 18

<b>D.</b>	<b>S.</b>
M1	-
<b>D.</b>	<b>S.</b>
C	C, PM1, PM2, M1, M2

From the postcranial skeleton, fragments of the diaphysis part of the ribs, collar bone (116 mm), axis vertebra, left and right humerus (250 mm), fragments of the radius, ulna, left femur (341 mm), small fragments of the left and right tibiae, diaphysis parts of the left and right fibula, phalanges, left and right calcaneus (60 mm) have been preserved.

The eruption phases of the teeth, the ecto- and endocranial sutures, the dimensions of long bones (Stloukal, Hanáková 1978; Bernert 2008) and the ossification of the epiphysis ends (Ferembach *et al.* 1980) indicate a 15-17 years old *Iuvenis*, while several elements of the neurocranium (frontal bone, mandibula, mastoid process) and the dimensions of long bones are characteristic female features. According to the estimation of the long bones (Rösing 1988; Sjøvold 1990) it was a young female with intravital body height of 1.36 m. On the distal epiphysis of the left humerus *supratrochlear foramen* (STF), an epigenetic trait could be observed (Fig. 3: 1).

### Cremation grave no. 19

The 62 bone fragments measuring between 2 and 23 mm and weighing 52 g show a variety of colours; most bones were blueish white and grey, while some were white, greyish white and brownish black, which indicates a burning temperature of 525-645°C. Even though only approximately 2% of the burned remains were placed in the grave, fragments from the neurocranium (parietal bones) and others from the postcranial skeleton, like fragments from the diaphysis part of the ribs, diaphysis parts of upper limbs (humerus, ulna) and lower limbs (tibia) could be identified among the bones. The dimension of the long bones, the ecto- and endocranial sutures show signs of a *Iuvenis*. The available data does not make it possible to determine the sex.



**FIG. 3.** 1. Frontal (a) and dorsal (b) view of the young female's left humerus with *supratrochlear foramen* in grave no. 18; 2. Dorsal view of the child's left humerus with *supratrochlear foramen* in grave no. 22

### Cremation grave no. 20

The 91 bone fragments measuring between 2 and 34 mm and weighing 480 g show a variety of colours ranging from greyish white to blueish white and brownish white, which indicate a burning temperature of 525-645°C. No fragments of the skull could be identified, all bones come from the postcranial skeleton: small fragments from the diaphysis part of ribs, small pieces of the diaphysis part of the upper limbs (humerus) and lower limbs (femur, tibia), fragments of the thoracic vertebrae. According to the long bone fragments, the individual in the grave was an adult; sex determination is not possible.

### Cremation grave no. 21

The colour of the 52 bone fragments measuring between 2 and 28 mm and weighing 89 g, representing approximately 5% of the skeleton in weight, varied from light greyish white to grey and blueish white, indicating a burning temperature of 525-645°C. The bones come from the postcranial skeleton, small fragments from the diaphysis part of ribs, diaphysis part of the upper and lower limbs could be identified. The dimensions of the long bones indicate an adult, over 25 years old. Sex determination was not possible.

### Inhumation grave no. 22

The bones are well preserved; some parts of the skeleton are missing. From the skull small fragments of the neurocranium (frontal bone, parietal bones, occipital bone, temporal bones) and the facial bones (fragments of the mandible and maxilla, situation of the teeth/ dental formula: 2122) have been kept.

**TABLE 3.** Dental formula in grave no. 22

<b>D.</b>	<b>S.</b>
M1	DM2, M1
<b>D.</b>	<b>S.</b>
DM2	-

A significant part of the postcranial skeleton is missing, the diaphysis parts of the ribs, atlas and axis vertebrae, the left and right humerus without epiphysis ends, fragments of the radius, ulna, left and right femur without epiphysis ends could be identified.



Regarding the age of the buried individual, the eruption phases of the teeth, the ecto- and endocranial sutures, the dimension of the long bones (Stloukal, Hanáková 1978; Bernert 2008), the ossification phases of the epiphysis end (Ferembach *et al.* 1980) indicate a 6-7 years old *Infans I*. Sex determination in this case is not possible. On the distal epiphysis of the left humerus *supratrochlear foramen* (STF), an epigenetic trait could be observed (Fig. 3: 2).

### **Cremation grave no. 24**

The 43 bone fragments measuring between 2 and 35 mm and weighing 44.5 g show a variety of colours ranging from greyish white to blueish white, grey and brownish white, which indicate a burning temperature of 525-645°C. There could not be identified any fragments from the skull, all bones come from the postcranial skeleton: small fragments from the diaphysis part of ribs, small pieces of the diaphysis part of the upper limbs (humerus) and lower limbs (femur, tibia), fragments of thoracic vertebrae. According to the long bone fragments, the individual in the grave was an adult; sex determination is not possible. Among the burnt bones the skull was represented by one fragment of the parietal bones, the other fragments came from the postcranial skeleton among which small fragments of the upper and lower limbs could be identified. The small quantity and fragmentation of the burnt human remains does not make age or sex determination possible.

### **Cremation grave no. 25**

Only approximately 2% of the burnt bones were placed in this grave. The 23 bone fragments measured between 2 and 30 mm, their colour ranged from greyish white to brown and blackish white, indicating a burning temperature around 525-645°C. Among the bone fragments, parts of the neurocranium and teeth (two central and one lateral incisors) could be identified, the rest of the bones came from the postcranial skeleton, represented by small fragments from the diaphysis part of the long bones. The dimensions of long bones, the eruption phases of the teeth and the cortical layer thickness show a 2-4 years old *Infans I*.

### **Cremation grave no. 26**

The only 17 fragments of burnt bones measured between 2 and 28 mm. Their colour ranged from light greyish white to brownish white, indicating

a burning temperature of 525-645°C. There could not be identified any fragments from the skull, only parts of the postcranial skeleton: small fragments from the diaphysis part of the upper and lower limbs. Due to the fragmentation and small quantity of bones, age and sex determination was not possible.

### **Cremation grave no. 27**

The 75 burnt bone fragments measured between 2 and 28 mm in length and weighed 55 g. The bones show a variety of colours ranging from white and blueish white to brown, indicating a burning temperature at 525-645°C. Among the bones, small fragments from the neurocranium (parietal bones) could be identified, together with bones from the postcranial skeleton: diaphysis parts of the femur, radius, humerus and ribs. The dimension of long bones and the thickness of the cortical layer (2-4 mm) indicate an adult. The available data does not make sex determination possible.

### **Cremation grave no. 27A (28)**

The 112 bone fragments weighing 270 g were collected from the grave, most of them were between 5 and 34 mm long. Their colour varies from white and light greyish white to blueish white, blue and brownish black, indicating a burning temperature of 525-645°C. Among the bones, small fragments from the neurocranium (occipital bone, parietal bones) could be identified together with some bones from the postcranial skeleton: diaphysis parts of the femur, radius, humerus. The dimensions of long bones, the thickness of the cortical layer (2-4 mm) and the ecto- and endocranial sutures are characteristic for an adult. The parietal and occipital bones, although not entirely convincingly, but suggest a male individual.

### **Cremation grave no. 29**

The 47 burnt bone fragments measured between 2 and 32 mm in length and weighed 29 g. Their colour ranged from greyish white to blueish white and grey, indicating a burning temperature of 525-645°C. 98% of the skeleton is missing, small fragments of the neurocranium (parietal bones) and the postcranial skeleton (diaphysis part of the long bones, lower epiphysis end of the left radius) could be recognized. The dimension of the long bones (distal

epiphysis end of the left radius) indicates an adult. Due to the fragmentation and small quantity of bones, sex determination was not possible.

### Inhumation grave no. 38

The bones are preserved in good condition. From the skull, fragments of the neurocranium are kept (frontal bone, parietal bones, occipital bone, temporal bones with mastoid process) together with the facial bones (small fragments from the mandible, situation of the teeth / dental formula: 2123). On M<sub>1</sub> from the 3rd quadrant caries could be observed. The postcranial skeleton is represented by the atlas vertebra, right clavicle, and fragments of diaphysis parts of the long bones (humerus, femur, tibia).

**TABLE 4.** Dental formula in grave no. 38

<b>D.</b>	<b>S.</b>
-	I <sub>2</sub> , C
<b>D.</b>	<b>P</b>
M <sub>3</sub> , M <sub>2</sub> , PM <sub>2</sub> , PM <sub>1</sub>	PM <sub>1</sub> , PM <sub>2</sub> , M <sub>1</sub> , M <sub>2</sub> , M <sub>3</sub>

The condition of the teeth, the ecto- and endocranial sutures show a 30-40 years old adult, while the dimorphic features of the skull (glabella, occipital protuberance, mastoid process) and the dimension and robustness of the bones indicate a male individual.

### Inhumation grave no. 40

The bones are preserved in good condition. Small fragments from the neurocranium (frontal bone, parietal bones, occipital bone, temporal bones) and facial part (fragments of the mandible, the teeth are heavily worn, situation of the teeth / dental formula: 2122) have been kept. From the postcranial skeleton, the diaphysis part of the upper limbs (humerus, radius, ulna), fragments from the diaphysis part of the lower limbs (femur, tibia) and the pelvis girdle (iliac bones, ischial bones, sacrum) could be identified.

**TABLE 5.** Dental formula in grave no. 40

<b>D.</b>	<b>S.</b>
-	C
<b>D.</b>	<b>S.</b>
M <sub>2</sub> , M <sub>1</sub> , PM <sub>2</sub> , PM <sub>1</sub> , C, I <sub>2</sub>	PM <sub>2</sub> , M <sub>1</sub>

The condition of the teeth, the ecto- and endocranial sutures are typical for a *Senilis*, a 60 years old individual. The features of the skull (glabella, occipital protuberance, mastoid process, the shape of the canines from the maxilla), the pelvis girdle show traits of a male. On the lingual part of the mandible, one case of *tubercula genialia* could be observed (Fig. 4: a) (d variant after Hauser, de Stefano 1989).

#### **Cremation grave no. 41**

Approximately 15% of the cremated remains was preserved, all fragments belong to the postcranial skeleton and no fragments from the skull have been kept. The dimensions of the long bones are characteristic for a 30 years old adult. Sex determination was not possible.

#### **Cremation grave no. 42**

Approximately 15% of the cremated remains was preserved, the length of the bones varied between 2 to 43 mm. The colour of the bones ranges from greyish white to blueish brown, which indicates a burning temperature of approximately 450°C. The dimensions of the long bones are characteristic for a 20-30 years old young adult, probably male.

#### **Cremation grave no. 44**

Only a few heavily fragmented human bones have been kept from this grave, belonging to an adult above 30 years.

#### **Inhumation grave no. 46**

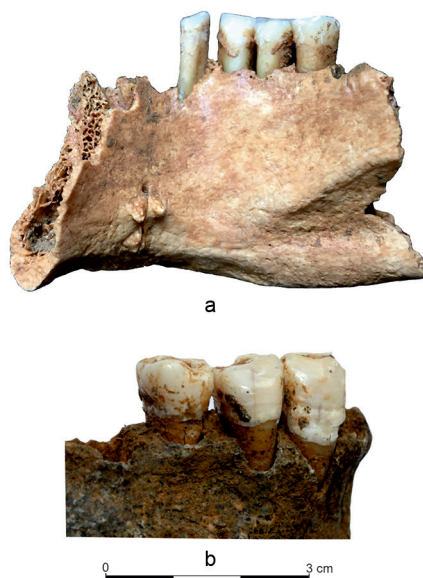
The bones have been poorly preserved, 60-70% of the skeleton is missing. From the skull small fragments of the neurocranium (parietal bones, temporal bones, frontal bone, occipital bone) and the facial bones (fragments of the maxilla, zygomatic bones, situation of teeth / dental formula: 2123) have been kept. From the postcranial skeleton small fragments of the diaphysis part of the upper limbs (ulna, radius, humerus), the distal epiphysis end of the left ulna, the distal epiphysis end of the left radius have been kept. From the bones of the hand the scaphoid, capitatum bones and phalanges could be identified. Further preserved bones are the diaphysis part of the lower limbs

(femur, cortical layer 3-4 mm, tibia, fibula), while from the bones of the feet, a calcaneus (the dorsal part of the bone is not complete) was collected.

**TABLE 6.** Dental formula in grave no. 46

D.	S.
M1, PM2, PM1 (root of the teeth in the alveolar)	I1 ( <i>post mortem</i> tooth loss)
D.	S.
PM2, PM1, C, I2, I1	I1, M1, M2, M3 ( <i>post mortem</i> tooth loss)

Although the major indicators used for sex determination (the pelvis girdle and significant part of the skull) are missing, some aspects (dimension and characters of the long bones) indicate female sex, while others (fossa canina and the mentum zone in  $\perp$  shape) are specific for males. Therefore, the individual in grave 46 was most probably a male (0,5/+1 after Éry *et al.* 1963) of very small intravital body height (~1.58 m after Bernert 2008 and Sjøvold 1990). The heavily worn incisors, dental calculus on the buccal surface and the ecto- and endocranial sutures indicate a 35-50 years old adult. The heavily worn teeth, without caries were affected by dental calculus, and enamel hypoplasia could be observed (Fig. 4: b).



**FIG. 4.** a. *Tubercula genialia* on the mandible in grave no. 40 (without scale); b. Enamel hypoplasia and dental calculus on the teeth in grave no. 46

### Cremation grave no. 46A

Due to the small number of bones (90 fragments, 101 g, approximately 10% of a burned human body) and their fragmentation (the length of bones varied between 5 to 55 mm), the sex of the individual could not be defined. The colour of the bones ranges from white, greyish white to blueish white, blueish black and greyish black, which indicates a burning temperature of approximately

400-525°C. Small fragments from the postcranial skeleton (diaphysis part of the long bones - femur, radius, humerus) and a few small fragments from the neurocranium (occipital bone and parietal bones with short suture area) could be identified. The dimensions of the long bones and the ecto- and endocranial sutures are characteristic for an adult.

### **Cremation grave no. 48**

The 67 bone fragments measured between 2 and 32 mm in length and they weighed 130 g. The colour of the bones ranges from white, greyish white to blueish white and brownish white, which indicates a burning temperature of approximately 525-645°C. Fragments from the skull are missing. From the postcranial skeleton, small fragments from the diaphysis part of the ribs and diaphysis part of the upper and lower limbs could be identified. Sex and age determination was not possible.

### **Inhumation grave no. 49**

The bones from this grave are poorly preserved. Most part of the skull is missing. From the postcranial skeleton, fragments of the left and right clavicle (151 mm), part of the upper limbs (left humerus: 331 mm, radius and ulna, phalanges from the bones of the hand), cervical, thoracic and lumbar vertebrae, one fragment of the sternum (corpus sterni), fragments of the rib diaphysis, fragments of the pelvic bones (iliac bone, ischium, sacrum), fragment of the lower limbs (left femur: 463 mm, diam. 46 mm, tibia, fibula, fragments of the skeleton of the feet - the right heel: 84 mm), atlas vertebra, fragments of the diaphysis of the long bones (humerus, femur, tibia) could be identified.

**TABLE 7.** Dental formula in grave no. 49

<b>D.</b>	<b>S.</b>
-	I <sub>2</sub> , C
<b>D.</b>	<b>P</b>
-	-

Dental calculus and the ecto- and endocranial sutures indicate a 30-40 years old adult. The characteristics of the skull (glabella, accentuated occipital protuberance, evolved mastoid process), the size and robustness of the long bones show the traits of a male. According to the estimation of the long bones

(Rösing 1988; Sjøvold 1990) the individual had a medium-high intravital body height of 1.71 m. On the fifth rib from the lower middle right side of the skeleton, a healed fracture was observed (Fig. 5).



**FIG. 5.** Broken and healed rib in grave no. 49 (without scale)

### **Cremation grave no. 52**

The 2 to 35 mm long 46 bone fragments weighed 100 g. Their colour ranged from greyish white and grey to brownish white, which indicates a burning temperature of approximately 525-645°C. From the skull one fragment of a parietal bone could be identified, the other bones come from the postcranial skeleton: small fragments from the diaphysis part of the ribs, diaphysis part of the upper and lower limbs. According to the dimensions of the long bones in the grave no. 52 an *Infans I* was buried.

### **Cremation grave no. 56**

Only 7 bone fragments from the diaphysis part of the long bones, measuring between 2 and 27 mm were collected, their colour was mostly blueish white and greyish white, which indicates a burning temperature of approximately 525-645°C. According to the dimensions of the long bones, an adult was buried in grave no. 56.

### **Cremation grave no. 57**

Approximately 15% of the cremated remains have been preserved, among them small fragments of the neurocranium (temporal bone) and the root of a canine. The dimensions of the long bones are characteristic for males above 30.

### **Cremation grave no. 59**

The 70 bone fragments measured between 2 and 32 mm in length and they weighed 230 g. The bones show a variety of colours ranging from greyish white to brownish white, grey and blueish black, which indicates a burning temperature of approximately 525-645°C. Fragments from the skull are missing, small fragments from the diaphysis part of the ribs and fragments from

the diaphysis part of the upper limbs (humerus) could be identified from the postcranial skeleton. According to the dimension of long bones, the grave belonged to a *Iuvenis*. Sex determination was not possible.

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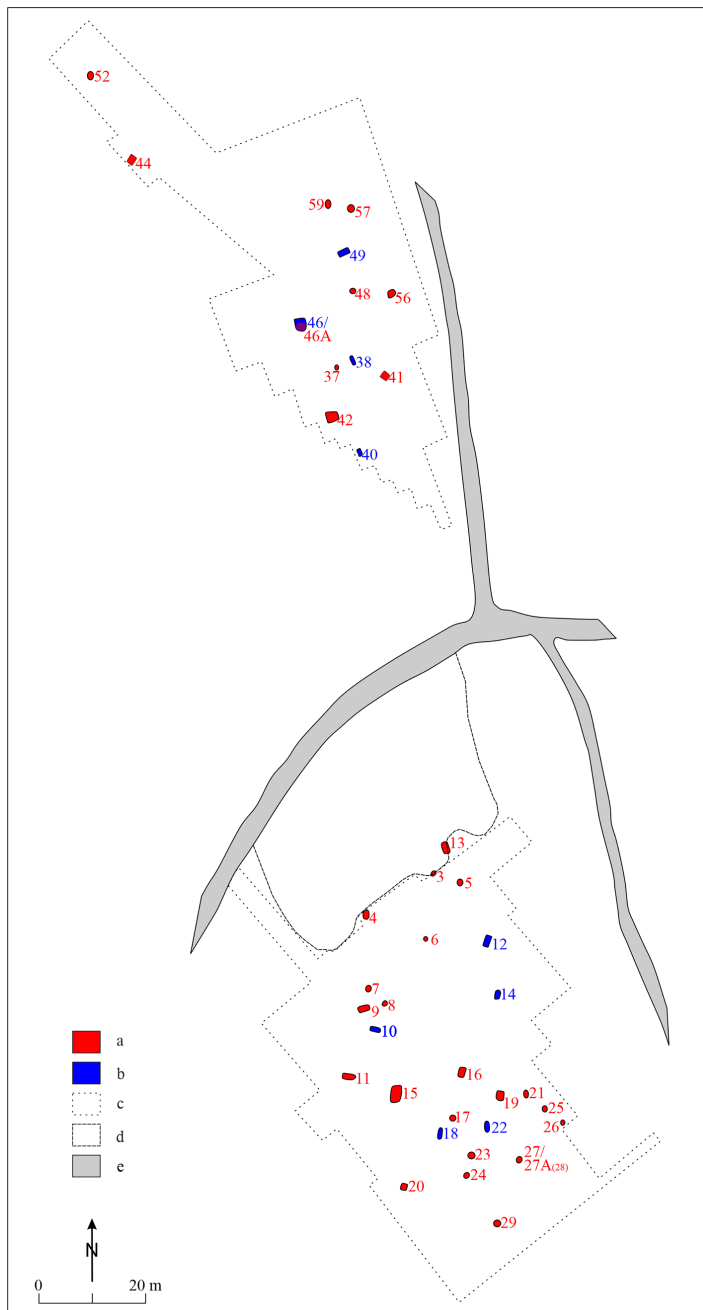
The analysis of the Fântânele–Dealul Iușului Celtic cemetery's paleodemography is greatly influenced by its biritual character. For the accuracy of the data, the period of use of more than a century must also be taken into account. On the other hand, the interpretation of the demographic and funeral phenomena is justified, taking into account the position of the graves from the point of view of the two sectors (Fig. 6).

Out of a total of 43 human remains (two graves from the 41 funeral complexes were double burials), 9 were inhumations and 34, i.e. three quarters of the graves were cremations. The preponderance of cremation graves in cemeteries from the Late Iron Age is characteristic for Transylvania, where cremation was the exclusive funeral rite in a number of cemeteries. (Berecki 2006, 55; Rustoiu *et al.* 2017, 250, 256). A similar proportion to that from Fântânele–Dealul Iușului was found in two other cemeteries in this region. In the small cemetery at Orosfaia, of the twelve graves, three were inhumations, eight were cremations, and in one case the funeral rite could not be established (Vaida 2000; Berecki 2006, 57). Of the 13 graves investigated so far in Sălcuța, ten were cremations and three were inhumations (Vaida, Marinescu 2017; 2020). Unlike these funerary sites, in cemeteries from the Great Hungarian Plain, such as the one in Pișcolt, inhumation is much more common (Németi 1993; 2012, 296, fig. 1).

At Fântânele–Dealul Iușului three skeletons (graves no. 10, 12 and 14) were found in a crouching position, two lying on the right and one on the left (Fig. 7). All the graves with skeletons in crouching position were unearthed in the southern sector, two of them occupy an isolated, peripheral position within the cemetery.

Crouching burials are often encountered in the Early Iron Age cemeteries of the Vekerzug culture or Alföld group (Németi 2012). Rarely this rite is also documented in cemeteries from the Late Iron Age, especially in the Great Hungarian Plain. Two graves (M 201 and 202) of the 75 inhumation burials in the biritual Celtic cemetery with 186 graves at Pișcolt, northwestern Romania, were in a crouching position (Németi 1993, 118), both were dated to the early horizons (Berecki 2021, fig. 20). Of the 20 graves unearthed

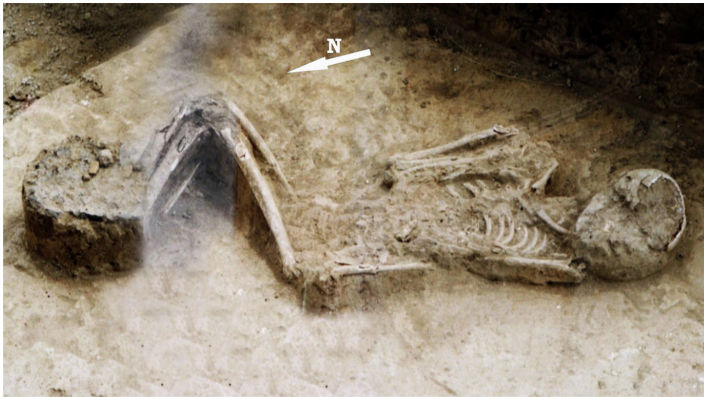




**FIG. 6.** Funerary rites at Fântânele–Dealul Iușului. a. cremation graves; b. inhumation graves; c. researched area; d. sand quarry; e. road



1



2



3

**FIG. 7.** Burials in crouching position at Fântânele–Dealul Iușului. 1. Grave no. 10; 2. Grave no. 12; 3. Grave no. 14

at Tiszavasvári–Városföldje–Jegyzőtag in Hungary, twelve were inhumations, one (grave no. 16) in crouching position (Almássy 1998, 75, pl. XIV/5). A contracted burial of a *Maturus* female from the early La Tène period is mentioned from Szeged–Kiskundorozsma (Pilling, Ujvári 2012, 222). One grave (grave no. 13) from the 50 burials from Jászberény–Cseróhalom was in crouching position (Kaposváry 1969, 180). In the Late Iron Age cemetery of Gyoma–Egei-halom, two of the 22 excavated graves had skeletons in crouching position with rich inventories, another crouching skeleton is known from the Hódmezővásárhely–Solt palé site, and two skeletons were also found in crouching position at the Békéssámson–Erdőháti halom (Maráz 1982).

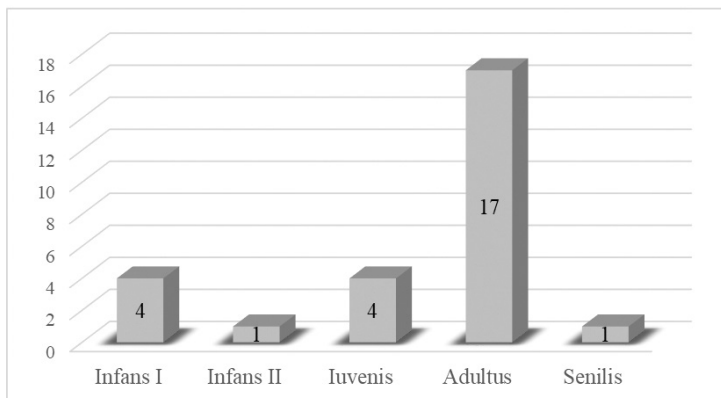
According to the funeral rite and their location within the cemetery, the individuals buried in crouching position seem to be “external, foreign” elements of the community. The inventory of these graves usually consists of vessels, sometimes metal objects. No warrior buried in crouching position is known from the Late Iron Age. In Fântânele, but also in Szeged and Tiszavasvári (although this part of the cemetery is not fully explored here), the peripheral location of two such graves also suggests the allogeneic character of these individuals within the community.

Two double burials were also investigated; in one case (grave no. 27/27A) both superimposed bodies had been cremated, while the second grave no. 46/46A was biritual: the lower deceased was cremated and the upper one inhumed. In the Iron Age cemeteries from the Carpathian Basin a great number and diversity of double burials can be observed. According to the age of the deceased, double burials can be divided in two larger categories with different possible social background: those of children (graves of an adult and a child or graves of two children), and burials of two adults, like both graves at Fântânele (Berecki, Vaida 2017). In the case of these adult graves, it has been assumed that women voluntarily followed the warriors in the afterlife (Dizdar 2016, 306), other times it was considered that adults were buried together because of their simultaneous death, while in some cases the temporary succession of the graves could be observed (Vaday 2006, 598–601). In other cases, anthropological and biochemical (blood group) observations suggested that both burials belonged to siblings, most probably twins (Jerem 1968, 161, 175). In the eastern part of the Carpathian Basin, beside the two such graves from Fântânele–Dealul Iușului, Late Iron Age double burials are known from Fântânele–Dâmbul Popii (grave no. 42) and Pișcolt–Nisipărie (Németi 1992, 97–98, fig. 27).

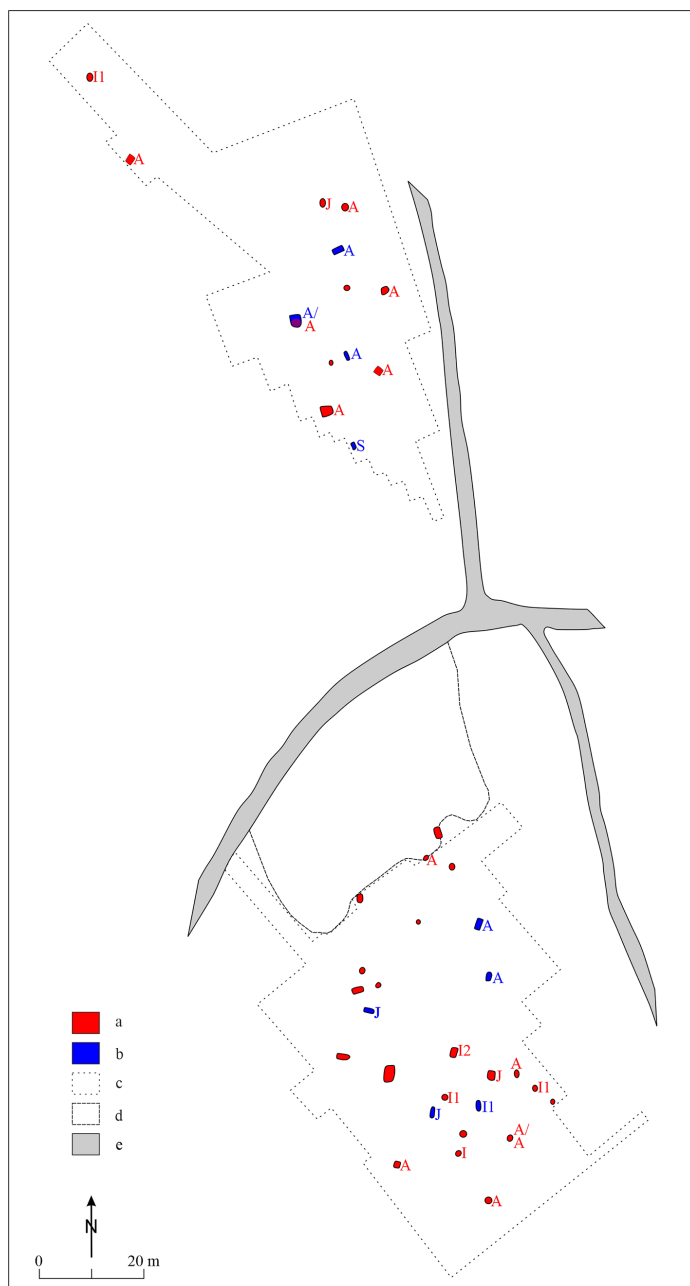
Due to the biritual character of the cemetery, the anthropological analysis of the human remains from Fântânele–Dealul Iușului applied a different methodology for cremation and inhumation graves. While age and sex determination, intravital body height, dental anthropological observations, anthropometry, paleopathology and bio-chemical analysis could be undertaken in the case of inhumation graves, only the basic physical anthropological information (age and sex) could be established for cremation graves.

In the case of cremation graves, the sex of the deceased could be ascertained only in exceptional cases (in the case of the double burial 27/27A one of the groups of incinerated remains has male characteristics), while in the case of inhumation graves, the sex could be established for almost all graves, except the *Infans* I grave no. 22, whose age (6–7 years old) does not allow observations in this respect. However, the relatively small percentage (approx. 18.6%) of the cases in which sex could be defined does not allow us a correct assessment of the proportions of the sexes in the community that was buried here.

At the same time, it can be seen that the funeral rite is not related to the age or sex of the deceased. Moreover, even in the double grave no. 46/46A in the northern sector, one of the deceased was cremated and the other inhumed (Fig. 8). Only in the case of the graves of children and adolescents can it be ascertained – with the necessary reservations – that, while in the southern sector their funerary rite is biritual, in the northern sector the two such graves are only of incineration.



**CHART 1.** Age distribution of graves at Fântânele–Dealul Iușului (15 graves were indeterminate, 1 grave was determined as *Infans*, without further information)



**FIG. 8.** Age distribution of graves at Fântânele–Dealul Iușului (I = *Infans*, J = *Juvenis*; A = *Adultus*; S = *Senilis*. a. cremation graves; b. inhumation graves; c. researched area; d. sand quarry; e. road).

Out of the 43 excavated graves, in 15 cases, i.e. in almost 35% of the burials the age of the deceased could not be determined for various reasons, e.g. lack or low quantity of human bones for examination, their fragmentation, etc. However, it can be observed that only 63% of the 27 analysed individuals reached adulthood. In comparison with other Late Iron Age cemeteries, the proportion of children in Fântânele–Dealul Iușului is a little higher. Mortality of children and young people in the Ludas cemetery in north-eastern Hungary is around 19% (Tankó 2012, 212–213, fig. 219, 221), and even lower in the Chotín and Dubník cemeteries in the Nitra Region of south-western Slovakia (Tóth 2015a, 19).

Regarding the representation of sex in the cemetery, the data are very incomplete, mainly due to the limitations of the analysis of cremation burials. For all adult skeletal burials, the sex of the deceased was determined: 1 skeleton was female and 5 were male. In the case of two cremation graves, there were definite signs of men, and in another cremation grave the bones presumably indicate also a male.

From a statistical point of view, the analyzed remains of 28 individuals in the Anthropological Program Pack of Zs. Bernert show, that life expectancy at birth was 1-4 years (Chart 2: 1). The additional life expectancy is 30-65 years for men and 24-25 years for women. Since only one female grave could be examined, its statistical value is rather indicative than representative. For the same case survivorship curves show a low age classification among women (Chart 2: 2). In the case of men, the peak in mortality during the Late Iron Age was at the age of 30-40 (Chart 2: 3), typical for the Late Iron Age societies (Balázs *et al.* 2015, 7). According to the survivorship curves most of the individuals died 30-40 years old, senior individuals aged over 60 could only be observed in a few cases.

Some cremation graves lack skull bones. While the lack of skull bones in graves 21, 24, 26, and 41 can be explained by the small amount of bones placed in the grave (mostly less than 50 g of bone was placed in these graves), in graves no. 20 (480 g), no. 48 (130 g) and no. 59 (230 g), their absence can be presumed to be intentional. In the Ludas cemetery it was observed that in some of the children's graves the skull bones were not included (Tankó 2012, 213). At Hegyfalú the vertebrae of the spine did not occur among the cremated remains, and fragments of the pelvis were also rare. This may indicate that the greater heat effect was directed at the waist, with the limbs and head not lying in the center of the fire (Balázs *et al.* 2015, 7).

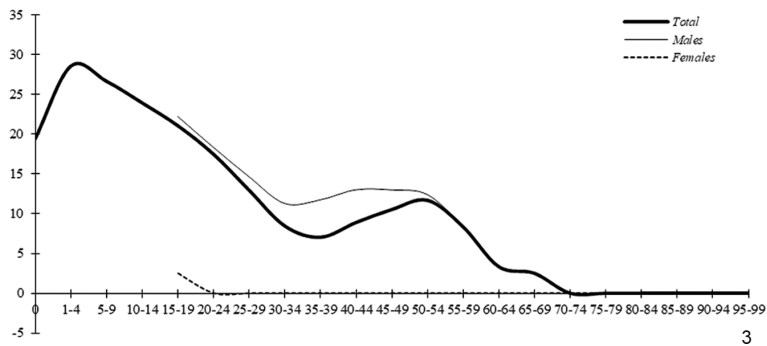
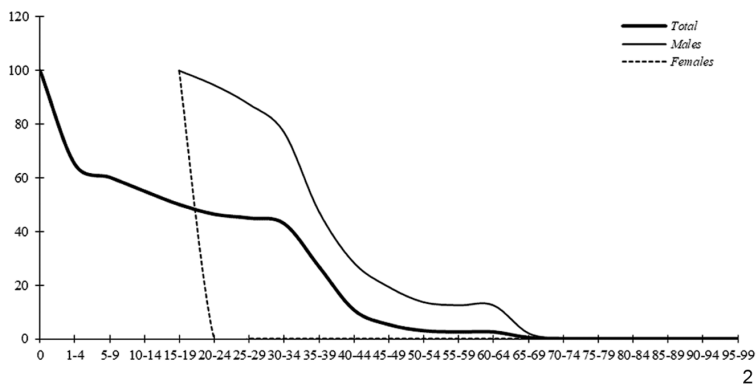
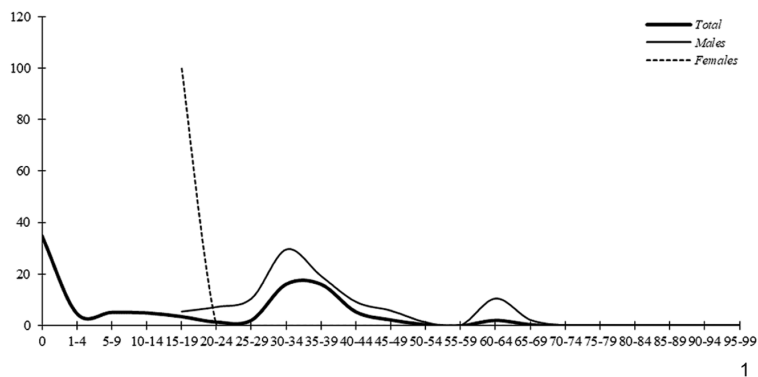
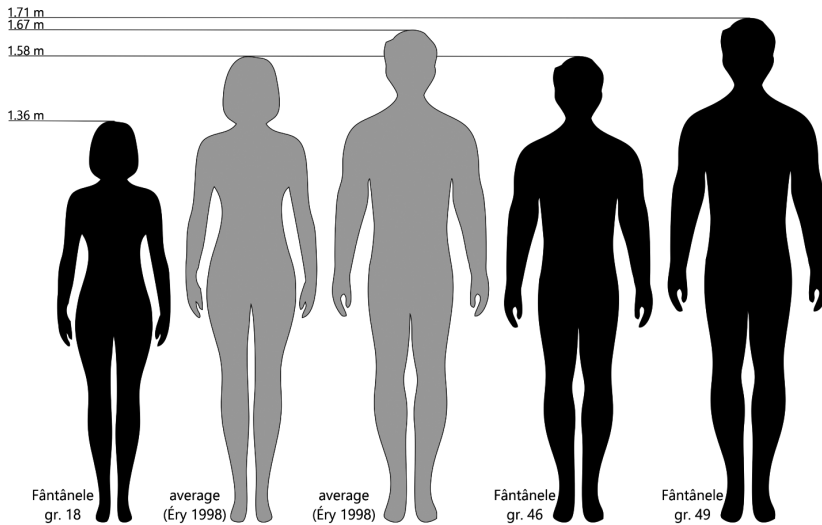


CHART 2. 1. Life expectancy curves; 2. Survivorship curves; 3. Mortality curves



**FIG. 9.** Intravital body height of graves no. 18, 46 and 49 at Fântânele–Dealul Iușului

Even if it cannot be proven without doubt, in these cases the separation of the body parts and their differential treatment can also be presumed (Rebay-Salisbury 2015, 24–26). Such manipulation of the human body and even the cremation of the parts can be supposed also in the case of most of the cremation graves when the burnt remains placed in the grave are scarce.

In the case of three skeletal burials (grave no. 18 of a young woman and graves no. 46 and no. 49 of men), the intravital body height could also be estimated. The 1.36 m tall woman was below the Carpathian Basin average (Éry 1998: women: 1.58 m, men: 1.67 m) and she was shorter than the women in Ludas (Tankó 2012, 205, T.951: 1.57/1.62 m), Hegyfalú (Balázs *et al.* 2015: 1.54 m, 1.57 m), Ordacsehi (Zoffmann 2012, 7. tábla: 1.55 and 1.53 m) and Chotín (Tóth 2015b, 115: 1.5735 m).

The 1.58 m tall man in grave no. 46 is also below average. At the same time, the man in grave no. 49 is above average with a height of 1.71 m. The average intravital body height of men in the Brežice cemetery in Slovenia was 1.60–1.70 m (Hincak, Guštin 2011); in Chotín, 1.72 m is the average for five men (Tóth 2015b, 115).

Pathological cases in the community are not extraordinary. Periodontal disease (caries) was observed in grave no. 38 of a man aged 30–40. The caries could be hereditary and a marker of bad nutrition (Budai 2007).



Grave no. 46 also shows tartar and enamel hypoplasia on the teeth. The causes of enamel hypoplasia are hereditary and may also come from environmental exposure, like nutritional and vitamin deficiency, birth injury or preterm birth, certain infections or diseases (Ortner 2003; Pálffy *et al.* 2012).

The analysis of dental calculus with ultramicro-chemical (UMC) procedure using renal reagents Harzalith I A reagent (sour solution) and B reagent (alkaline solution) (Berényi, Frang 1989; Porowski *et al.* 2008; Buckley *et al.* 2014) undertaken in a pilot project regarding the diet of the Early Iron Age and Early and Middle La Tène communities in Transylvania shows that in the period of the Early Iron Age meat consumption was more widespread, since the calcium-phosphate ratio was higher. In the Late Iron Age nutrition was mostly grain-based, as shown by the higher carbonate-apatite ratio. This result is also supported by the still modest archaeobotanical analyses (Berecki 2021, 27–28).

In grave no. 49 a healed fracture (trauma) of the diaphysis part of a rib, caused by falling or a violent act, could be observed (Ortner 2003).

Epigenetic traits of *supratrochlear foramen* (STF) were observed (Ortner 2003) in grave no. 18 of a young woman and in grave no. 22 of a child. The incidence rate of STF is very large (0,3-58%). The T-Box genes have an important role in the formation of these anomalies. The perforation of the distal epiphysis ends could be observed at 6-7 years old individuals (in extrauterine life). It is probably a developmental variation or deficiency after birth. Even if connection or kinship between STF cases is hard to be proved, the similar size and shape of cases in the same cemetery might indicate some familial relationship. The cases from Fântânele are most probably a simple developmental variation (Hirsh 1927).

In the case of an at least 60 years old *Senilis* male from grave no. 40, *tubercula genialia, D variant* was identified. The genial tubercle is a simple epigenetic variation which predominates within males (Hauser, de Stefano 1989).

Based on the morphological examination of the human bones, it can be stated that the community which buried its dead at Fântânele–Dealul Iușului used open air pyres reaching a medium temperature of 525-645°C (according to Shipman *et al.* 1984; Mays 1998). The analysis of the graves in Ludas cemetery shows a much wider frame of burning, between 200 and 700°C, in some cases even above 800°C, most bones being burned in a controlled, homogeneous environment (Tankó 2012, 212; Tankó, Tankó 2012, 251). The same wide frame between 200 and 800°C is documented in the case of the cremated human remains from Hegyfalú (Balázs *et al.* 2015), and 250-600 / 700-900°C

at Dobova (Hincak, Guštin 2011), while at Zvonimirovo the average burning temperature was 400–600°C (Šlaus, Novak 2013).

The cremated osteological material placed in the grave or collected during the archaeological survey is only 2–5% of the skeleton in a few cases, similar to other Late Iron Age cemeteries from the Carpathian Basin. In the case of the cremation graves at Fântânele–Dealul Iușului the bones placed in the pits were between 2 and 34 mm long. In graves no. 23 and 37 the low quantity of human bones made any analysis impossible.

The average dimension of the cremated human bones in Ludas was 10 mm (Tankó 2012, 210–211). The quantity of the cremated bones placed in the graves is extremely low: between a few grams and 480 grams, but most often less than 100 g. The average quantity of cremated human remains placed in the grave pits at Ludas was between 100 and 200 g, never above 500–700 g (Tankó 2012, 215, fig. 213; Tankó, Tankó 2012, 251). At Mátraszőlős and Hegyfalú the average quantity was around 300 g (Almássy 2012, Balázs *et al.* 2015), while at Bucsu only a few tens of grams of cremated remains were placed in the graves in most cases, rarely reaching 100 g, in one case the remains measured 450 g (Tóth 2010, 133–134).

Thus, it can be stated that in the case of inhumations at the biritual cemetery in Fântânele, the preservation of human remains was generally suitable for anthropological analysis: the age of the deceased was determined in each case and adult individuals' sex could also be established. However, data for only slightly less than half of the cases were obtained for intravital body height calculation.

From a paleodemographic point of view, the disproportionate shift of sex – fundamental parameter for constituting the demographic profile of a society (Burmeister, Gebühr 2018) – in favour of men is surprising.

Without losing sight of the limited possibilities in this respect of the methods of anthropological examination, it can be stated that only dental diseases could be observed in the Fântânele community, and only the enamel hypoplasia of grave no. 46 may give rise to suspicion of malnutrition. However, this phenomenon on the teeth can be attributed to a number of other factors (infections, preterm birth, etc.) as well. Both epigenetic traits – STF in two cases and *tubercula genitalia* in one case – are simple genetic variations.

Regarding the cremation rite, it can be stated that during the cremation which took place at another site, the deceased was burned on an open pyre, at a temperature of 525–645°C, which corresponds to the average in the Carpathian Basin. The extremely fragmented bones, ranging in length from 2 to

34 mm, were partially collected at the site of incineration and only a very small proportion were placed in the grave. In some cases, this proportion does not exceed 10–15% of the ashes. The bones were collected specifically from the pyre, and pieces of coal were almost never placed in the grave.

Finally, the Late Iron Age community of Fântânele, which buried its dead on Dealul Iușului for more than a century, fits integrally into the known data of the contemporaneous cemeteries in the Carpathian Basin in terms of human anthropology and paleodemography, as well as funerary ritual and rite.

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