

DRILLED DOG CANINE ORNAMENTS FROM A SPECIAL LATE COPPER AGE GRAVE*

KUTYASZEMFOGBÓL KÉSZÜLT DÍSZEK EGY KÜLÖNLEGES KÉSŐ RÉZKORI SÍRBÓL

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Abstract

Grave 367 of the Balatonlelle-Rádpusztasite 67/5 cemetery dating from the classical period of the Baden culture contained the burial of an adult woman interred according to an unusual rite involving the placement of a child's skull under the head. The sole grave goods from this burial were three and ten fragmented drilled dog canines. Roughly one-half of the canines lay by the feet of the deceased. The worn surface of the canines and the damaged perforations indicate that they had been worn for a long time, while their position in the grave would suggest that some had once adorned the lower part or hemline of a longer garment. The Hungarian and Central European analogies dating from a few centuries later raise the possibility that woman laid to rest at Balatonlelle as well as the dogs providing the canines used for the adornment, a wholly unique practice in the Carpathian Basin during the fourth millennium BC, were not of local, but of eastern origin.

Kivonat

A Balatonlelle-Rádpusztas-Templom mellett (67/5. sz. lelőhely) feltárt, a klasszikus badeni kultúrához köthető 367. sírból, amelybe egy felnőtt nőt temettek különleges rítus szerint (gyermekkoponyával a feje alatt), egyedüli mellékletként 13 db átfúrt, többé-kevésbé töredékes kutyaszemfog került napvilágra. Legalább felük a halott lába mellett helyezkedett el. A fogak kopott felülete és a sérült lyukfúratok azt sejtetik, hogy tulajdonosuk hosszabb ideig viselte őket, és valószínűleg egy hosszabb ruhadarab alsó részét díszítették nagyobbbrészt. A Kárpát-medence Kr. e. 4. évezredében egyedülálló, csak kutyaszemfogakból készült dísz(ítés) párszáz évvel későbbi, hazai és közép-európai analógiái felvetik annak lehetőségét, hogy a Balatonlellén eltemetett nő – valamint a kutyafogdíszhez felhasznált kutyák – nem helyi, hanem keleti eredetűek.

KEYWORDS: DRILLED DOG CANINES, ORNAMENT, GRAVE GOODS, BADEN CULTURE, CARPATHIAN BASIN

KULCSSZAVAK: ÁTFÚRT KUTYASZEMFOGAK, DÍSZ, SÍRMELLÉKLET, BADENI KULTÚRA, KÁRPÁT-MEDENCE

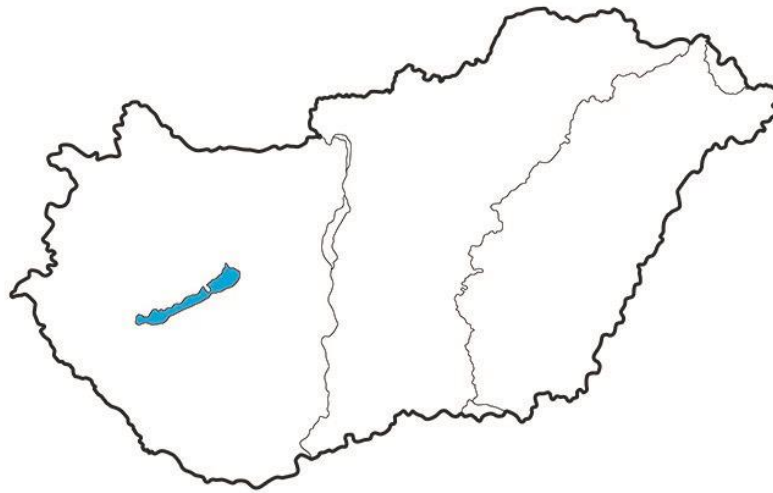
Introduction

As part of the research project funded by the National Research, Development and Innovation Office ("The complex analysis of the Late Copper Age burials of the Carpathian Basin", NKFI Grant K-128413), we are currently sampling the period's burials for strontium isotope analyses.

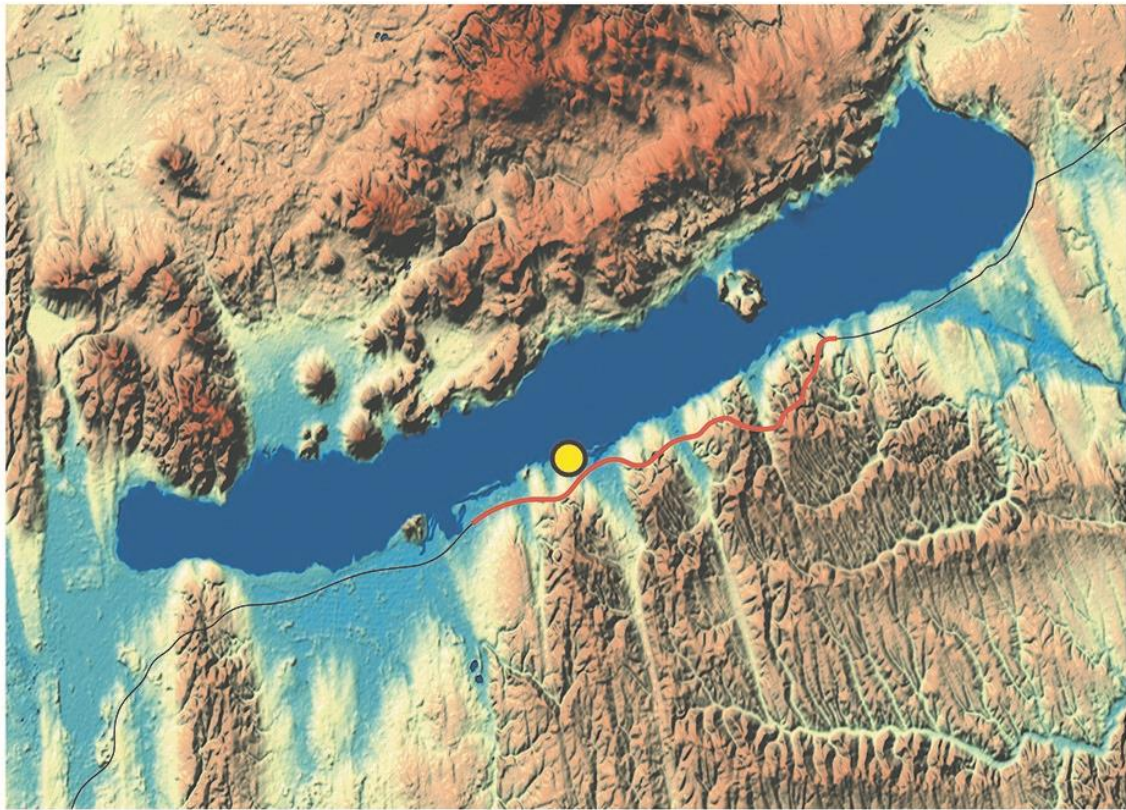
We selected a few extraordinary features uncovered on sites in County Somogy for determining the baseline: the animal bones were transported from the Rippl-Rónai Museum in Kaposvár to the Institute of Archaeology in Budapest.

During the identification and assessment of the animal bones, we found that the animal bones from Grave 367 of the Balatonlelle-Rádpusztas-Templom mellett site (Site 67/5; **Fig. 1.**) were drilled dog canines from several dogs (*Canis familiaris* Linnaeus, 1758). In view of the exceptional nature of the finds and the burial itself, we decided to devote a separate study to the description and discussion of this burial and its remarkable finds.

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Fig. 1.: Location of Balatonlelle-Rádpusztza, Site 67/5

1. ábra: Balatonlelle-Rádpusztza-Templom mellett, 67/5. lelőhely ábrázolása Magyarország térképén

Archaeological context

The archaeologists of the Kaposvár museum excavated 650 features across a roughly 1 hectare large area ahead of the construction of Road 67 in County Somogy as part of a development-led excavation in 2005. István Molnár uncovered four crouched burials in the middle, northern part of the

investigated area. Two of these can be assigned to the Late Copper Age, to the Baden culture (Graves 367 and 415), while the date of the two other burials remains uncertain owing to the lack of grave goods (Molnár–Sípos 2006, 52).

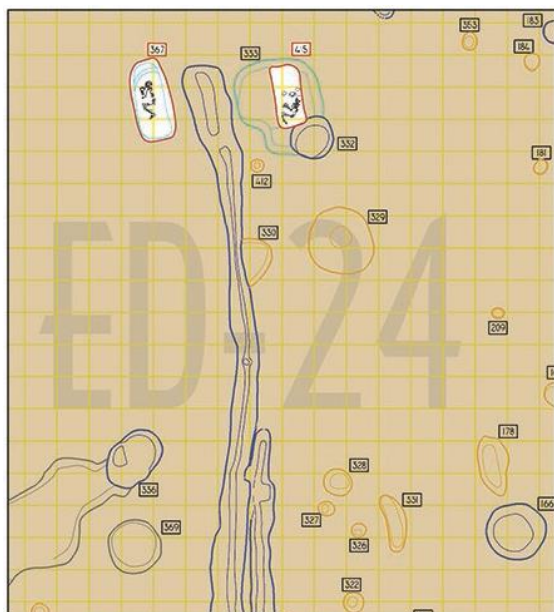


Fig. 2.: The location of the two Baden burials (Graves 367 and 415) relative to each other within the cemetery

2. ábra: A két badeni sír (367. és 415.) egymáshoz viszonyított helyzete a temetőn belül

The two Late Copper Age burials had a similar alignment and lay a few metres apart (**Fig. 2.**). Both graves contained a roughly south to north oriented burial crouched on the right side and both contained additional human skull fragments. The ongoing complex analysis of Grave 415, a most extraordinary burial in several respects, was begun in 2016 and involves the burial's archaeological assessment, physical anthropological assessment, aDNA analysis, radiocarbon dating, stable isotope analyses of carbon and nitrogen, and the non-invasive examination of the grave goods. The grave goods have been covered in a study published recently in *Archeometriai Műhely*, presenting and discussing the archaeological and archaeometric analysis of the currently known earliest known jet bead from the Carpathian Basin (Bondár et al. 2021). The archaeological, physical anthropological and aDNA analyses of the other Late Copper Age burial uncovered on this site (Grave 367) has also been completed (Bondár 2020, Köhler 2020, Bondár & Szécsényi-Nagy 2020), alongside its radiocarbon dating; however, no other analyses could be undertaken in the lack of any grave goods.

Grave 367 lay in the northern part of the trench, some 3 m from Grave 415 (**Fig. 2.**). The roughly north to south oriented burial lay in a 2.2 m long, more-or-less oblong grave pit that widened slightly at the southern end. It was found at a depth of 20–25 cm from the current surface. The body had been deposited in the middle of the grave pit, with the head and feet both lying some 50 cm from the two ends of the pit (**Fig. 3/1-3.**).

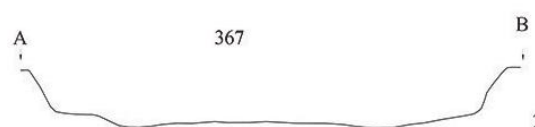


Fig. 3.: Grave 367: the burial and its detail

3. ábra: A 367. sír és részletei

The body was placed in the grave in a crouched position with the skull turned right, the two hands were drawn up and lay tightly beside each other; according to the excavator, the hands had probably been bound together. The legs were also drawn up, with the spine and the thighs at right-angle, while the lower leg lay at an angle of 45 degrees.

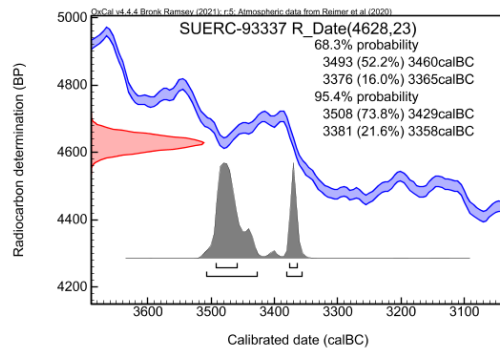


Fig. 4.: Calibrated radiocarbon dates for Grave 367

4. ábra: A 367. sírba fektetett halott radiokarbon-kezelésének kalibrált eredménye

The skeleton was heavily damaged: the pelvic bone and the ribs were missing and one of the thigh bones and lower leg bones were also fragmented. Six perforated animal teeth lay east of the lower leg bone. The burial did not contain any other grave goods.

Samples from the calf bone (fibula) of the individual interred in Grave 367 were sent to the SUERC Laboratory in Glasgow for radiocarbon dating in 2021. The calibrated dates indicated that

the burial could be assigned to the mid-fourth millennium BC, to around 3508–3429 calBC (**Fig. 4.**). A smaller broken skull lay under the skull of the deceased (**Fig. 3/4**). It was obvious from the position of the bones that this skull had been deposited first. It remains uncertain whether the deposition of the skull and the deceased's body had taken place simultaneously or whether some time had elapsed between the two burials.

According to the physical anthropological examination, the grave contained the body of an *adultus-maturus* (35–45-year-old) woman. The broken skull fragments under her head came from an *Infans* I (1–7-year-old) child (Köhler 2020). Samples from the individuals were submitted for the archaeogenetic analyses conducted by Anna Szécsényi-Nagy. The adult individual had well-preserved DNA suitable for a complete mitochondrial genome sequencing, which indicated that she was genetically female. The child's skull was extremely poorly preserved: neither its sex, nor a possible kinship relation with the woman could be determined. Neither were there any strong matrilineal ties between the woman interred in Grave 367 and the children buried in Grave 415 (Bondár & Szécsényi-Nagy 2020: 95).



Fig. 5.:

Balatonlelle-Rádpusztza, Site 67/5.
Grave 367: pendants made from drilled dog canines

5. ábra:

Balatonlelle-Rádpusztza-Templom mellett, 367. sír: átfúrt kutyaszemfogakból (caninus) készült csüngők

Table 1.: Overview of the drilled canines found in Grave 367. Abbreviations: UC – upper canine; LC – lower canine; GL – greatest length; GB – greatest breadth; GD – greatest depth

1. táblázat: Összesítő táblázat a 367. sírban talált átfúrt kutyaszemfogakról. Rövidítések: UC – felső szemfog; LC – alsó szemfog; GL – legnagyobb hossz; GB – legnagyobb szélesség; GD – legnagyobb vastagság

Archaeo-logical ID	Zoological ID	Tooth type	Side	GL (mm)	GB (mm)	GD (mm)	Hole drilled in the tooth root	Diameter of hole (mm)	Tooth Crown
13.10/367.1	C1	UC	dex	35,5	6,5	10,5	Present and complete	2,9 x 2,5	Longitudinally cracked
13.10/367.1	C2	UC	sin	35,6	5,6	9,6	Present and complete	2,4 x 2,5	Longitudinally cracked
13.10/367.1	C3	LC	sin	33,5	6,0	9,0	Present and complete	2,1 x 2,3	Worn and damaged on the caudal surface
13.10/367.1	C4	LC	dex		7,0	10,6	Present, but broken	3,1	Longitudinally cracked; Worn and damaged on the caudal surface
13.10/367.1	C5	UC	dex	ap. 31,5	5,7	8,8	Present, but broken	1,9	Longitudinally cracked; Medially worn on the top
13.10/367.1	C6	LC	sin		6,8	10,2	Present, but broken	2,8	Longitudinally broken; Worn on the caudal surface
13.10/367.1	C7	UC	sin		6,3	10,7	Present, but broken		Longitudinally broken
13.10/367.1	C8	LC	sin	ap. 32,0	6,2	9,6	Present, but broken	2,3	Longitudinally broken
13.10/367.1	C9	LC	sin	ap. 35,0	5,7	10,2	Present, but broken		Longitudinally broken; Damaged on the caudal and medio-lateral surface; Enamel hypoplasia
13.10/367.1	C10	LC	sin				Broken-off root		Longitudinally broken; Worn on the caudal and medio-lateral surface
13.10/367.1	C11	LC	dex				Broken-off root		Longitudinally broken
13.10/367.1	C12	LC	dex				Broken-off root		Longitudinally broken; Worn on the caudal surface
13.10/367.1	C13	LC	sin				Broken-off root		Longitudinally broken

Description of the dog teeth from Grave 367

In contrast to the “ca. six animal teeth” recorded as having been found beside the leg of the deceased in the field diary, ten dog canines had been bagged from the grave, suggesting that additional teeth had been found after lifting the skeleton, which had apparently lain in other bodily regions. This is also confirmed by the discovery of three additional dog teeth among the human skeletal remains. The teeth were drilled from the side (*medio-lateralis*) in the upper third of the root near the tip to enable their threading or their suspension as pendants (**Fig. 5.**).

In order to perform an accurate species identification of the teeth, we examined the comparative dog, fox and wolf skulls and mandibles in the collection of the Hungarian Natural History Museum. The thirteen dog teeth making up the assemblage could be identified as canines, among which there were both upper and lower canines. Given the presence of both right and left side teeth and their extraction from both the upper and lower row of teeth, the teeth originated from at least six dogs, although the variability of their size and form would suggest that the teeth were probably taken from more individuals (**Table 1.**). The assemblage was dominated by lower teeth (nine pieces), mostly left lower canines, and contained fewer upper teeth (four pieces). The C4 and C6 lower canines perhaps form a pair.

The teeth were medium well preserved. Most are fragmented, and even the few intact canines are cracked along the vertical axis. Aside from the traces of wear and the cracks, the surface of the teeth, including the enamel, are covered with dense plant root imprints (**Fig. 6.**). Their poorer state of preservation compared to the human remains would suggest that they had not been made for the burial as funerary adornments, but had been worn for a longer period of time during life. In terms of their condition, the canines can be assigned to three main groups. The root and the crown survived intact in the case of three specimens (C1, C2 and C3) and thus the length, breadth and thickness could be measured (Kysely 2021, fig. 4), as could the smallest and largest diameters of the perforations drilled for attachment or suspension (**Table 1.**). The basal part of the root broke off on six specimens (C4–C9) and therefore the drilled perforation did not survive in its entirety, although one diameter of the perforation could be measured. Four specimens (C10–C13) were fragmented to the extent that only a small portion of the root and/or crown survived (**Fig. 5.**, lower row).



Fig. 6.: Enlargement of the drilled perforation of canines C1 and C2

6. ábra: Nagyítás a C1 és C2 szemfogak furatáról

Except for the drilling, there are no other traces of working on the teeth. The perimeters of the perforations are sharp and intact. Some were drilled perpendicular to the root (e.g. C1 and C3), while others were slightly offset compared to the longitudinal axis (e.g. C2: **Fig. 6.**). Similarly to the cracks and the traces of damage, the interior of the perforations is covered with fine residue. Given the poor condition and damaged surface of the teeth, it seems likely that the damage to the teeth occurred during their use or deposition. It must also be borne in mind that since canines are set in the front part of the maxilla and mandible and protrude from among the other teeth, they are also susceptible to greater wear and injury from blows or from chewing on hard objects such as bones during the dog's lifetime (*intra vitam*) (Bellis 2018: 101; Arcanum Kézikönyvtár).

The form and size of the canines are visibly typical for dogs, falling between gracile fox canines and robust wolf and bear canines. The relevant literature does not contain modern dog canine sizes, at least regarding total length, because the teeth are generally part of the skull. Although information on separate archaeological finds are more frequent, in these cases, the exact determination of the teeth (upper or lower tooth row) and their condition as well as the methods used for recording dimensions can pose difficulties in comparisons.

In any case, the available evidence would indicate that the intact canines from Balatonlelle that could be measured (C1 and C2) are shorter than the upper canines measuring 37 mm found on the pile dwelling settlement at Stare gmajne in the Ljubljana marshland (Slovenia), similarly occupied during the mid-fourth millennium BC (Toškan 2009: 306).

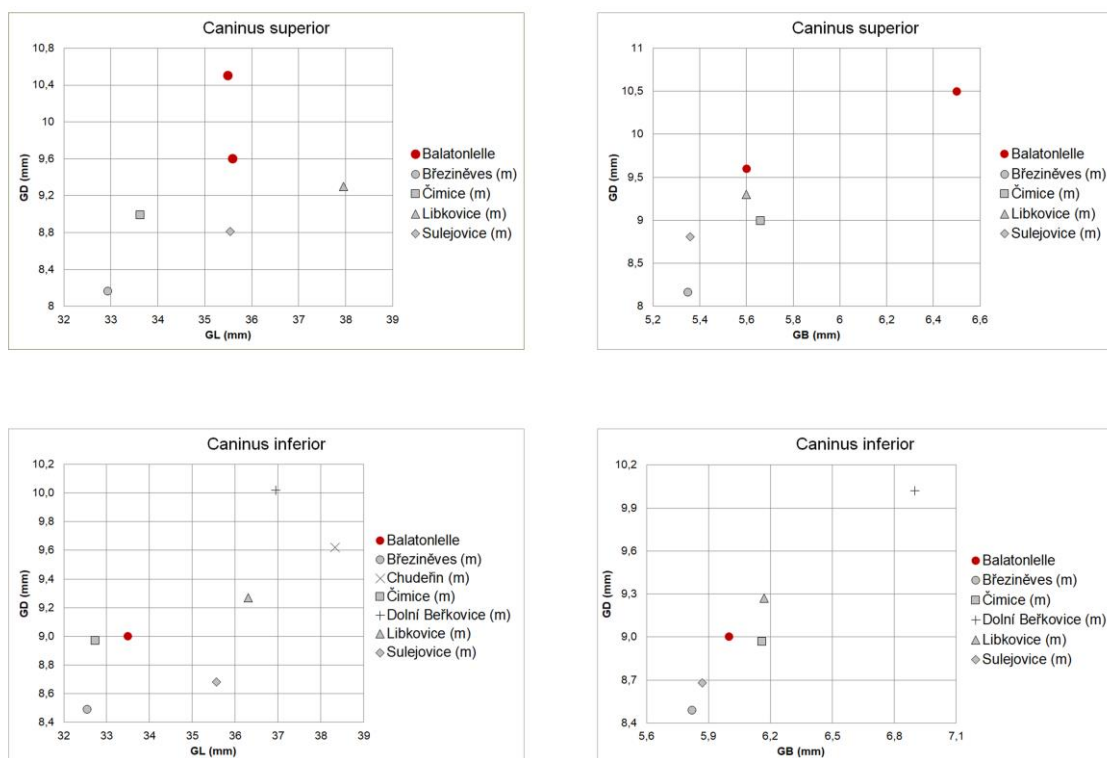


Fig. 7.: Scatter plots comparing the dimensions of the upper and lower canines from Balatonlelle-Rádpusztá-Templom mellett with canines of the Corded Ware culture from the Czech Republic (GL – greatest length; GB – greatest breadth; GD – greatest depth; m – mean)

7. ábra: A Balatonlelle-Rádpusztá-Templom mellett-i felső (caninus superior) és alsó szemfogak (caninus inferior) méreteinek Zsinórdíszes kultúrához tartozó csehországi leletekkel történő összehasonlítása szórásdiagramokon (GL – legnagyobb hossz; GB – legnagyobb szélesség; GD – legnagyobb vastagság; k – középérték).

Compared to the mean value of the dozens of canines recovered from the cemeteries of the Corded Ware culture (2800–2500 BC) in the Czech Republic (Kysely 2021, Table 3), the lengths of the Balatonlelle teeth fall into a similar size range, while their breadth and thickness is more robust (**Fig. 7.**, upper row). In contrast, the size and ratios of the single intact lower canine (C3) fit perfectly into the range of the dog teeth known from the Corded Ware cemeteries in the Czech Republic and can be best assigned to the groups of smaller, gracile teeth (**Fig. 7.**, lower row).

The incisors and canines brought to light by the hundreds in the cemeteries of the Corded Ware culture in Germany and the Czech Republic have a fairly homogeneous distribution. Statistically, they correspond to medium-sized dogs with a withers height of 35–50 cm such as fox terriers, Skye terriers and cocker spaniels among modern species; among prehistoric dog species, they can best be likened to the widespread turbary dog type, also

known as Torfspitz (*C. f. palustris* Rütimeyer, 1861; Kysely 2021).

There is but one single similar assemblage in the Hungarian archaeological record: a necklace strung of a dog canine and two dog incisors found in the cremation burial of the Middle Bronze Age Encrusted Pottery culture at Mernye-Nagyárok (Skriba et al. 2010: 319–321, Figs 27–28). Although it remains unknown whether the canine came from the upper or lower mandible, its length of 34.2 mm does not differ significantly from the size range of the Balatonlelle teeth (**Table 1.**).

Discussion

Dogs in prehistory

As the first domesticated mammal, dogs have been companions to humans well before the spread of sedentary lifestyles: for some 15,000 years in Europe and some 12,000 years in Asia (Frantz et al. 2016: 1228), although more recent finds would suggest that domesticated dogs appeared even

earlier, in the Upper Palaeolithic some 36,000 years ago (Galeta et al. 2021). Given that the period's human communities were engaged in hunting and foraging, and that wolves, the wild ancestors of dogs, were predatory pack animals, the earliest dogs were in all likelihood kept as "hunting companions" for sniffing out and rounding up wild prey (Bökönyi 1974: 320; Bartosiewicz 2006: 121). Later, with the emergence and spread of sedentism, their secondary exploitation took various forms: guarding, herding, pets, cart dogs (Switzerland, Belgium), pack animals (Plains Indians) and sled dogs (beyond the Arctic Circle), and in the Netherlands, dogs were even used for turning churning mills (Bartosiewicz 2006).

The dog finds brought to light from the burials and prehistoric settlements of Central Europe and the western fringes of the Carpathian Basin are assigned to two main types. Small- and medium-sized turbary dogs were the most widespread (Bökönyi 1974: 320; Bartosiewicz 2002; Kysely 2021). For example, several remains of this type with an average withers height of 45 cm were brought to light from the Baden occupation of the Late Copper Age settlement at Balatonőszöd-Temetői-dűlő, while the medium-sized "ancient sheepdogs" with a height of 62.1 cm and an average withers height of 53.2 cm (*C. f. matris optima* Jeitteles, 1877), known from both the Boleráz and the Baden period (Vörös 2013), could also be used as hunting dogs (Bökönyi 1974: 318).

István Vörös identified dogs with a withers height of 50.2 cm that could be assigned to the turbary dog type among the animal remains from the Baden settlement at Pécs; at the same time, the differing dog mandibles indicated that despite the fairly uniform stature, the heads were of different size and form (Vörös 2011: 417–418).

There is a general scholarly consensus that these small- and medium-sized dogs were unsuitable for military purposes, for hunting big game or for protecting herds from large-bodied predators such as wolves and bears, and that they were too big to be cuddled as lap-dogs. However, as predators and scavengers, as well as owing to their pack mentality, they were useful for waste disposal, for guarding the settlement (barking), for herding domesticates and during hunts (for catching small game, as well as for sniffing out, chasing and rounding up big game) (Bartosiewicz 2002; Kysely 2021).

Examples can also be cited for the primary exploitation, namely the consumption of dogs from prehistory to modern times both from Europe and Asia (Bartosiewicz 2006: 121; Bökönyi 1974: 320). However, with a few Bronze Age exceptions, dog remains are rarely found in archaeological kitchen refuse in Hungary (Tugya 2010), most likely

because the cattle, sheep, goats and pigs bred by sedentary food-producing communities provided a steady source of meat and thus there was no need whatsoever to kill off the dogs used for guarding, protection and herding for their meat (Bartosiewicz 1994: 62).

Finds of complete or partial dog skeletons in burials are considerably more frequent in Hungary, an indication that prehistoric man was often accompanied by his faithful four-legged (hunting) companion to the otherworld. Several Neolithic and Copper Age burials containing dogs are known from earlier and more recent excavations, for example from the Lengyel cemetery at Alsónyék-Bátaszék (Zalai-Gaál et al. 2011), the Tiszapolgár cemetery at Polgár-Basatanya (Bognár-Kutzián 1963), and the burial ground assigned to the Boleráz and Baden periods at Pilismarót-Basaharc (Gál 2015). Dog remains have also been recovered from settlement burials, for example at Balatonőszöd-Temetői-dűlő (Horváth 2013; Vörös 2013: 324–325, Tables 43–45). In the Bronze Age, the meat and brain of dogs were both consumed in Hungary and dogs were often chosen as foundation sacrifices, too (Vörös 1998).

Drilled tooth ornaments

Drilled tooth pendants are found singly or in higher number as a homogeneous assemblage, or combined with other ornaments such as drilled claws, jewellery made of other bones or mollusc shells, faience beads, metal studs or spirals, and various other types in archaeological contexts, and their position in burials is also highly varied.

In Europe, one or more drilled tooth ornaments appear beside the deceased in burials from the Upper Palaeolithic onward. Reflecting the environment in which hunter-forager communities lived, these were amulets, necklaces and headdresses typically fashioned from reindeer, red deer and wild boar canines, or, more rarely, from the canines of predators such as fox, wolf and bear (May 1986, Table 2; Larsson 2006: 253).

The teeth of wild species, particularly canines, were believed to impart to their wearers the creature's strength and courage or signalled the skills and ingenuity needed for its hunting and killing. Moreover, in addition to their durability (being the hardest raw material of animal origin beside insect chitin), their low number (deer have two canines, usually only the males, while predatory species have four) and their acquisition by taking the animal's life made them into highly prized prestige items (Choyke 2001: 251–252; Bartosiewicz 2006: 170–171; Kysely et al. 2019: 112).

Their decorative role and the symbolic meaning ascribed to them increased their desirability and thus, with the spread of domestic animals and a

sedentary life-style, the canines or other teeth of wild species could be partially or wholly substituted by the teeth of domesticates or by imitation red deer canines. Owing to their underdeveloped nature, imitations of the bead-shaped red deer canines were made from the Aurignacian period onward (Choyke 2001: 253): pieces fashioned from bone, tusk and other raw materials are known from countless European (Choyke 2001) and Hungarian sites such as Polgár-Csőszhalom (Late Neolithic; Choyke 2001: 255), Abony 36 (Middle Copper Age; Choyke 2010: 203, Fig. 18.6), Bonyhád-Biogáz üzem and Kakucs-Turján (Middle Bronze Age; Szabó 2012; Kiss 2017; Gál 2018: 124, Fig. 8).

Dog teeth, and canines in particular, were by far the most widespread ornaments in the burials of the Corded Ware culture, and thus in addition to thousands of genuine canines, hundreds of imitations are also known from the culture's cemeteries in central Germany and the Czech Republic, where they were mainly recovered from female burials (Kysely et al. 2019: 108, fig. 7f; 124). Deer and dog canines occur together in the kurgan burials of the Yamna culture on the Eastern European steppe, suggesting the possible eastern origin of the use of dog teeth as beads (Kysely et al. 2019: 123). Moreover, given the statistically representative finds from the Czech Republic, it proved possible to demonstrate a diachronic change reflecting the growing value of genuine dog teeth, especially of canines, in the Corded Ware culture (Kysely et al. 2019: 113–114).

The use of animal teeth as adornments, either singly or in larger quantities, is obviously attested in later periods, too (cf. Choyke 2010; Choyke–Bar-Yosef Mayer 2017; Kysely et al. 2019: 121–123), virtually up to the present. As costume accessories, animal teeth, whether of wild species or domesticates, were vested with protective, apotropaic and healing properties (Ortutay 1979), and were believed to epitomize the animal's much-admired qualities such as strength, courage and swiftness in the wearer's life (Choyke 2010: 201).

Dog tooth ornaments from Hungarian prehistoric sites

Very few dog teeth with traces of working from prehistoric archaeological contexts have been published in the Hungarian archaeological literature. The dog tooth pendants from Feature 1999 of the Notenkopf site investigated at Dunaújváros-Rácdomb is currently the earliest find of this type. This artefact, presumably worn as an amulet, was fashioned from a molar (the upper fourth premolar or the lower first molar) and not a canine (B. Horváth–Keszi 2004: 74, Fig. 92).

In his monograph on the Pécel (Baden) culture, János Banner illustrated three drilled dog teeth among the finds from Ózd-Kőaljatető (Banner

1956: 97, Taf. 68. 8–10); however, knowing that the site was successively occupied during several periods, a Late Copper Age date for these finds cannot be conclusively proven. It must nevertheless be noted that all three are definitely canines and that their root was perforated in a manner similar to the Balatonlelle canines.

Dog tooth ornaments appear in greater number and diversity on terminal Early Bronze Age and Middle Bronze Age sites. Although only a single pendant fashioned from a dog canine came to light on the Hatvan settlement of Jászdózsa-Kápolnahalom (Csányi et al. 2000: 156, Pl. 5. 4), it was recovered from a highly remarkable context. In 1966, a hoard was found in a pot under a burnt occupation level (Level 11) which in addition to the tooth amulet, was made up of 37 gold lock-rings, 30 small gold studs, a gold disc, a bronze flanged chisel, a bronze axe, faience beads, a drilled bird claw and a strand of amber beads (Csányi et al. 2000; Tárnoki 2015, 32–33).

Several drilled dog teeth came to light from the occupation levels of the Vatyá culture on the Százhalombatta-Földvár tell settlement; however, these were all molars (e.g. lower first molar: Vretemark–Sten 2020: 61, Fig. 46). The Százhalombatta tell is one of the Bronze Age settlements where dog meat was quite certainly consumed (Vretemark–Sten 2020: 58–61).

Several drilled animal teeth were uncovered on the settlement of the Encrusted Pottery culture uncovered at Site 1 during the excavations ahead of the construction of Road 61 bypassing Kaposvár: one of these appears to be a pig incisor, while another pair of teeth were possibly dog canines fashioned into pendants (Kiss–Somogyvári 2004: 105, Fig. 4. 2–3). A scattered cremation burial of the Encrusted Pottery culture uncovered at Mernye, also in Transdanubia, yielded three drilled dog teeth (a canine and two upper third incisors) interpreted as the ornaments of a necklace that lay under a vessel (Skriba et al. 2010, Fig. 28).

The drilled dog canines from Graves 12 and 13 of the Ószentiván cemetery, a burial ground of the Maros culture, were unquestionably parts of a necklace strung of these pendants and other drilled animal teeth (possibly of pigs) as well as beads that lay in the region of the neck and the chest (Banner 1929: 16, Fig. 4).

Three drilled dog canines were found together with bronze spiral beads and dentalium beads in Grave 4 of the Oroszvár cemetery. Discussing the reconstruction of the pectoral ornament worn by the woman interred in the cemetery of the Gáta culture, István Bóna noted that “we witness the appearance of a pectoral ornament of Eastern European and Inner and Northern Asian origin, which originally symbolised rank and status, and later, at the onset

of the Bronze Age, epitomised wealth and power” (Bóna 1960, 203).

The largest assemblage of dog tooth ornaments came to light from Grave 2 of the burial ground of the Perjámos culture at Hódmezővásárhely-Kopáncs. The grave goods deposited in the burial of the 16–18-year old girl interred with a lavish array of jewellery included several drilled canines, mostly from dogs. The highest number of animal teeth was found in the region of the neck, the right shoulder and near the shoulder, and around the right hand which lay near the shoulder (Szabó 1997: 61–68, Figs 5 and 11). It must be noted, however, that the none of the five grave good clusters found in the region of the head, the neck and shoulders, the left elbow, the left hip and the legs was made up exclusively of dog canines or dog teeth, but comprised also dog incisors as well as fox, wolf and cattle teeth, and that in addition to the animal teeth, the first, second and third cluster contained marine shells, faience beads, bronze spiral tubes and bronze studs, too. The combination of various ornamental elements and their apparently random position within the grave raises the possibility that they had not adorned the body, but rather a dress or a bonnet-like headgear, and neither can it be excluded that two different garments had been placed in the burial: one with a necklace strung of dentalium shells, animal teeth, copper and faience ornaments, and another one embellished with strands of animal teeth and other pieces of jewellery (Szabó 1997: 69).

Although the above overview obviously focused on the analogies from prehistoric times, it must nevertheless be noted that dog tooth pendants are fairly frequent finds in the burials of the Hungarian Conquest period, too (cf. Kovács 1992: 52–53; Medgyesi 2016).

European parallels

Drilled dog teeth – and other animal teeth – for beautifying the dead were used from the onset of the local Neolithic (6395±75 BP) onward in the regions lying north of the Carpathian Basin. Dog teeth were mainly recovered from the female and child burials (but also from a few male graves) of the Zvejnieki cemetery in Latvia, whose interments contained drilled animal teeth by the thousands. The highest number of dog teeth, 69 pieces in all, was found in Grave 226, a child burial dated to the Middle Neolithic (5345±60 BP). The strand strung of teeth originating from at least ten dogs covered the chest and the hips (Larsson 2006).

Grave 19, a male burial in the Middle Neolithic Linearbandkeramik cemetery of Nitra yielded a strand of drilled animal teeth. The necklace found in the neck region under the chin was made up of human teeth and two dog or fox teeth, although

none were canines (Pavúk 1972: 11, 42, Pl. 25, Fig. 19/12–25).

A single pendant fashioned from a dog tooth, an upper canine, came to light on the pile dwelling settlement of Stare gmejne that is closest to the Balatonlelle pendant in both space and time. The slightly oblique perforation was probably made using the same technique as the perforation on tooth C2 from Balatonlelle (Fig. 7.; Toškan 2009: 294–295, Fig. 14.22). The few decorative costume accessories found at this site include a bead fashioned from a bird bone, while teeth such as boar tusks were used for the production of sharp implements (Toškan 2009: 295).

In contrast, hundreds of dog teeth, mostly canines, were found in Grave 59 of the Karsdorf burial ground in Burgenland used by a community of the Corded Ware culture. The most intriguing zoological finds from the double burial of an adult woman and a roughly ten-year-old child (dated 4163±27 calBP) were the shell beads beside and behind the woman’s spine in a backpack-shaped heap and the drilled dog and/or fox teeth by the left arm and before the pelvis, also forming a bag-like cluster (Behnke 2014: 132, Fig. 6; 184, Fig. 37).

Drilled animal tooth pendants, predominantly dog canines and incisors, have been found by the dozen in the burials uncovered in other cemeteries of the Corded Ware culture (2900–2300 BC) in central Germany and the Czech Republic (over 4000 pieces from 134 burials). In addition to the animal teeth, the necklaces and other adornments comprising also beads fashioned from mollusc shells were principally recovered from female and child burials (Kysely et al. 2019).

Among these, Grave 10 of the Prague-Březiněves cemetery containing the burial of a 30–40-year-old woman merits special attention: several hundreds of dog teeth were found beside her body. The teeth from dozens of dogs formed three clusters: (1) only canines were found behind the head, suggesting a headdress or a hooded garment; (2) eight rows of incisors, canines and molars were found in the neck and chest region, possibly the remains of a composite necklace or dress adornment; (3) a few molars were found beside the left arm (Kysely et al. 2019: 90).

Moving southward from the Carpathian Basin, some of the burials in the Mokrin cemetery of the Perjámos culture in the Voivodina yielded dog canines that were part of necklaces or other adornments in combination with pendants of kaolin, shell, deer teeth, bone and other raw materials. The number of dog canines ranged from one or two pieces (as in Graves 7 and 8) to several dozen (e.g. 67 pieces in Grave 104), and they were more frequent in female than in male burials (59 pieces in the former, 19 in the latter; Girić 1971: 224–226).

Finally, a Bronze Age assemblage found near Leipzig must be mentioned. Over a hundred drilled dog teeth came to light from a burial dated to 2500–2200 BC during the excavations ahead of the opening of the Profen coal mine. The dog teeth formed regular rows and pointed in the same direction, suggesting that they had once perhaps adorned a “handbag flap” (Curry 2012).

The analogous finds reviewed in the above reveal that dog teeth were used singly as amulets, or, if found in higher numbers, as beads or ornaments alike. In cases of assemblages made up of several pieces, all four tooth types (incisors, canines, premolars and molars) were used and teeth from both younger and older dogs were selected. The permanent teeth of dogs generally erupt by the time they are 6–7 months old, meaning that only the teeth of individuals older than half a year were suitable for drilling. The use of teeth from young dogs is also an indication that their meat was probably consumed (Kysely et al. 2019: 93).

Irrespective of the adornment type, the known drilled dog teeth are dominated by canines, a reflection of their prominent nature: for example, the pectoral ornament from Oroszvár had canines at the terminals (Bóna 1960: 199, Fig. 2) or they flank the beads or pendants made from more frequent tooth types (Šebela 1999 in Kysely et al. 2019: 126). Their high value is reflected by the hundreds of imitation dog canines found in several dozen Corded Ware burials (Kysely et al. 2019).

Conclusion

The dog canine ornaments from Grave 367, a female burial, of the Balatonlelle cemetery represent a unique assemblage from the fourth millennium BC. The number of teeth and the fact that they originate from the same species and represent the same tooth type sets them apart from the other amulets and decorative bead strands used since earlier times to adorn the dead across Europe. The pendants and necklaces strung solely of dog canines as well as their decorative suspension without any other adornments (such as drilled human or other animal teeth, molluscs, faience or other beads, precious metal studs, spirals and the like) distinguished them from the other decorative strands and pectoral ornaments which also comprised dog teeth, occasionally in high numbers. The regional distribution of the currently known analogies to drilled dog teeth and/or canines indicates that they were used for adorning the mortuary garment worn by or placed on the deceased, or for decorating a costume accessory such as a headdress, a pouch or a handbag-like article. Given the location of the teeth within the burial, a longer garment whose hemline was embroidered with the teeth seems more likely. The broken perforations too suggest that the canines had

been sewn or pinned to a garment (cf. Kysely et al. 2019: 126). At the same time, neither can we exclude the possibility that a jewellery item of dog canines had been placed by the woman’s feet in a pouch-like article.

Given that the well-datable parallels all came to light from burials, it seems quite obvious that the Balatonlelle assemblage had once embellished a garment or was an adornment associated with the individual, possibly a status symbol, that was buried together with the deceased and was therefore not hereditary. Dating from the earlier fourth millennium BC, the assemblage fits in nicely with the general pattern both within and beyond the Carpathian Basin that higher numbers of dog tooth ornaments are more typical for female and child burials than for male ones. One striking trait of the Balatonlelle burial is the lack of any other grave goods, again an indication of the role of dog teeth in signalling identity. The skull placed under the head of the deceased whose body had been carefully arranged as part of a ritual and the unique ornament fashioned from dog teeth likewise epitomised the deceased woman’s special status. It is also quite interesting that Grave 415, lying a few metres away and dating from the same period, contained a child interred according to the same rite with a skull placed under the head, although the rich array of grave goods was of an entire different kind, comprising a copper bracelet and a jet bead (Bondár et al. 2021).

Dog tooth ornaments are most frequently found in the burials of the Corded Ware culture, a cultural complex that appeared and spread after the third millennium BC: given the eastern origins of this culture, it is quite possible that Grave 367 of Balatonlelle is not an isolated phenomenon and that the deposition of the drilled dog tooth ornaments should be seen not as mere chance, but rather as an imprint of other traditions in the grave of the woman interred on the territory of the Baden culture.

Accordingly, the planned complex assessment of the burials and of the grave goods crafted from animal raw materials dating from the fourth millennium BC, and in particular the isotope analyses that will be conducted as part of our research project, will no doubt shed more light on the origins as well as the possible mobility of the woman and the dogs interred in the Balatonlelle burial, which will in turn contribute to a better understanding of the cultural, social and symbolic values and meanings attached to them.

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References

- Arcanum Kézikönyvtár: Fogtörés. In: Kutyatár. <https://www.arcanum.com/hu/online-kiadvanyok/Kutyatar-kutyatar-1/a-kutya-betegsegei-1C25/az-emesztorendszer-betegsegei-1DD4/fogbetegsegek-1DEA/fogtores-1DF8/> (accessed July 29, 2021)
- BANNER, J. (1929): Az Ószentiváni bronzkori telep és temető (Die Ausgrabungen bei Ószentiván). *A Szegedi Alföldkutató Bizottság Könyvtára II. szakosztály közleményei* **4** 3–32.
- BANNER, J. (1956): *Die Péceli Kultur*. Archaeologia Hungarica, Series nova 35. Akadémiai Kiadó, Budapest. pp. 314.
- BARTOSIEWICZ, L. (1994): Late neolithic dog exploitation: Chronology and function. *Acta Archaeologica Academiae Scientiarum Hungaricae* **46** 59–71.
- BARTOSIEWICZ, L. (2002): Dogs from the Ig pile dwellings in the National Museum of Slovenia. *Arheološki Vestnik* **53** 77–89.
- BARTOSIEWICZ, L. (2006): *Régenvolt háziállatok*. L'Harmattan Kiadó, Budapest. pp. 223.
- BEHNKE, H. J. (2014): Ein Gräberfeld der Schnurkeramik und der frühen Bronzezeit in der Karsdorfer Feldflur, Burgenlandkreis. *Jahresschrift für mitteldeutsche Vorgeschichte* **94** 125–218.
- BELLIS, A. (2018): Reviewing the pathology and welfare of dogs in Roman Britain. In: BARTOSIEWICZ, L. & GÁL, E. (eds.) Care or neglect? Evidence of animal disease in archaeology. *Proceedings of the 6th meeting of ICAZ Animal Palaeopathology Working Group*, Oxford & Philadelphia, 97–115.
- BOGNÁR-KUTZIÁN, I. (1963): *The Copper Age Cemetery of Tiszapolgár-Basatanya*. Akadémiai Kiadó, Budapest. pp. 596.
- BONDÁR, M. (2020): Késő rézkori különleges temetkezések Balatonlelléről (Somogy m.) – Unusual burials of the Late Copper Age at Balatonlelle (County Somogy, Hungary). *A Kaposvári Rippl-Rónai Múzeum Közleményei* **7** 89–108.
- BONDÁR M. & DEMÉNY A. & NÉMETH P. & KARLIK M. & FINTOR K. & TÓTH M. (2021): Különleges gyöngy egy különleges késő rézkori sírból – Special bead from a special Late Copper Age Grave. *Archeometriai Műhely* **18/2** 143–155.
- BONDÁR, M. & SZÉCSÉNYI-NAGY, A. (2020): Skull cult in the Late Copper Age. *Ziridava* **34** 91–104.
- BÓNA, I. (1960): Az oroszvári 4. női sír mellédíszének rekonstrukciója. Adatok a közép dunamedencei bronzkori viselethez II. – The Pectoral Ornament of the Female Grave 4 at Oroszvár. Data Illustrating the Costume of the Bronze Age in the Middle Danube Basin. II. *Archaeológiai Értesítő* **87** 198–205.
- BÖKÖNYI, S. (1974): *History of Domestic Mammals in Central and Eastern Europe*. Akadémiai Kiadó, Budapest. pp. 597.
- CHOYKE, A. M. (2001): Late Neolithic red deer canine beads and their imitations. In: CHOYKE, A. M. & BARTOSIEWICZ L. (eds.), *Crafting bone – Skeletal technologies through time and space. Proceedings of the 2nd meeting of the (ICAZ) Worked Bone Research Group*. Budapest, 251–264.
- CHOYKE, A. M. (2010): The Bone is the Beast: Animal Amulets and Ornaments in Power and Magic. In: CHOYKE, A. M., CAMPANA, D., CRABTREE, P., DEFRANCE, S.D. & LEVTOV J. (eds.) *Anthropological Approaches to Zooarchaeology: Colonialism, Complexity, and Animal Transformations*. Oxford, 197–209.
- CHOYKE, A. M. & BAR-YOSEF MAYER, D. E. (2017): Introduction: The Archaeology of Beads, Beadwork and Personal Ornaments. In: BAR-YOSEF MAYER, D. E., BONSALL, C., CHOYKE, A. M. (eds.), *Not just for show. The Archaeology of Beads, Beadwork and Personal Ornaments*. Oxford, 1–4.
- CSÁNYI, M., STNACZIK, I. & TÁRNOKI, J. (2000): Der bronzzeitliche Schatzfund von Jászdózsá-Kápolnahalom. *Acta Archaeologica Academiae Scientiarum Hungaricae* **51** 147–167.
- CURRY, A. (2012): World's Oldest Purse Found — Studded With a Hundred Dog Teeth? *National Geographic News*, **June 27**. <https://www.nationalgeographic.com/animals/article/120627-worlds-oldest-purse-dog-teeth-science-handbag-friederich> (accessed July 31, 2021)
- FRANTZ, L. A. F., MULLIN, V. E., PIONNIER-CAPITAN, M., LEBRASSEUR, O., OLLIVIER, M., PERRI, A., LINDERHOLM, A., MATTI-ANGELI, V., TEASDALE, M. D., DIMOPOULOS, E. A., TRESSET, A., DUFFRAISSE, M., MCCORMICK, F., BARTOSIEWICZ, L., GÁL, E., NYERGES, É. Á., SABLIN, M. V., BRÉHARD, S., MASHKOUR, M., BĂLĂŞESCU, A., GILLET, B., HUGHES, S., CHASSAING, O., HITTE, C., VIGNE, J.-D., DOBNEY, K., HÄNNI, K., BRADLEY, D. G. & LARSON, G. (2016):

Genomic and archaeological evidence suggest a dual origin of domestic dogs. *Science* **352** (6290) 1228–1231.

GÁL, E. (2015): Animal bone remains from the Late Copper Age cemetery at Pilismarót-Basaharc. In: BONDÁR, M. (ed.), *The Late Copper Age cemetery at Pilismarót*. Research Centre for the Humanities, Hungarian Academy of Sciences, Budapest, 369–381.

GÁL, E. (2018): Preliminary results concerning the Middle Bronze Age (Vatya culture) bone tools from Kakucs-Turján, Central Hungary. In: JAEGER, M., KULCSÁR, G., TAYLOR, N. & STANIUK, R. (eds). Kakucs-Turján. *Studien zur Archäologie in Ostmitteleuropa* Dr. Rudolf Habelt GmbH, Bonn, **18** 119–136.

GALETA, P., LÁZNIČKOVÁ-GALETOVÁ, M., SABLIN, M. & GERMONPRÉ, M. (2021): Morphological evidence for early dog domestication in the European Pleistocene: New evidence from a randomization approach to group differences. *The Anatomical Record: Advances in Integrative Anatomy and Evolutionary Biology*. **304/1** 42–62.

<https://doi.org/10.1002/ar.24500>

<https://anatomypubs.onlinelibrary.wiley.com/doi/epdf/10.1002/ar.24500>

GIRIĆ, M. (1971): Mokrin, the Early Bronze Age Necropolis. I. *Dissertationes et Monographiae. Saveza Arheoloskih Drustava Jugoslavije* Smithsonian Institution / The Archaeological Society of Yugoslavia, Beograd. **11** pp. 271.

B. HORVÁTH, J. & KESZI, T. (2004): Az Intercisa Múzeum Kincsei II. – *Die Schätze des Intercisa Museums 11. – Az Intercisa Múzeum őskori állandó kiállításának katalógusa – Katalog der Urzeitlichen Beständigen Ausstellung des Intercisa Museums*. Intercisa Múzeum. Dunaújváros. pp. 98.

HORVÁTH, T. (2013): Állati csontvázakat tartalmazó objektumok. In: HORVÁTH, T. (ed.), *Balatonőszöd–Temetői dűlő őskori településrészei. A középső rézkori, késő rézkori és kora bronzkori települések* [The Prehistoric settlement of Balatonőszöd–Temetői dűlő (M7/S-10)]. Horváth, T. (ed.). Magyar Tudományos Akadémia Bölcsészettudományi Kutatóközpont Régészeti Intézete. Budapest. 2013. Digitális kiadás – dupla DVD [Digital edition, double DVD].

KISS, V. (2017): Hogyan keltezhetők a bronzkor változásai? - 3. rész - MTA BTK RI Lendület Mobilitás Kutatócsoport
<https://mobilitas.ri.abtk.hu/?media=hogyan-keltezhetok-bronzkor-valtozasai-3-resz&lang=hu>
(2021. 08. 09.)

KISS, V. & SOMOGYVÁRI, K. (2004): Újabb adatok a mészbetétes kerámia kultúrája telepeiről: előzetes jelentés a Kaposvár, 61. út 1. lelőhely középső bronzkori településéről. In: NAGY E. GY., DANI J. & HAJDÚ Zs. (szerk.) *ΜΩΜΟΣ II. Őskoros Kutatók II. Összejövetelének konferenciakötete*: Debrecen, 2000. november 6–8. Hajdú-Bihar Megyei Múzeumok Igazgatósága. Debrecen, 93–112.

KOVÁCS, L. (1992): A Móra Ferenc Múzeum néhány régi, honfoglalás kori leletanyagáról: Oroszlámos, Horgos, Majdán, Rábé (Csóka). *Móra Ferenc Múzeum Évkönyve* **1991/92-1** 37–74.

KÖHLER, K. (2020): Balatonlelle-Rádpusztá 67/5. lelőhely embertani leleteinek vizsgálati eredményei. *A Kaposvári Rippl-Rónai Múzeum Közleményei* **7** 106–108.

KYSELÝ, R., DOBEŠ, M. & SVOBODA, K. (2019): Drilled teeth and shell artefacts from a grave at Prague-Březiněves and a review of decorative artefacts made from animal material from Corded Ware culture in the Czech Republic. *Archaeological and Anthropological Sciences* **11** 87–131.

<https://link.springer.com/article/10.1007/s12520-017-0514-5>

KYSELÝ, R. (2021): Dog size and variability in the Late Eneolithic: Drilled teeth from Corded Ware graves in Bohemia. *International Journal of Osteoarchaeology*. **31/4** 487–505.

<https://onlinelibrary.wiley.com/doi/10.1002/oa.2966>

LARSSON, L. (2006): A tooth for a tooth. Tooth ornaments from the graves at the cemeteries of Zvejnieki. In: LARSSON, L. & ZAGORSKA, L. (eds.). Back to the origin. New research in the Mesolithic-Neolithic Zvejnieki cemetery and environment, northern Latvia, *Acta Archaeologica Lundensia*. Lund 253–287.

MAY, F. (1986): *Les sépultures préhistoriques. Etude critique*. Éditions du C.N.R.S., Paris. pp. 264.

MEDGYESI, P. (2016): Bajelhárító állatsontok egy vésztői honfoglaláskori sírból. *Mesélő Múzeum* jan. 18.

http://www.museum.hu/hir/5228/Meselo_muzeum

MOLNÁR, I. & SÍPOS, C. (2006): Balatonlelle-Rádpusztá, Romtemplom mellett (67/5 lelőhely). In: HONTI SZ., FÁBIÁN SZ., GALLINA Zs., HAJDÚ Á. D., HORNOK P., KOÓS I., MERSDORF Zs., MOLNÁR I., NÉMETH P. G., POLGÁR P., P. SZEŐKE J., SERLEGI G., SIKLÓSI Zs., SIPOS C. & SOMOGYI K.: Régészeti kutatások az M7-es autópálya Somogy megyei szakaszán és a 67-es úton (2004–2005) Előzetes jelentés IV – Archaeological research on the Somogy county section of the M7 highway and

on Route No. 67. Preliminary Report IV. *Somogyi Múzeumok Közleményei* **17** 51–52.

ORTUTAY, Gy. (szerk.). (1979): *Magyar Néprajzi Lexikon*. II. kötet. Budapest.

<http://mek.niif.hu/02100/02115/html/2-343.html>

(accessed August 1, 2021)

PAVÚK, J. (1972): Neolithisches Gräberfeld in Nitra. *Slovenska Archeologia* **20/1** 5–105.

ŠEBELA, L. (1999): The Corded Ware culture in Moravia and in the adjacent part of Silesia (catalogue). Institute of Archaeology of the Czech Academy of Science, Brno. pp. 238.

SKRIBA, P., NAGY, B., REMÉNYI, L., LÁSZLÓ, O., KREITER, A., TÓTH, M., TUGYA, B. & SZILÁGYI-GÁBOR, I. (2010): Késő rézkori település, középső bronzkori hamvasztásos sír és Árpád-kori temetőrészlet a Mernye határában (Late Copper Age settlement, Middle Bronze Age cremation burial and a fragment of an Árpadian Age cemetery on the outskirts of Mernye). In: KVASSAY J. szerk./ed., *Évkönyv és jelentés a Kulturális Örökségvédelmi Szakszolgálat 2008. évi feltárásairól* (2008 Field Service for Cultural Heritage Yearbook and Review of Archaeological Investigations). Budapest, 249–342.

SZABÓ, G. (1997): A Perjámos-kultúra leletei Hódmezővásárhely környékén (Adalékok a kora és középső bronzkori női viselethez). - Findings of Perjamos culture in Hódmezővásárhely region (contribution to female costumes in the early and middle Bronze Age). In: HAVASSY P. (szerk.) *Látták Trója kapuit. Bronzkori leletek a Közép-Tisza vidékéről* (Sie sahen die Tore von Ilion. Funde aus der Bronzezeit vom mittleren Theissgebiet). *Gyulai Katalógusok* **3** Gyula, 59–84.

SZABÓ, G. (2012): Előmunkálatok Bonyhád, Pannonia Zrt. biogáz-üzem megelőző régészeti feltárás anyaga feldolgozásához I.: sírmellékletek, embertan, DVD. Szekszárd.

TÁRNOKI, J. (2015): Üzenet az idők mélyéről. Bronzkori település Jászdózsza-Kápolnahalmon. Kézirat.

http://www.jaszdozsza.hu/e107_files/downloads/ertehtar/tarnokijudit.pdf

TOŠKAN, B. (2009): Bone, antler and teeth artefacts from the Copper Age pile-dwellings Stare Gmajne and Blatna Brezovica. In: VELUŠČEK, A. (ed.) *Koliščarska naselbina Stare gmajne in njen čas. Ljubljansko barje v 2. polovici 4. tisočletja pr. Kr.* (Stare gmajne Pile-dwelling Settlement and Its Era. The Ljubljansko barje in the 2nd half of the 4th millennium BC), *Opera Instituti Archaeologici Sloveniae* **16** Ljubljana, 287–327.

TUGYA, B. (2010): A kutyahús fogyasztásának archaeozoológiai bizonyítékai – The archaeozoological evidences of dog meat

consumption. In: KVASSAY J. (szerk.) *Évkönyv és jelentés a Kulturális Örökségvédelmi Szakszolgálat 2008. évi feltárásairól – 2008 Field Service for Cultural Heritage Yearbook and Review of Archaeological Investigations*. Budapest, 99–106.

VÖRÖS, I. (1998): Dog as building offering from the Bronze Age Tell at Jászdózsza. – Építési kutyaáldozat Jászdózsáról. *Folia Archaeologica* **45** 69–90.

VÖRÖS, I. (2011): Késő rézkori település állatsont-leletei Pécsen (Animal bone remains from a Late Copper age settlement at Pécs). In: FEKETE M. (ed.), „...eleitől fogva” Régész – Tanár – Ember. A 75 éves Makkay János köszöntése. *Specimina Nova. Supplementum* **11**. HORVÁTH, Sz. & KISS, M. & RAUERT, M. H. (eds.). *Vivarium Fontium*. **6** Pécs. 411–434.

VÖRÖS, I. (2013): Balatonöszöd késő rézkori településen feltárt emlőállatok maradványai [Remains of mammalian animals from the Late Copper Age settlement at Balatonöszöd]. In: HORVÁTH, T. (ed.), *A Balatonöszöd–Temetői dűlő (M7/S-10) lelőhely őskori településrészei* [The Prehistoric settlement of Balatonöszöd–Temetői dűlő (M7/S-10)]. Magyar Tudományos Akadémia Bölcsészettudományi Kutatóközpont Régészeti Intézete. Budapest. 2013. Digitális kiadás – dupla DVD [Digital edition, double DVD].

VRETEMARK, M. & STEN, S. (2020): Animal bones from the Bronze Age tell settlement of Százhalombatta-Földvár in Hungary. *Százhalombatta Archaeological Expedition Report* **3**. Matrica Múzeum. Százhalombatta. pp. 132.

ZALAI-GAÁL, I. & GÁL, E. & KÖHLER, K. & OSZTÁS, A. (2011): „Ins Jenseits begleitend”: Hundemitbestattungen der Lengyel-Kultur von Alsónyék-Bátaszék. *Acta Archaeologica Academiae Scientiarum Hungaricae* **62/1** 29–74.

