

Meat offerings in graves of the Hallstatt Period in Bohemia (Czech Republic): An archaeozoological comparison

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(with 7 figures and 2 tables)

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Abstract

The paper provides a preliminary review of the current state of knowledge concerning meat offerings in the Hallstatt funeral rite in Bohemia (c. 800–450 BC). Uncharred animal bones, representing meat offerings, from three burials from the Bylany and Hallstatt Tumulus cultures found in two recently excavated sites were analysed archaeozoologically and in great detail. Information from earlier excavations in Bohemia was taken into account and some of the finds were revised. The paper presents a comparison of these finds from the perspective of taxonomy, anatomy, the age of the animals slaughtered and taphonomy. Contrary to former opinions, not only pigs but also sheep and cattle were offered. Despite some variation being observed, the comparison reveals similarities between meat offerings from both mentioned local cultures of the Hallstatt period. In all three recently excavated burials, a calf is the dominant object with respect to the number of bone finds (and offered meat). Adult and sub-adult sheep were also present in all three cases and an adult pig was present in at least one case. These multiple-species offerings are rare in Bohemia, and likely to reflect the special status of the deceased. Young age of cattle also appear to be the rule. Another regular feature is the offering of fleshy parts of the legs and rib segments, while other fleshy and non-fleshy parts of the body were not offered. Various observations (articulation, butchery marks, phosphate analysis) suggest that the bones found in the graves had originally borne substantial portions of meat. The absence of the head and certain fleshy parts of the body – specifically the spine region – is a common observation in the Bylany culture; the missing parts were most probably used for the funeral banquet. A comparison with neighbouring regions and an estimation of the body size of the offered animals is also presented.

Keywords: Early Iron Age, Bylany culture, Celts, food offering, funeral banquet, pig – boar (*Sus*), cattle (*Bos*), sheep/goat (*Ovis/Capra*).

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Zusammenfassung

Der Artikel bringt einen vorläufigen Überblick über den aktuellen Forschungsstand der Fleischbeigaben im hallstattzeitlichen Grabitus in Böhmen. Rezent wurden unverbrannte Tierknochen aus der Bylany-Kultur und der hallstattzeitlichen süd- und westböhmischen Hügelgräberkultur (ca. 800–450 BC) archäozoologisch detailliert analysiert. Diese neuen Funde stammen aus drei Gräbern von zwei Fundstellen. Gleichzeitig wurden Informationen aus älteren Grabungen einbezogen, wobei einige Funde revidiert worden sind. Der vorliegende Beitrag präsentiert einen Vergleich dieser Funde unter dem Gesichtspunkt der taxonomischen und anatomischen Repräsentanz, des Alters der Tiere und der Taphonomie. Im Unterschied zu manchen früheren Ansichten wurden nicht nur das Schwein, sondern auch Schaf und Rind in die Gräber gegeben. Trotz der beobachteten Variabilität sind bestimmte Ähnlichkeiten zwischen den Fleischbeigaben in den beiden erwähnten Lokalkulturen der Hallstattzeit festgestellt worden. Wird die Knochenzahl (bzw. Fleischmenge) bewertet, so ist in allen drei neu untersuchten Gräbern das Kalb das dominante Objekt. Erwachsenes oder subadultes Schaf war auch in allen drei Fällen vorhanden und erwachsenes Schwein war mindestens in einem Fall anwesend. Solche mehrere Arten umfassende Beigaben kommen in Böhmen selten vor und können einen spezifischen Status des Bestatteten reflektieren. Das junge Alter des Rindes scheint auch die Regel darzustellen. Eine weitere regelmäßige Erscheinung ist die Opferung fleischtragender Teile von Gliedmaßen und von Rippenblöcken, während andere fleischtragende sowie nichtfleischtragende Körperteile nicht ins Grab gegeben wurden. Verschiedene Untersuchungen (artikulierter Zustand, Fleischerprinzipien, Phosphatanalyse) lassen nachweisen, dass die ausgegrabenen Knochen ursprünglich beträchtliche Menge Fleisch trugen. Die Absenz des Kopfes und bestimmter fleischtragender Körperteile – insbesondere im Bereich der Wirbelsäule – wird in den Gräbern der Bylany-Kultur häufig festgestellt, die fehlenden Teile wurden höchstwahrscheinlich beim Bestattungsmahl verwendet. Einen Bestandteil des Artikels bilden unter anderem Vergleiche mit benachbarten Regionen und die Abschätzung der Körpergröße der Tiere.

Schlüsselwörter: Frühe Eisenzeit, Bylany Kultur, Kelten, Fleischbeigaben, Leichenschmaus, Schwein (*Sus*), Rind (*Bos*), Schaf/Ziege (*Ovis/Capra*).

Introduction

The Hallstatt culture – named after the lakeside village of Hallstatt in Upper Austria – was the predominant culture of western and central Europe in the Early Iron Age and rich archaeological material has been obtained from Hallstatt settlements and burials. A number of animal bone assemblages from this period have been analysed by archaeozoologists, including Erich Pucher (see PUCHER 1995, 1998, 2000, 2003, 2004). This culture is known for its large complex funeral rituals resulting in extremely rich burial mounds such as those at Vix (France), and Hohmichele and Hochdorf (Germany), located in the western Hallstatt zone (RIEK & HUNDT 1962; BIEL 1985; ROLLEY 2003). Another well-known but mysterious finding is that at Býčí skála, Moravia, in the eastern Czech Republic and belonging to the eastern Hallstatt zone. This find also includes animal bones (PUCHER 1995). The Hallstatt cultural complex is broadly known for the deposition of meat offerings in graves.

Although Bohemia is almost completely surrounded by mountains, which makes it a geographically, and to a certain extent culturally closed unit, rich grave goods representing social elites (the aristocracy, chiefs, princes) is a common feature of the Hallstatt period also in this country. The presence of a wagon is not uncommon, as this region is part of the western Hallstatt zone, for which chariot burials (also called “princely” burials) are a typical feature. Yokes, bridles, horse harnessing and related components can also be a part of grave inventories, but no horse skeleton has yet been found in what is now Bohemia. During the Hallstatt period, phase Ha C to Ha D1, three main local cultural groups existed in Bohemia: (1) the Bylany culture in central and northern Bohemia, (2) the Hallstatt Tumulus culture in southern and western Bohemia, and (3) the Silesian-Platěnice culture in north-eastern Bohemia. Tumuli and flat cemeteries are both known, but each culture exhibits its own particular funeral customs, all of which have been summarised by VENCLOVÁ *et al.* (2013). In the Bylany culture, 10 types of graves were defined by KOUTECKÝ (1968), some of these overlaid by burial mounds. Bylany is a bi-ritual culture, with skeletal burials and cremations sometimes appearing together in one grave. A special type of grave is formed by large, rich chamber graves; the richest of these contain a wagon or its component parts, a yoke and horse harnessing (KOUTECKÝ 2013: pp. 66–73). The Hallstatt Tumulus culture is also bi-ritual and is characterised by burials beneath (sometimes large) tumuli. Large, “princely” graves can also contain the remains of a wagon or harness, as can graves of the Silesian-Platěnice culture. Both types of burial, inhumation and cremation, are known (MICHÁLEK & CHYTRÁČEK 2013: pp. 86–90). The Silesian-Platěnice culture represents a continuation of the Lusatian (Urnfield) culture. Only cremation burials (mostly in urns) were recorded in this culture (VOKOLEK 2013: pp. 101–106). Animal bones appear in the graves of all three cultures, but are especially common in the Bylany culture. In the latest phase of the Hallstatt culture (Ha D2–Lt A), regional dissimilarities begin to disappear. Although the traditions described above continue (incl. the presence of vehicles and harnesses in graves), animal bones become more of a rarity (VENCLOVÁ *et al.* 2013: pp. 147–154).

Until very recently, there has been no detailed analysis of animal bones. Data from earlier excavations are incomplete or entirely lacking, and often inconclusive. Existing information is included in general archaeological overviews in the form of a brief summary or commentary in KOUTECKÝ (1968), KOUTECKÝ & FRIDRICHOVÁ (1980), FRIDRICHOVÁ *et al.* (1996, 1997, 1999), and VENCLOVÁ *et al.* (2013). The contribution made by this study presents a detailed analysis of the remarkably rich meat offerings found recently in Bohemia, and revises some older finds and adds them to the existing body of knowledge.

Sites, graves and material

The current excavations at Rovná and Prague–Letňany were analysed in detail using a modern interdisciplinary approach. The bones found at the two sites provide important material for the comparison presented here.

At Rovná, in the district of Strakonice, southern Bohemia, two tumuli belonging to the Hallstatt Tumulus culture were discovered in close proximity. Only the larger of the two tumuli (tumulus 1), with a diameter of at least 25 m and dated to the Late Hallstatt Period, phase Ha D2-3, has so far been excavated (CHYTRÁČEK *et al.* 2014, 2015, 2016, 2017a, *in print*). The burial mound contained a chariot burial, which included the two-wheeled chariot, parts of a horse harness and bronze vessels. Although the tumulus was later partly disturbed, the chamber floor was mostly intact. Uncharred human and animal bones were retrieved. The archaeozoological results are based on a detailed analysis made by the author of this paper. These appear in part in publications by CHYTRÁČEK *et al.* (2014, 2015, 2017a, *in print*). All the main osteological finds have been determined; the floated material is still under investigation.

At Prague–Letňany, near Prague, central Bohemia, two graves (Nos 6 and 14) were found 250 m apart. Both are rectangular and orientated north-south, and both are dated to the Bylany culture, Ha C/D1 (FROLÍKOVÁ 2015; KOZÁKOVÁ *et al.* 2017). Grave 6 contained a chariot burial with the remains of an unburned human skeleton on a four-wheeled wagon, components of horse harnessing equipment, iron spits, animal bones and other offerings. Analysis of the artefacts is in progress. Palynological and archaeobotanical analysis and infrared spectroscopy brought interesting and unprecedented results with respect to the bunch flowers used as an offering, the composition of the wooden vehicle, and the nature of the paints used on the ceramic vessel (KOZÁKOVÁ *et al.* 2017). The animal bones were placed in the central part of the eastern half of the grave. Grave 14 contained the remains of an unburned human skeleton, part of a wooden yoke, animal bones and other finds (FROLÍKOVÁ 2015). The animal bones were placed at the southern end of the grave. The archaeozoological data is based on the analyses carried out by the author of this paper. Detailed analysis of the finds from grave 6 is included in the publication by KOZÁKOVÁ *et al.* (2017).

Previous publications concerning earlier excavations which had yielded animal offerings usually provide incomplete archaeozoological data and are of lesser use. These are included selectively in this comparison. Important finds relate to the larger cemeteries of the Bylany culture found at Hradenín, Lovosice, Poláky and Prague. Some of the finds from Poláky and Lovosice have been revised by the author of this paper.

Methods

The locations of the sites cited in the text and the corresponding districts are provided in Fig. 1. Methods of excavation procedures, details about the sites and dating of the graves are given in the literature cited in the text.

In the case of the finds from the two recent excavations and some finds from Poláky and Lovosice, the anatomical representation and the determination of animal species and age given in the text and schemes are based on the author's on-site observations and laboratory analysis. In the case of earlier excavations, observations are generally based

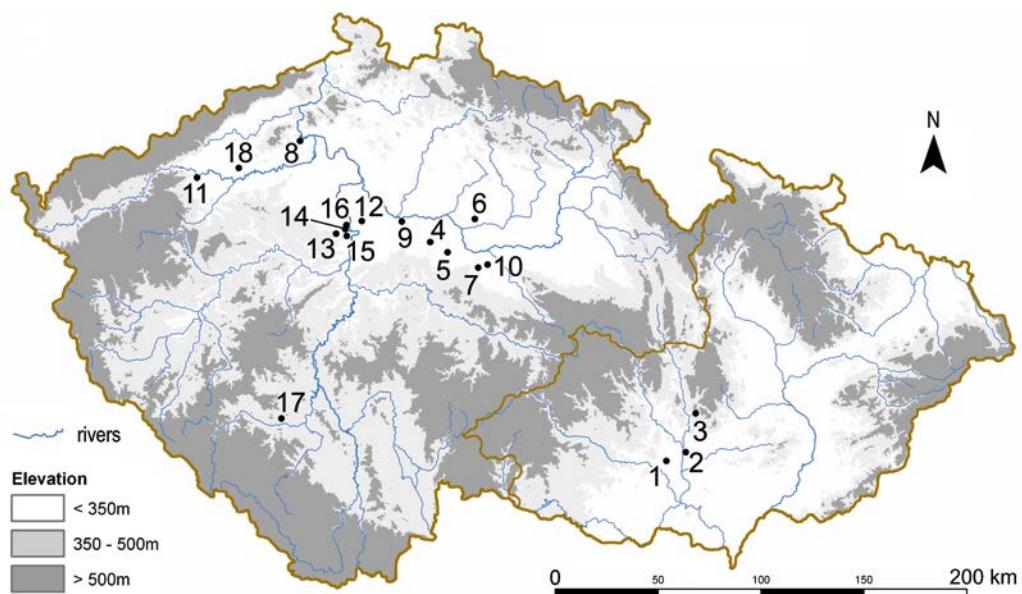


Fig. 1. Map of the Czech Republic showing the location of the Czech Hallstatt culture sites evaluated and cited in the study. Thick brown line – border of the Czech Republic; thin brown line – border between Bohemia and Moravia. Sites in alphabetical order: 1: Bratčice (Brno-venkov distr.), 2: Brno-Holásky (Brno distr.), 3: Býčí skála (Blansko distr.), 4: Bylany (Kolín distr.), 5: Hradenín (Kolín distr.), 6: Kolaje (Nymburk distr.), 7: Kutná Hora–Karlov (Kutná Hora distr.), 8: Lovosice (Litoměřice distr.), 9: Nehvizdky (Prague-east distr.), 10: Nové Dvory (Kutná Hora distr.), 11: Poláky (Chomutov distr.), 12: Prague–Letňany (Prague distr.), 13: Prague–Liboc (Prague distr.), 14: Prague–Lysolaje (Prague distr.), 15: Prague–Střešovice (Prague distr.), 16: Prague–Suchdol (Prague distr.), 17: Rovná (Strakonice distr.), 18: Rvenice (Louny distr.).

on the existing literature. The analysis is complicated by the degradation and fragmentation caused by adverse soil chemistry. Some fragments could therefore not be identified zoologically and anatomically. This could lead to the absence of certain anatomical elements in our results. For example, some long bones or ribs presented graphically as incomplete might originally have been buried whole. Bones which were determined anatomically but not zoologically, ranked to large mammal or medium mammal only, could also be missing from the anatomical schemes in Figs 2 and 3; they are involved there only when their belonging to a particular species is highly probable. It was not possible to determine the exact origin of each rib or vertebra fragment (for example, whether the second or third rib, and so on); the positions given in the schemas is therefore only approximate.

The individual ages of animals were estimated according to KOLDA (1936: p. 675), HABERMEHL (1961), SILVER (1969), SCHMID (1972) and MORAN & O'CONNOR (1994). The bones of the cattle were still immature; breed size could be estimated only in the case of the sheep and pig. The withers height of the sheep was calculated according to

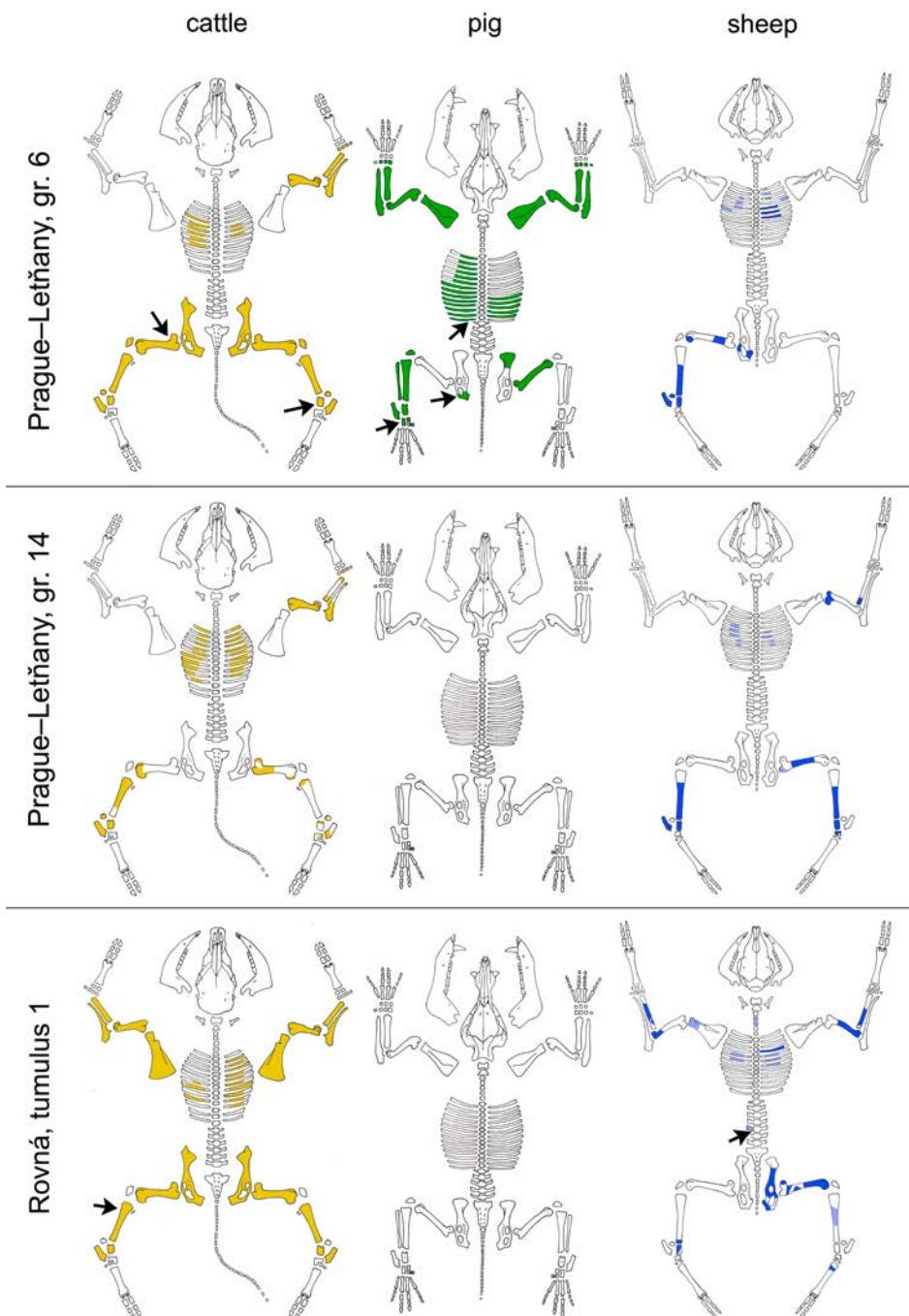


Fig. 2. Anatomical representation in three recently analysed Hallstatt burial meat offerings (*cf.* Tab. 1). Arrows indicate the position of butchery marks. Image: R. Kyselý (Prague–Letňany, gr. 6, according to Kozáková et al. 2017), drawings of the skeletons taken from Helmer (1987). For further explanatory notes see Fig. 3.

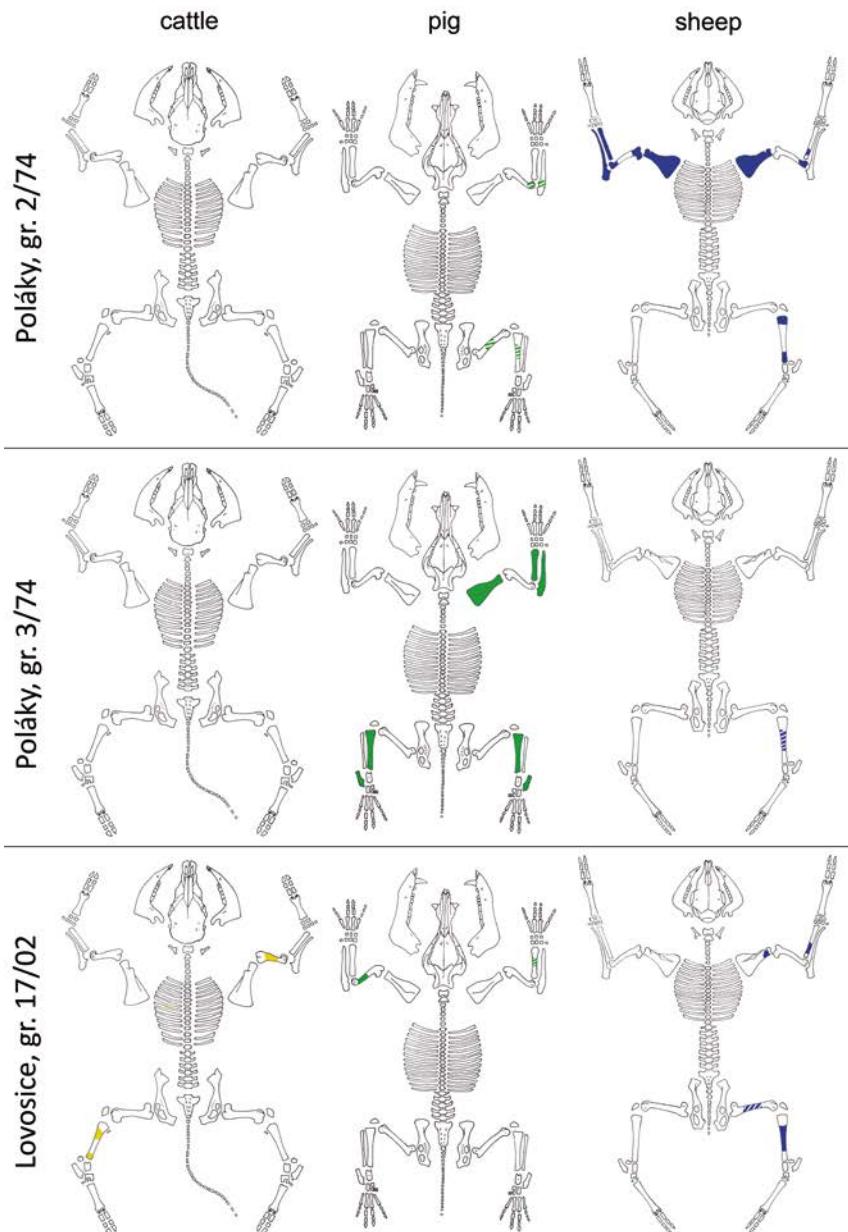


Fig. 3. Anatomical representation in other Hallstatt meat offerings. Included are only multi-species offerings where detailed anatomical determination is available. Explanatory notes: Left – cattle (yellow), middle – pig (green), right – sheep/goat (blue); darker colours indicate reliable determination; hatching indicates that the side (right or left) is uncertain; lighter colours indicate uncertain determination or uncertain assignment to an offering (e.g., based on an outlying position in a grave), for further details, see “Methods”. All highlighted bones are uncharred except for the charred tibia from Poláky, grave 3/1974. Gr. = grave. Image: R. KYSELÝ, drawings of the skeletons taken from HELMER (1987).

TEICHERT (1975) and MAY & TEICHERT (2001). The withers height of the pig was calculated according to TEICHERT (1969) and MAY *et al.* (1996).

Results

The following overview presents the results of the determination of the taxonomy and the age and anatomy of the recently analysed uncharred meat offerings from the excavation of the graves at Rovná and Prague–Letňany. Important similar osteological finds from the Bylany culture are also reviewed. The study is completed by a brief commentary on other groups within the Hallstatt cultural complex which appear in Bohemia. An estimation of the size of the animals deposited in the graves is provided in the final section.

Rovná

Various bones of hare, dog, adult pig, roe deer, rodents and frog found in the upper layers of the excavated tumulus are obviously not related to the Hallstatt burial. A fragment of a horse metacarpus was found outside the chamber and was not necessarily intended as an offering. Brown bear (*Ursus arctos*) phalanges, perhaps representing bear paw(s) or a whole skin, are currently under analysis.

Parts of the skeleton of a juvenile pig were found mostly in the upper horizons, *i.e.*, above the bottom of the chamber, and could be related to a later intervention observed in the western part of the tomb (Fig. 4; CHYTRÁČEK *et al.* 2014, 2015, 2017a; this intervention is analysed recently using 14C analysis). Excluding the above-mentioned species, only cattle and sheep/goat (caprine) were reliably confirmed in the bottom of the chamber (*i.e.*, in layers 4 and 5). One fragment of metacarpus found in the chamber wall was determined as sheep and no more than one caprine individual was found within the whole tumulus (MNI=1). From an anatomical point of view, the caprine remains might therefore be part of a single offered sheep. Caprine remains were found in both the eastern and western halves of the tomb and were fairly widely scattered, perhaps because of the above-mentioned intervention. Several fragments were found outside the chamber or in upper horizons. However, all or at least some of the caprine bones are considered as part of the original offering made during the Hallstatt “princely” burial. So far we have not been able to confirm or exclude the possibility that some or all of the pig bones were also used in the Hallstatt funeral.

The remains of one calf skeleton lay in the bottom of the chamber, in the eastern half close to some bronze vessels. The remains were lying apart from a wagon and human bones, indicating the position of the human body in the western half of the chamber (Fig. 4; schemes in CHYTRÁČEK *et al.* 2014, 2015, 2016). The bones were partly articulated and are undoubtedly part of the original Hallstatt burial. The calf remains are well preserved and the most interesting find with respect to the animal material. Only selected fleshy cuts are represented, that is, rib segments and proximal parts of the

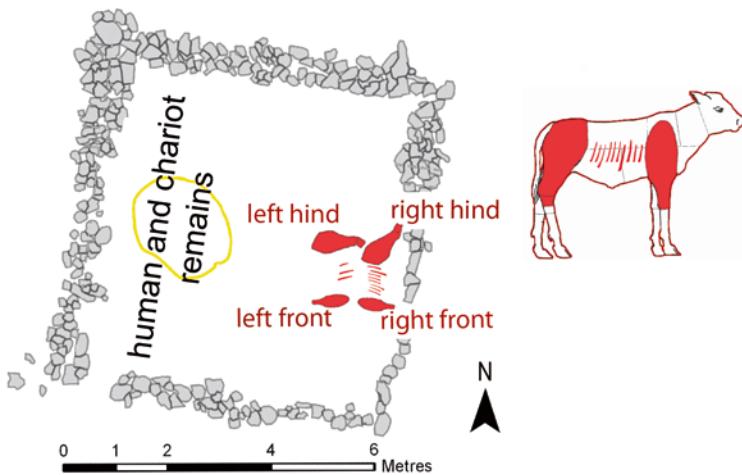


Fig. 4. Reconstruction of the position of the calf offering in the tomb at Rovná. Grey – stone walls of the funeral chamber; yellow – later intervention; red – approximate nature of the offered calf portions *in situ* and indication of the corresponding parts of the anatomy on the scheme of a calf body (red sketch). Drawing of the chamber walls and later intervention taken from CHYTRÁČEK *et al.* (2014).

legs. The distribution of the body parts is particularly interesting. Proximal segments of all four legs and two segments of the left and right ribs, anatomically unconnected to each other, were placed in the tomb in such a way as to resemble the shape of a complete animal lying on its back (see Fig. 4). Distal parts of the legs, backbone and skull are missing, however. Their absence is undoubtedly original as the missing parts contain hard tissues such as teeth and compact bone which would normally still have been preserved. Based on the fusing of the proximal radius (the left mostly unfused, the right mostly fused), the fused *processus coracoideus scapulaea*, the unfused distal humerus and the size and appearance of the bones, the animal was aged between 10 and 15 months, most probably around 12 months. A sheep/goat is represented by the same fleshy body parts, but the presence of vertebrae, proximal parts of the metapodials and one isolated molar were also recorded in the lower horizons. Nevertheless, the position of the “non-fleshy” molar and most of the metapodials in the western part and western wall of the chamber – *i.e.*, outside the supposed location of the meat offering – suggests they were not part of the original offering (for the anatomical parts considered to be in the original offering, see Fig. 2). Based on bone size and appearance, the unfused distal tibia (but probably not long before fusing), and the fused acetabulum and distal humerus, all found in the bed of the chamber, the age of the sheep was estimated as being between 1 and 2 years.

Certain bones from particular body segments were probably anatomically articulated *in situ* and there are very few butchery marks. Both of these phenomena suggest the offering of fleshy cuts. Phosphate analysis (see CHYTRÁČEK *et al.* 2014: fig. 7) showed that the

area of the tomb where the calf was found shows a much higher concentration of organic material than other areas of the chamber. This corresponds with the assumption that a considerable quantity of food (possibly meat) was present on the animal bones; we can certainly, therefore, call this a meat offering. The arrangement of the calf remains could act as a symbolic substitution for the whole body.

No burning or gnawing was observed on the animal bones that are considered part of the offering. The position of butchery marks (chops on the calf tibia and a cut on the caprine vertebra) is presented in Fig. 2. The raw data (incl. archaeozoological details and the exact location of the finds) will be included in a catalogue in a later publication.

Prague–Letňany

Grave 6. A relatively large quantity of animal bones had accumulated in a well-defined area in the eastern half of the central part of the grave (KOZÁKOVÁ *et al.* 2017: fig. 2). Out of 535 bones or bone fragments, 140 were anatomically determined; 226 of the undetermined finds are very small fragments of disintegrated bones. The bones were found together with three identical iron rods. These were c. 110 cm in length and thought to be spits (Fig. 5A; FROLÍKOVÁ 2015; KOZÁKOVÁ *et al.* 2017). The author's analysis of the osteozoological assemblage, including the spacing of the bones, is detailed in KOZÁKOVÁ *et al.* (2017). Further details on the osteological determination are available in Tab. S1. In summary, the material is relatively well preserved (Fig. 5A) and determined as belonging to three species, probably one individual for each species: one calf aged between 12 and 18 months, most probably 14–17 months (the fusion of the distal humerus was about to take place and the fusion line of the proximal radius was still partly visible; Fig. 6); one adult sheep over 3.5 years old; and one adult pig over 3.5 years old. The following anatomical parts were found in the grave: the calf – proximal part of the right foreleg, proximal parts of both hind legs, segments of left and right ribs; the pig – proximal parts of both forelegs, proximal part of the left hind leg, an isolated right ischium and femur, segments of the left and right ribs including their proximal parts; the sheep – proximal part of the left hind leg, probably rib segment(s) (see Fig. 2, Tab. 1 and KOZÁKOVÁ *et al.* 2017 for more detail). Roughly three-fifths of the meat from the calf, two-thirds of the meat from the pig, and a quarter of the meat from the sheep was placed in the tomb (Tab. 1). Only some of the long bones were articulated *in situ*, but groups of ribs formed natural anatomical units almost always (*cf.* Figs 5, 6A). Only a very few butchery marks (cuts) were noted, mostly concentrated in the joint regions (hip, ankle; for their positioning see Figs 2, 6B), and thus correspond to dismembering. These observations suggest partial portioning and that only smaller pieces of the bodies (such as rib segments and parts of the legs) and no larger parts (such as half bodies) were placed in the grave. Burning was not reliably confirmed and the hypothesis was suggested that the meat was not grilled and that the spits were placed in the grave only symbolically (KOZÁKOVÁ *et al.* 2017). No gnawing was observed on the bones.

Grave 14. The bones are less well preserved and more fragmented, and the total quantity of bones is somewhat smaller than in grave 6. Only 153 out of a total of 843 bone fragments were anatomically determined; most of the undetermined material (570 finds) was made up of very small, disintegrated bone fragments. Animal bones were lying in the south-eastern corner of the chamber; part of a human skeleton was found in the northern part (for the grave scheme and further archaeological information, see FROLÍKOVÁ 2015).

Table 1. Overview of the finds reliably identified as meat offerings in the newly analysed graves. Absolute dating according to VENCLOVÁ *et al.* (2013). *Rough estimation.

site, context	culture (absolute dating)	species	body parts considered to be offering (cf. Fig. 2)			
			observed anatomical parts	portion of whole body*	portion of meaty part of the body*	ageing
Rovná, burial chamber in tumulus 1	Hallstatt Tumulus culture, Ha D2-3 (550-450 BC)	cattle	proximal parts of all four legs and segments of right and left ribs, partly in anatomical/ articulated state	1/2	2/3	10–15 months
		sheep/goat	proximal parts of three legs and ribs, partly in anatomical/ articulated state?	1/4	1/3	1–2 years
Prague– Letňany, grave (feature) 6	Bylany culture, Ha C/D1 (800-550 BC)	cattle	proximal parts of three legs and segments of right and left ribs, partly in anatomical/ articulated state	1/3	3/5	12–18 months
		pig	proximal parts of all four legs and segments of right and left ribs, partly in anatomical/ articulated state	1/2	2/3	> 3.5 (6) years
		sheep/goat	proximal part of left hind leg and probably segment(s) of ribs, partly in anatomical/ articulated state	1/5	1/4	> 3.5 years
Prague– Letňany, grave (feature) 14	Bylany culture, Ha C/D1 (800-550 BC)	cattle	proximal parts of three legs and segments of right and left ribs, partly in anatomical/ articulated state	1/3	3/5	15–22 months
		sheep/goat	proximal parts of three legs and probably segment(s) of ribs, partly in anatomical/ articulated state	1/4	1/3	2.5–3.5 years



Fig. 5. Prague–Letňany, terrain photo-documentation. A: grave 6: animal bones *in situ*, viewed from the east. One of the wheels and three iron rods are lying over the bone assemblage (*cf.* grave schemes in FROLÍKOVÁ 2015 and KOZÁKOVÁ *et al.* 2017). B: grave 14: orthophoto of the animal bones *in situ*. The northern (N), southern (S), western (W), eastern (E) and central (C) parts of the bone assemblage are indicated by the relevant letters (*cf.* Tab. S2 and grave scheme in FROLÍKOVÁ 2015). Note the anatomical position of some ribs and unbroken long bones. Photos: M. SMELÍK, Osina Archeo (upper) and R. KYSELÝ (lower).



Fig. 6. Prague–Letňany, grave 6. A: Composed continual part of the right foreleg of the calf (*Bos taurus*); B: Detail of cut marks on the neck of the calf's left femur. Scale: one segment = 1 cm. Photos: R. KYSELÝ.

Details of the archaeozoological determination are provided in Tab. S2 (incl. the spatial arrangement of the bone assemblage). Archaeozoological analysis revealed that the bones found in the floor of the grave belong to a calf and a sub-adult or adult sheep. The presence of just one individual of each species is highly probable as no anatomical overlap and no contradictions with respect to age were recorded. There is no doubt that the find represents a meat offering. The presence of a pig was not reliably confirmed, but it is possible that some of the undetermined fragments belong to this species. Additionally, the bones of a quail (*Coturnix coturnix*), a passeriform bird and a water vole (*Arvicola terrestris*), and three bone fragments from an adult or sub-adult cattle were found in the upper layers. Their presence is considered accidental displaced settlement material and not part of the ritual, although the bird bones defy reliable interpretation.

Like grave 6, the anatomically related ribs formed series of ribs lying collaterally *in situ*; it is likely that four separate rib segments were added during the burial (*cf.* Fig. 5B). Some leg bones might also have been articulated, as was observed in the case of the

left hind leg of the calf and the left hind leg of the sheep, but the degree of articulation appears generally low.

The calf is the dominant object in the assemblage with respect to the quantity of bones (and meat). The incomplete remains of proximal parts of both hind legs and one (left) foreleg were determined. The same anatomical elements were observed in the case of the sheep. The dominance of hind legs and the absence of the left foreleg in both species are interesting. The left foreleg is also absent from the calf remains in grave 6 (*cf.* preserved anatomical parts in Fig. 2). A number of the calf's ribs were present, both left and right. All or most of the ribs from a medium-sized mammal probably belong to the sheep. Among them again both left and right ribs were identified. The heads and vertebrae were completely absent from the assemblage. No butchery marks, no gnawing, and no (reliable) burning were recorded.

As with the calf in grave 6, the *tuber calcanei* and proximal radius of the calf are fused, but (unlike grave 6) the humerus has a fused distal epiphysis. Despite this fusion, the humerus of the calf from grave 14 is slightly smaller than the humerus in grave 6. The individual must therefore have been killed a short time after the fusion of the epiphysis and the two individuals must have been of similar age. The age of the calf was estimated to between 15 and 22 months (most probably 17–20 months). Based on the unfused proximal epiphysis of the humerus and the fused *tuber calcanei*, the sheep was aged to between 2.5 and 3.5 years (for anatomical details, the state of the epiphyses and measurements, see Tab. S2).

Prague – earlier finds

Earlier graves of the Bylany culture in the Prague region were reviewed in FRIDRICHOVÁ *et al.* (1996, 1997, 1999). Animal bones were present in six graves at the Prague–Střešovice necropolis. They were reported in accordance with the traditional view as pig (FRIDRICHOVÁ *et al.* 1999: table 1 and text), but an unpublished report by L. PEŠKE (1979) revealed the remains of the fleshy parts (of the legs and ribs) of sheep/goat in all four determinable cases (four graves), including the case of one juvenile sheep. Further bones were found in two graves at the necropolises at Prague–Liboc and Prague–Lysolaje (both reported as a pig in FRIDRICHOVÁ *et al.* 1997: table 1) and one grave at Prague–Suchdol (determined as the meaty parts of the legs and ribs of an adult sheep by PEŠKE 1978a; *cf.* KOUTECKÝ & FRIDRICHOVÁ 1980). Isolated bones are reported in other Prague sites; many bones from earlier excavations were lost and others remain undetermined. However, based on the information available, it seems that in all the graves analysed, each grave contained no more than one (identified) animal species.

Hradenín

Research on this large and well-known Bylany culture necropolis in central Bohemia (Fig. 1), numbering 29 graves, was published in the 1930s (DVOŘÁK 1934/1935, 1939); a modern re-evaluation of the material is yet to be carried out. Meat offerings were

determined in all skeletal graves. In male graves, the bones of “pig quarters” were offered, usually accompanied by an iron knife; the bones of a foreleg are reported from graves II, III, XIV, XX, XXVI, XXVIII; the bones of a hind leg from graves I, V, VIII, IX, XII, XVIII, XXIV. Three of the graves contained the burial of a four-wheeled chariot (DVOŘÁK & SCHRÁNIL 1938). Pig ribs and a knife are reported from child burial VI and unspecified pig bones in child burial X. Only one of the listed graves (grave V) contained a cremation burial, with the remains of a cremated human spread on the floor. Animal bones are not recorded in urn burials. There are no details of the age or anatomy of the offered animals.

Poláky

The site at Poláky in north-western Bohemia, containing 73 or 74 graves from the Bylany culture, is the largest known Hallstatt burial ground in the Czech Republic (published in KOUTECKÝ & SMRŽ 1991; KOUTECKÝ 1993). Animal bones were present in 25 graves. A summary evaluation revealed that (parts of) pig (5 graves), both young and adult, cattle (3 graves), and sheep or sheep/goat (3 graves) were all offered. A fragment of the burned antler of red deer (1 grave) and roe deer (1 grave), the burned bones of an undetermined bird (1 grave) and a pendant from the distal phalanx of bear, *Ursus arctos*, were reported (KOUTECKÝ & SMRŽ 1993: pp. 8, 20; PEŠKE 1978b). A detailed osteological determination of the main part of this set by PEŠKE (1978b) suggests that larger fleshy cuts were placed in the grave in at least six cases: the uncharred bones of the foreleg and hind leg of an adult or sub-adult sheep (2 cases) and an adult or young pig (4 cases). More than one species was used for a meat offering in only two graves: a combination of pig and caprine was observed in both cases. In cremations or bi-ritual burials, animal bones were sometimes burned.

According to the text and scheme in KOUTECKÝ & SMRŽ (1991: p. 187), grave 13/1974 contained a find of a well-preserved pig skeleton (without its head) found near the iron knives. The find appears to be atypical because it represents an intact body, including the spine region, rather than selected body parts. Nevertheless the original report (PEŠKE 1978b) as well as current re-analysis (R. KYSELÝ pers. obs.) did not confirm the presence of the *columna vertebralis* and distal parts of the legs in the material, deposited recently in the Regional Museum in Chomutov. Only proximal parts of three legs and one rib were recognised from the highly fragmented bones of a pig, aged according to the unfused distal humerus and proximal radius less than one year (R. KYSELÝ pers. obs.). This contradiction may be caused by excavation method, as it is possible that some fragile elements (such as vertebrae) were not or could not be extracted from the soil.

Lovosice

A detailed analysis of the Bylany culture graves at Lovosice (Lovosice II – area “Aoyama”), central Bohemia, excavated in 2002, has been carried out but the research

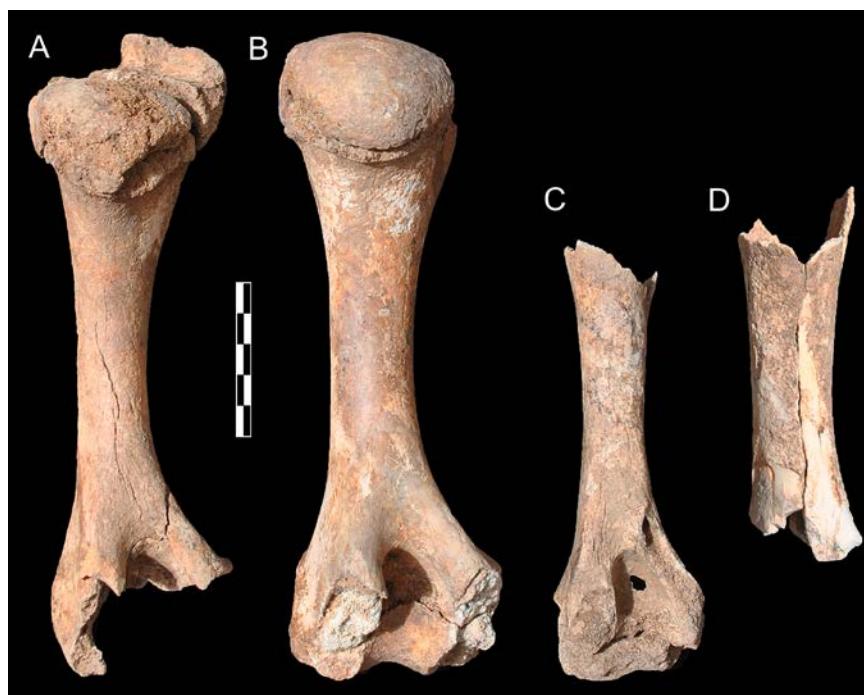


Fig. 7. Photo-documentation of four humeral bones of the calves (*Bos taurus*). A: Prague–Letňany, grave 14; B: Prague–Letňany, grave 6; C: Rovná, tumulus 1; D: Lovosice, grave 17/2002. Note the size differences and the fused distal epiphysis in the left-hand case and the unfused distal epiphysis in the two middle cases. Scale: one segment = 1 cm. Photo: R. KYSELÝ.

is yet to be published in its entirety. Only very basic data on the nature and quantity of the bones used in the offerings are available (PÜLPÁN 2009, 2014). Animal bones were found in nine graves and various domestic species were recorded. Current re-analysis of the finds from graves 17/2002 and 23/2002 reveals that the former contained three basic domestic species (cattle, pig and sheep/goat) and the second contained sheep/goat (R. KYSELÝ pers. obs.); the presence of canid (dog?) in these graves, suggested tentatively in a thesis by PÜLPÁN (2009), is thus not confirmed. Advanced corrosion and disintegration of the bones make a reconstruction of the original species and anatomical representation and aging difficult; however, fleshy, proximal parts of legs, and perhaps ribs, were again recorded besides undetermined fragments (as demonstrated in Fig. 3). The cattle from grave 17/2002 was determined as being non-adult (< 2.5 years, according to the unfused distal tibia). The similar size and appearance of the diaphysis of the humerus to the humeri from Prague–Letňany suggest a similar (perhaps slightly higher) age (R. KYSELÝ pers. obs.; Fig. 7). The sheep/goat (and possibly even the pig) from this grave is also not adult. Further analysis of these relatively recent excavations could provide new and important information.

Other Bylany culture sites

Animal offerings are reported from other graves from various districts in Bohemia. They were usually described as “pig” or “pig quarters” and occasionally ribs (KOUTECKÝ 1968). Other species are reported on rare occasions. In the earlier excavations, the remains of cattle, probably partly articulated, were reported from the grave at Rvenice, north-western Bohemia (found together with the remains of other animals; KOUTECKÝ 1966, 2003). Fragments of cattle bones were also found in graves at Nehvizdky, central Bohemia (KOUTECKÝ & ŠPAČEK 1982). An unusual find comes from Kutná Hora–Karlov, where a whole pig skeleton, one year old, and largely preserved cattle skull were found in grave 10/89 (L. PEŠKE in ŠUMBEROVÁ 1996: p. 488). It is possible that a whole pig skeleton was also present in Kolaje, grave I, central Bohemia, as the spine is depicted in the scheme in SEDLÁČKOVÁ (1973); and in this cemetery, a red deer skeleton had been mentioned earlier but was not confirmed in the later study (SEDLÁČKOVÁ 1973).

A recent archaeological overview of north-western Bohemia reports pig and sheep/goat repeatedly and cattle in one grave; hare was alleged to have been present in one grave (KOUTECKÝ 2003: p. 125). Charred animal bones are sometimes found together with a knife in the Bylany culture graves containing cremated human remains (*e.g.*, Libochovice; KOUTECKÝ 1968).

Other cultural groups of the Hallstatt culture

In the Silesian-Platěnice culture – part of the Urnfield cultural complex in eastern Bohemia – animal bones are usually impossible to determine. Uncharred animal bones, such as cattle bones, are rarely found in this culture (VOKOLEK 2013: pp. 101–106). In the Hallstatt Tumulus culture and Late Hallstatt graves, animal bones have so far been found only on very rare occasions (MICHÁLEK & CHYTRÁČEK 2013: pp. 86–90; VENCLOVÁ *et al.* 2013: p. 150).

Animal body size

The eventual adult size of the animals is difficult to estimate from the bones of juveniles. This is the case with the cattle in all three of the recently analysed graves. The absence of skulls prevents an evaluation of breed morphology such as horns and head shape.

The withers height of the pig at Prague–Letňany could be estimated on the basis of the lengths of six long bones and two short bones. Estimates using the short bones, considered less reliable, provide lower values for body size than do the long bones (Tab. 2): the average height based on the two methods is 77 cm and 82 cm respectively. The average withers height of the sheep was estimated using calcaneus and talus lengths to c. 63 cm; see Tab. 2 (for all osteometric data see Tabs S1, S2). Osteometric data from Rovná are much scarcer and no lengths were available from bones considered to originate reliably from the Hallstatt period. The only usable measurements were obtained from caprine bones found inside the Hallstatt chamber: proximal width of metatarsus (Bp) = 19.2 mm,

smallest length of the *collum scapulae* (SLC) = 16.3 mm, greatest length of the *processus articularis scapulae* (GLP) = (29.5) mm. These data suggest a smaller sheep, but this could be because of its relatively young age (see above). For a further comparison see below (at the end of the Discussion).

Discussion

Occurrence and distribution

The animal bones and other offerings were usually placed away from the human body. In the Bylany culture, the animal bones were placed in the southern part in north-south

Table 2. Estimations of withers heights based on material from the Hallstatt burials at Prague–Letňany.

context	species	anatomy	greatest length, GL	greatest lateral length, GL	measurements (mm)	withers height (cm)	
Letňany, feat. 6	<i>Sus domesticus</i>	humerus dex.	(196)	80	83.7		calculated according to TEICHERT (1969)
Letňany, feat. 6	<i>Sus domesticus</i>	humerus sin.	195.4	79.7	76		calculated using sex-combined indices for adults according to MAY et al. (1996)
Letňany, feat. 6	<i>Sus domesticus</i>	radius dex.	149.8	78.8	86		calculated according to TEICHERT (1975)
Letňany, feat. 6	<i>Sus domesticus</i>	radius sin.	151	79.4	86.3		calculated using indices based on males according to MAY & TEICHERT (2001)
Letňany, feat. 6	<i>Sus domesticus</i>	ulna dex.	197.5	78.4	84.9		
Letňany, feat. 6	<i>Sus domesticus</i>	femur dex.	215	78.5	81.1		
Letňany, feat. 6	<i>Sus domesticus</i>	calcaneus sin.	74.5	69.7	78.1		
Letňany, feat. 6	<i>Sus domesticus</i>	talus sin.	39.7	39.7	71.1	80.9	
	<i>Sus domesticus</i>	arithmetic mean		76.9	82.1		
Letňany, feat. 6	<i>Ovis aries</i>	calcaneus sin.	56		63.8	61.3	
Letňany, feat. 14	<i>Ovis aries</i>	calcaneus sin.	56.3		64.2	61.5	
Letňany, feat. 14	<i>Ovis aries</i>	talus dex.		27.3	61.9	64.9	
Letňany, feat. 14	<i>Ovis aries</i>	talus sin.		27.3	61.9	64.9	
	<i>Ovis aries</i>	arithmetic mean			63	63.1	

oriented graves and in the eastern part in west-east oriented graves, although the position varies somewhat (KOUTECKÝ 1968, 2013; PŮLPÁN 2014). The position of animal bones in grave 6 at Prague–Letňany is therefore somewhat atypical.

Meat offerings are more common in the Bylany culture than in the other Bohemian Hallstatt cultures. This may be due to factors which reduce the amount of bone material available for analysis, such as the exclusive use of cremation in the Silesian-Platěnice culture and adverse soil condition in the southern and south-western regions of Bohemia occupied by the Hallstatt Tumulus culture and eastern regions of Bohemia occupied by the Silesian-Platěnice culture. Animal bones from a cremation burial are often charred and sometimes mixed with human bones. Charring and extensive fragmentation, sometimes probably intentional (KOUTECKÝ 2013), reduce the possibility of analysing and interpreting the finds. Uncharred animal bones yield more helpful information concerning animal species, anatomical representation, age, spatial context and the quantity of offered meat. The present review deals with unburned offerings, but the combination of charred and uncharred animal bones, as with grave 3/1974 at Poláky (see Fig. 3), suggests that the practices are sometimes combined.

Animal bones representing meat offerings are not present in all graves even in the Bylany culture. According to KOUTECKÝ (1968), animal bones are present in 30 % of the 136 Bylany culture graves analysed (17 % were found with a knife and 13 % without). Meat offerings are distributed in all formal burial categories, but are somewhat more frequent (*c.* 50 % of graves) in rich chamber graves (with chariots or their component parts, yokes and horse harnessing – typological group I-1 and I-2) than in simple pit graves (*c.* 20%). In cremation burials, they are rarer than in inhumations. Later excavations revealed comparable results: animal bones were reported from 47 % of graves at Poláky, 45 % of graves at Hradenín, and 60 % of graves at Lovosice. In large rich graves, meat offerings are recorded quite often but not in every grave (DVOŘÁK 1934/1935, 1939; KOUTECKÝ 1968, 1993, 2003; Půlpán 2014). Animal offerings are also not reported from some large complex burials in other countries, such as Eberdingen-Hochdorf, Germany (BIEL 1985; ARNOLD 1999), or Vix, France (ROLLEY 2003), although human bones were preserved there. In southern Germany, animal bones were found in 19.2 % of all relevant graves, or in 46 % of the main (central) graves (according to MÜLLER-SCHEESSEL & TREBSCHE 2007).

Species representation

In earlier literature, meat offerings found in graves of the Bylany culture were usually assigned to pig (KOUTECKÝ 1968; ŠOLLE 1955). It is likely that in some cases this determination was not verified by specialists (zoologists). The labelling *a priori* as pig could be influenced by the importance of pig and boar in the succeeding La Tène culture, as the Hallstatt culture is seen to represent the proto-Celtic background (see below). Later, more reliable determinations of animal bones resulted in a re-assessment as other species were also recorded in the meat offerings in Bylany culture graves (as already argued by

KOUTECKÝ & FRIDRICHOVÁ 1980; *cf.* also PÜLPÁN 2012). This view is confirmed by this paper. Cattle, pig and sheep/goat are reported as being used in meat offerings in Bohemia. If the sheep/goat bones could be determined, they were always identified as sheep. The fact that the people did not use just one species suggests that the offerings did not represent a sacred or cultic animal but served as a meal for the afterlife (*cf.* PICHLOVÁ 1969).

Meat offerings were also commonly reported in southern Germany (Bavaria and Baden-Württemberg), in north-eastern France, and in Austria (KOUTECKÝ 1968; VON DEN DRIESCH 1993; ARNOLD 1999; MÜLLER-SCHEESSEL & TREBSCHE 2007). The phenomenon also appears in the Eastern Hallstatt zone (KMETOVÁ 2017b), for instance in the Horákov culture in southern Moravia (details in ŠOLLE 1955; NEKVÁSIL 1970, 1993; STEGMANN-RAJTÁR 1992; DOBISÍKOVÁ *et al.* 2010; GOLEC 2005; KOS 2011, 2014) or in the Hallstatt period in Slovakia (PICHLOVÁ 1969; KMETOVÁ 2017a,b). Within the time horizon of the Hallstatt period, the domestic species mentioned above were also preferred as grave offerings in regions other than Bohemia (*cf.* TORBRÜGGE 1979; AMBROS 1960a, 1984; WĘGRZYNOWICZ 1982; VON DEN DRIESCH 1993; REBAY 2002: p. 98; PUCHER 2003; SCHMITZBERGER 2006; MÜLLER-SCHEESSEL & TREBSCHE 2007; ABD EL KAREM 2012, 2015). VON DEN DRIESCH (1993) has shown that only cattle, pig and sheep/goat were used as grave offerings in southern Germany, but the offerings vary according to species and anatomical representation. VON DEN DRIESCH (1993) also concluded that pig and sheep played a similarly important role in burial rituals, while cattle was used less often and goat only very rarely. New data presented by MÜLLER-SCHEESSEL & TREBSCHE (2007) based on a large quantity of material from southern Germany revealed that pig is somewhat more frequent than caprines (particularly for Ha C and Ha D1, where the offerings are most abundant) and that species other than domestic pig, cattle and caprines are absent or extremely rare. Very recently, pig remains, found together with a knife, were also determined in the excavation of a burial at Bettelbühl near Heuneburg, Germany (KRAUSSE *et al.* 2017). In the western Hallstatt zone, the preferred offering for human males was pig, and the preferred offering for human females was sheep/goat (MÜLLER-SCHEESSEL & TREBSCHE 2007; STADLER 2010). In the eastern Hallstatt zone, cattle might be sometimes even more frequent than the other two taxons (KMETOVÁ 2017b). The dominance of sheep in grave contexts compared to goat seems to have general validity and corresponds with its dominance in settlements (MÜLLER-SCHEESSEL & TREBSCHE 2007; KMETOVÁ 2017b). In the large group of graves at Statzendorf, Austria, small domestic ruminants (presumably sheep) predominate, but the exclusive presence of pig and cattle is also common (SCHMITZBERGER 2006). Sheep and pig appear together in a single grave relatively frequently; combinations of cattle + pig or cattle + sheep appear only once each. In addition, little owl and corn bunting were identified in one grave at this site (SCHMITZBERGER 2006). Wild animal species are found extremely rarely in graves and rarely represent meat offerings. Apart from some finds of deer bones and antlers, bear phalanges from Poláky and Rovná, Bohemia (see above, Results), and another possible bear find from Vedrovice, Moravia (STEGMANN-RAJTÁR 1992), other examples are burned brown bear phalanges and the bones of a lynx in graves at Führholz,

southern Austria (KUNST 2005), and hare, beaver, duck, and pike in Nové Košáriká, Slovakia (AMBROS 1975; KMEŤOVÁ 2017a, b). From the Horákov culture, southern Moravia, usually sheep/goat and pig are reported (NEKVASIL 1993; STEGMANN-RAJTÁR 1992; KOS 2014), but also cattle (KOS & GOLEC 2008). Sheep/goat are also markedly more dominant over cattle and pig at Vrádiště, Slovakia (AMBROS 1960a), where mostly only a single species appears in each grave. However, in burial mounds at Nové Košáriká, also in western Slovakia, the number of species involved in the rite is much greater: the bones of cattle, pig, sheep, goat?, dog, hare, beaver, chicken, goose, duck, and pike and egg shells were determined (PICHLEROVÁ 1969; AMBROS 1975; KMEŤOVÁ 2017a,b). The lesser importance of beef in the mortuary contexts analysed from the western Hallstatt zone (see especially MÜLLER-SCHEESSEL & TREBSCHE 2007) and eastern Hallstatt zone (see above) is in contrast to the three newly analysed Bohemian graves.

The importance of sheep/goat – relative to pig – is noted in many Czech sites, such as at Poláky and in cemeteries in Prague. However, pig slightly predominates in terms of frequency in the large group of graves in the cemetery at Poláky (PEŠKE 1978b; cf. KOUTECKÝ 1993: p. 23, fig. 9). In all three recently analysed graves (Rovná, Prague–Letňany), cattle predominated in terms of the number of bones and the quantity of meat offered. Cattle was also found to be well represented in one of the re-analysed graves from Lovosice. Its general importance in Czech Hallstatt funeral rituals is, however, questionable. It was rarely reported in earlier excavations, but its reduced role could be due to incorrect determination, as the long bones of a calf, which are relatively small, could appear, to a non-specialist, to be pig bones. Other species occasionally reported from graves in Bohemia are represented by, allegedly, hare remains (according to KOUTECKÝ 2003, but no details on determination are given), the burned antlers of roe deer and red deer (Bylany, Poláky; KOUTECKÝ 1968; KOUTECKÝ & SMRŽ 1991), the pendant of a bear phalanx (Poláky; PEŠKE 1978b; KOUTECKÝ & SMRŽ 1991) and a horse tooth (Hradenín; DVOŘÁK 1939) or a horse tooth fragment (Poláky; PEŠKE 1978b). As the last five examples (*i. e.*, game and horse) clearly do not represent meat-bearing elements, the use of the most common farm animals for sacrifice and meat offerings seems to be the strict rule. For the most part, a single species is recorded in each grave. “Multi-species offerings” are very rare; in addition to Rovná and both graves at Prague–Letňany, they have been reported at Poláky and Lovosice (Figs 2, 3). Three species were reliably confirmed only in the case of grave 6 at Prague–Letňany and grave 17/2002 at Lovosice. In southern Germany, multi-species offerings are not uncommon and various combinations of species are reported. However, all three categories (pig, sheep/goat and cattle) commonly appear together only in findings from the Franconian Jura (MÜLLER-SCHEESSEL & TREBSCHE 2007). Relatively rich, multi-species offerings also appear in the eastern Hallstatt zone, such as in burial mounds at Nové Košáriká (AMBROS 1975). However, unlike the observation in Bohemia, some parts of cattle bodies rich in meat were often chopped into small pieces and some of the bones were even split and often found together with pieces of other species also chopped up to a high degree (KMEŤOVÁ 2017a, b). According to KMEŤOVÁ (2017a), this could be an evidence of the offering of soup, goulash, stew or Eintopf-type dishes in these burial mounds. The boiling is hardly

detectable on archaeological osteological material, but in the case of animal bones from Prague–Letňany, Rovná and other Czech sites this seems to be highly improbable as they contained large body portions and un-chopped bones. In these cases, the portions might instead have been offered roasted or raw. The presence of distal elements of legs (*cf.* phalanges and metapodia in Rovná), although being non-fleshy parts of the anatomy, might also have been intended as part of the funeral as they could represent the remains of a deliberately deposited hide (STADLER 2010). But the presence of un-meaty anatomical parts could also yield other information. Such bones, teeth, antlers or their fragments, as well as artefacts made from them, could suggest some kind of symbolic role for particular species or represent decorations, play things, amulets or other magic objects (KMEŤOVÁ 2017b). However, artefacts from animal astragali, frequent in some other cultures and regions, were found quite exceptionally in the Czech Republic (NÝVLTOVÁ FiŠÁKOVÁ & PARMA 2014).

Although we cannot reliably assign bones of the same species to an individual animal and should therefore use MNI (minimal number of individuals), no anatomical overlapping and no contradictions in ageing was found in any of the three graves analysed in this paper. This suggests the bones did indeed belong to one individual in each case. Multiple individuals from one species have not been confirmed so far in any Bohemian grave, even in complex, multi-species meat offerings.

Since the species offered are the most common farm animals from the corresponding time period, it is clear that people tended to exploit readily available resources. In Bohemia, in osteological material from Hallstatt and Early La Tène settlements, domestic animals clearly predominate over game, and domestic cattle is usually the most frequent species, followed by pig and sheep/goat (*cf.* PEŠKE 1980; BEECH 1995; KYSELÝ 2004; BOENKE *et al.* 2006; MÜLLER-SCHEESSEL & TREBSCHE 2007; CHYTRÁČEK *et al.* 2012). Similar results were obtained in neighbouring regions within the Hallstatt cultural complex, including southern Germany (VON DEN DRIESCH 1993; BIEL *et al.* 2006; SCHATZ & STEPHAN 2005; MÜLLER-SCHEESSEL & TREBSCHE 2007; SCHATZ & STIKA 2009) and Austria (PUCHER 1998, 2004). A low level of reliance on hunting seems to have been the norm (*cf.* especially TREBSCHE 2013). The relative ratios of domestic species differ between settlements and regions. Cattle, pig and sheep/goat provide most of the bone remains, but domestic pig was the most abundant in some settlements (*cf.* especially MÜLLER-SCHEESSEL & TREBSCHE 2007). This differs from results in Bohemia. Cattle and a pig are well represented in the large quantity of material from the settlement at Heuneburg (VON DEN DRIESCH & BOESSNECK 1989; VON DEN DRIESCH 1993), while sheep/goat accounts for 10%, or less, of the material. Other domestic animals of this period are dog, horse, fowl and possibly goose. Dog and horse tend to be found in low numbers in settlements; fowl only exceptionally (KYSELÝ 2010).

Horse depositions and iron artefacts

The deposition of a horse skeleton, or parts thereof, either burned or unburned, together with a male human skeleton (the horse rider?) appear quite commonly as burial items in

some areas of the eastern Hallstatt zone, such as Pannonia, or on rarer occasions in the western Hallstatt zone in Bavaria, Germany (*cf.* HENNIG 2001; KMEŤOVÁ 2013, 2014, 2017b; TECCO HVALA 2017). In the Czech Republic, horse skeletons, whole or part, have not been observed in Hallstatt graves even though horse is sometimes well represented in settlement material (PEŠKE 1980; KYSELÝ 2004). But large parts of horse skeletons thought to be from the Hallstatt period were discovered in an unusual find at Býčí skála (PUCHER 1995; GOLEC 2017). Horse teeth (such as the tooth found near the iron bridle in grave XVIII at Hradenín, central Bohemia; DVOŘÁK 1939) or small fragments of horse skull (one grave at Bratčice, southern Moravia; KMEŤOVÁ 2014) are perhaps used to symbolise a whole horse, just as chariot components could be used to represent a whole chariot in many graves. However, in Bohemia, meat offerings are often associated with the presence of horse harnessing and bridles, for instance at Lovosice, where it is the norm (PŮLPÁN 2014).

Apart from horse harnessing, other artefacts present in rich graves in the eastern Hallstatt zone include iron spits (*cf.* southern Moravian and other finds; GOLEC 2003/2004). Their appearance in the western Hallstatt zone, as is the case of the three spits at Prague–Letňany, is exceptional. Whether the offered meat was actually cooked on the spits is questionable, as discussed in KOZÁKOVÁ *et al.* (2017). As at Prague–Letňany, spits were found together with bones in the grave at Holásky, southern Moravia (Fig. 1), but here they were in small fragments and zoological determination of the bones is not provided (ČERVINKA 1948). Animal remains determined as cattle and sheep/goat were found together with spits in the grave at Bratčice, Moravia (KMEŤOVÁ 2014). Andirons (moon symbols) and knives have also been found. The co-occurrence of a meat offering and an iron knife, usually regarded as a ritual tool for killing the animal or cutting up the meat, was not observed in all graves, although it is quite a regular custom in the Bohemian Bylany culture (KOUTECKÝ 2013), the contemporary Moravian Horákov culture (NEKVASIL 1970, 1993; STEGMANN-RAJTÁR 1992; Kos 2014), and the Hallstatt period in other regions (*cf.* OSTERHAUS 1981; MÜLLER-SCHEESSEL & TREBSCHE 2007; KRAUSSE *et al.* 2017), and also occurs in the succeeding La Tène culture (BUJNA 1982; JEREM 2006).

Animal offerings in the wider cultural context

In the area under investigation, the Late and Final Bronze Age which immediately precedes the Hallstatt culture is represented by the Urnfield culture. Cremations from this period typically contain burned animals or parts of animal bodies, reflecting the burning of the offered animal, in whole or in part, together with the deceased (ABŁAMOWICZ 1996; PLESŁ 1996; NÝVLTOVÁ FiŠÁKOVÁ & ZACHAR 2010; JIRÁN *et al.* 2013; KMEŤOVÁ 2013). The cremated remains of cattle, sheep/goat and pig, but also of cervid antler and bear canine, have been recorded in the Czech Republic (ZÍKMUNDOVÁ 1961; PEŠKE 1975; PLESŁ 1996). Interestingly, charred horse remains are not unusual in burials from the central European Urnfield cultural complex (PLESL 1996; KMEŤOVÁ 2013, 2014, 2017b).

However, also unburned meat offering can be a rule, as found in Lower Austria Urnfield cemetery at Franzhausen-Kokoron (a total of 134 animals in approximately 100 graves according to G.K. KUNST in LOCHNER 2016).

In the La Tène culture, which represents a continuation of the Hallstatt culture in Bohemia, animals also played an important role in the rite. Celts often offered pig or boar to the deceased or used the same animals in the funeral banquet (GREEN 1992; MÉNIEL 2001; JEREM 2006; ŠUMBEROVÁ & VALETOVÁ 2011). The predominance of pig in archaeological osteological finds from graves in the Czech Republic (POULÍK 1942; PODBORSKÝ 1993, p. 393; TUREK 1997; VALETOVÁ & SANKOT 2011; SANKOT 2013), Slovakia (AMBROS 1960b, 1984; GARDELKOVÁ-VRTELOVÁ 2014), Austria (SALIARI *et al.* 2016), and Hungary (NÉMETH *et al.* 2002) seems to confirm this notion, although a special find including a calf in Nové Dvory, Bohemia (see below), or the relatively large number of graves with poultry (especially chicken) in Slovakia (GARDELKOVÁ-VRTELOVÁ 2014) and Pannonia (NÉMETH *et al.* 2002) has also been identified. The presence of different species and of different anatomical representation from culture to culture could be a matter of cultural choice and could have symbolic meaning, as implied by the comparison with the Bell Beaker culture (see below).

Anatomical representation

The offering of fleshy parts of the legs and ribs and the exclusion of other fleshy parts of the body, specifically the spine region and head, seems to be a strict rule within Hallstatt burials in the region under investigation. Although ribs do not bear so much meat as proximal parts of legs, they must be considered a meaty dish, as follows from anatomical state they were found in (below). In the case of the three recently analysed burials, the parts that are missing from the offering might have formed part of the funeral banquet. In other cases they could be placed on the funeral pyre, as was observed with a sacrificed pig from the burial ground at Lamadelaine, Luxembourg, dating from the 1st century BC (MÉNIEL 2006). At this site, the pig remains were laid out in a manner which recreated the shape of a pig. The same practice was probably observed at Rovná (see above, and Fig. 4). The fact that Rovná is much older than Lamadelaine proves the deeper roots of this custom. In Bohemia, grave 10/89 at Kutná Hora-Karlov is exception as it contains whole pig body and cattle skull (ŠUMBEROVÁ 1996). Other possible exceptions are grave 13/1974 at Poláky, which may contain a large section of an un-portioned pig body connected by the spine (see above), and grave I in Kolaje, which contains what is alleged to be a pig skeleton with spine (SEDLÁČKOVÁ 1973). A further case of an un-butchered, articulated body from the Iron Age is represented by the find of a calf from a ritual context at Nové Dvory, central Bohemia, dated to La Tène C2–D1 (KYSELÝ 2011; ŠUMBEROVÁ & VALETOVÁ 2011).

Czech grave finds from much earlier, the well-represented Bell Beaker culture, revealed that the lumbosacral and pelvic parts of pig bodies were generally used in offerings (KYSELÝ 2012a, b). This is in direct contrast to the practice in the Bohemian Hallstatt

culture, which appears to suggest culturally specific anatomical choices within funeral customs. The absence of the left foreleg of calves and sheep in both the graves at Prague–Letňany perhaps reflects another custom (*cf.* Fig. 2). These parts of the skeleton could have a specific role in the rite, but such an interpretation is unsafe due to the unknown role of taphonomic agents on bone preservation.

Whatever the case, phosphate analysis from Rovná (CHYTRÁČEK *et al.* 2014, 2015), the partly articulated state of the bones, and the relatively small number of cut marks at Rovná, Prague–Letňany and other sites suggests that substantial portions of meat (and not only bare bones) were placed in a grave. Only some of the long bones were observed to be articulated *in situ*, but ribs were usually in the form of an unseparated series (rib segment) (Fig. 5). The ribs would be found separated from each other and not collaterally in cases where they had been objects of consumption and the meat was removed. The position of butchery marks on calf and pig leg bones from Prague–Letňany located at the most proximal and most distal points of the offered parts corresponds to basic portioning (Figs 2, 6B and KOZÁKOVÁ *et al.* 2017). No other kinds of marks, such as longitudinal cuts on the diaphyses – typical of de-fleshing and filleting – or skinning cuts were observed.

As with the Bohemian finds, in burials at Statzendorf, Austria, and Vrádiště and Nové Košariská, Slovakia, proximal (fleshy) parts of the legs and ribs also predominate in the case of domestic mammals (SCHMITZBERGER 2006; AMBROS 1960a, 1975, 1984). Although this anatomical choice seems to be typical for the Hallstatt funeral rite (*cf.* RIECKHOFF *et al.* 2001), other types of find are also reported: intact bodies without the distal parts of the legs or head but including the spine, a chopped-up young cow, and whole pig legs are all reported from southern Germany (VON DEN DRIESCH 1993); the relatively frequent occurrence of vertebrae, distal legs and skulls is determined at Nové Košariská (AMBROS 1975, 1984).

Age and size

The age of the animals in the recently analysed graves – an adult pig and adult/sub-adult sheep and a calf – differs from what is commonly observed in settlement waste, that is, young pigs and adult cattle, reflecting primary and secondary exploitation of particular species common in the Iron Age (*cf.* MÜLLER-SCHEESSEL & TREBSCHE 2007). For more reliable conclusions, further evaluation and a larger database with respect to the ageing of animals are necessary. The similar age of the cattle in all three graves analysed in this paper and possibly also in the re-analysed grave from Lovosice is, however, striking (Fig. 7). Only young cattle were deposited in graves in southern Germany (N=5), where juveniles or sub-adults also predominate in the case of pig and caprines (MÜLLER-SCHEESSEL & TREBSCHE 2007).

Interestingly, the bones of the calf at Rovná are conspicuously smaller than those from Prague–Letňany, even though the age difference is not great. The calf from Rovná could therefore belong to a cattle breed with a smaller body type, or to another sex (female).

Similarly, bones of the calf from grave 14 at Prague–Letňany are somewhat smaller and more slender than those in grave 6, even though the former are thought to be from an older animal. Due to fragmentation and the erosion of the bone edges, the size difference cannot be demonstrated from measurements but it is visible in the photo in Fig. 7. The pig and sheep body sizes, as provided in the “Results” section (*cf.* Tabs 2, S1, S2), do not deviate from the ranges known for breeds in the region from prehistoric times, especially the Hallstatt period (*cf.* TEICHERT 1970; BOESSNECK *et al.* 1971; VON DEN DRIESCH & BOESSNECK 1989; BENECKE 1994; SCHMITZBERGER 2006; KYSELÝ 2016 and R. KYSELÝ pers. obs.), although some measurements of the pig from Prague–Letňany are somewhat greater than in the La Tène settlement of Manching (BOESSNECK *et al.* 1971). The withers height of this pig is also somewhat greater than Iron Age pigs evaluated by TEICHERT (1970). The size of the animals from Rovná and Prague–Letňany is not, however, exceptional. The distal width of the horse metacarpus (52.2 mm) from Rovná, the dating of which is unreliable (see above), corresponds to a relatively large horse, undoubtedly larger than the small horses typical of the central and western European Iron Age (*cf.* BÖKÖNYI 1974, 1993), including the La Tène horses at Manching (BOESSNECK *et al.* 1971: tab. 37) and in Bohemia (PEŠKE 1994) – sometimes called a “Celtic pony”.

Conclusion

Current analysis of meat offerings from three graves – two from the same Bylany culture burial ground at Prague–Letňany (central Bohemia) and one from a large burial mound of the Hallstatt Tumulus culture at Rovná (southern Bohemia) – together with a comparison of similar, older finds yielded interesting findings. A significant number of graves from the Hallstatt culture, especially the Bylany culture, contain meat offerings. The finds from Prague–Letňany and Rovná are, however, unusually rich, especially with respect to the number of animal species and the quantity of meat. The arrangement of the bones is also unusual. In the tumulus at Rovná they were found inside the chamber and apart from the human bones. The special arrangement of the offered body parts observed in this grave, which resembled the shape of a complete animal as described above, probably represents some kind of ancient and symbolic custom (Fig. 4). The position of animal bones inside the Bylany culture graves varies somewhat. At Prague–Letňany the offerings consisted of pieces of meaty body parts of more animal species concentrated in its eastern or southern section (depending on the grave). Grave 6 at Prague–Letňany and grave 17/2002 at Lovosice are the only graves in Bohemia where three animal species have been confirmed within a single offering. With respect to the Hallstatt Tumulus culture, determining the history of bones unearthed in the southern part of the Czech Republic has been hampered by adverse soil conditions, which have tended to prevent the preservation of osseous tissues. The animal bones forming the meat offering at Rovná thus represent a valuable find.

Despite the variability within Hallstatt meat offerings, some similarities were observed in the three burials analysed here, and in other, earlier finds.

- 1) All three graves contained more than one animal species: young cattle always predominates with respect to the number of bones and the quantity of meat; sheep and pig are the other species offered. The use of domestic animals other than pig was also common in other Bohemian Hallstatt graves. It is therefore necessary to re-consider the earlier determination of “pig” or “pig and knife” offering made in earlier publications. So far, almost exclusively, only three animal categories have been reported as having been used in meat offerings in Bohemia: cattle, pig and sheep/goat (of sheep/goat only sheep has so far been reliably determined). From earlier excavations, mainly pig and caprines are reported, but the relatively small size of calf bones might have been misinterpreted as pig in some early publications. Further analysis is necessary if we are to determine whether cattle plays a more important role than pig. Multi-species offerings are rare and not frequent enough to make reliable conclusions, but it seems that the animals offered are not of the same species when more than a single individual is killed. Unlike the graves analysed here, the more usual scenario, even with rich graves, is that only one species is represented by a single meat item – such as a part of one leg.
- 2) In all cases, the finds included partially articulated long bones from the fleshy parts of the legs and series of unseparated ribs. This observation, supported by the type and low occurrence of butchery marks and by the results of the phosphate analysis, shows that meat offerings (and not only bare bones) were undoubtedly part of the rite. Interestingly, it appears that specially selected fleshy parts of the animal bodies, such as proximal parts of the legs and rib segments, were placed in the graves. Other fleshy parts (specifically, the axial section of the body including vertebrae) and the head are absent. This “anatomical rule”, observed in all three of the newly analysed graves and elsewhere in Bohemia, enabled us to distinguish between those parts chosen as provision for the afterlife and those used for other purposes, such as for the funeral banquet. The presence of a whole animal or part of an animal including a spine in a grave is extremely rare in Bohemia. The quantity of meat offered to the deceased is variable (*cf.* Tab. 1, Figs 2, 3). In all three newly analysed graves, the amount of meat clearly exceeds that which could be eaten at a meal by a single individual.
- 3) The young age of the offered cattle and the older age (adult or sub-adult) of the offered pig and/or sheep/goat was also a common feature of all recently analysed graves. The offering in grave 6 at Prague–Letňany involved the slaughter of one calf, one adult pig and one adult sheep. This was an unexpected result as settlement material more often contains young pig bones and adult cattle bones. Adult cattle might have been too costly a gift for the community. But the opposite interpretation – that the tasty meat of a young calf could be considered an especially valuable gift – is also possible. The ages of the animals in the three graves need not constitute a rule as young and adult animals have already been reported in both pig and sheep meat offerings in Bohemia.

This research does not represent the final word on this particular aspect of the Hallstatt funeral rite. Earlier publications did not present a detailed analysis of animal bones; sometimes data is limited only to a brief note on “animal bones”. Because of this, a revision of some of the previously excavated material is necessary. The multidisciplinary

approach to the excavations at Rovná and Prague–Letňany (CHYTRÁČEK *et al.* 2014, 2015; KOZÁKOVÁ *et al.* 2017) was a novelty. In addition to the ongoing processing of data from the finds at Rovná and Prague–Letňany, a detailed analysis of other sites is also planned, such as at Lovosice, where the great quantity of material looks very promising.

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Online Supplementary Material

Table S1. Prague–Letňany, grave 6, animal bone finds – raw data. Acronyms: N = number of fragments, MNI = minimal number of individuals, sin = sinistra (left), dex = dextra (right), J = juvenile, S = sub-adult, pf = prox. epiphysis fused, pn = prox. epiphysis unfused, df = dist. epiphysis fused, dn = dist. epiphysis unfused, sn = sutura unfused, tn = *tuberousitas tibiae* or *crista iliaca* unfused, tf = *tuber ischiadicum* fused, L = length. Other acronyms of dimensions and method of measurement according to VON DEN DRIESCH (1976). Values in brackets are approximate. *Metric of the juvenile bones.

Table S2. Prague–Letňany, grave 14, animal bone finds – raw data. For acronyms and notes see Tab. S1.

Supplementary data associated with this article can be found, in the online version, at http://www.nhm-wien.ac.at/verlag/wissenschaftliche_publikationen/annalen_serie_a/120_2018

References

- ABD EL KAREM, M. (2012): Die Tierknochenfunde. – In: TIEFENGRABER, G. & WILTSCHKE-SCHROTTA, K. (eds): Der Dürrnberg bei Hallein – Die Gräbergruppe Moserfeld-Osthang. (Dürrnberg-Forschungen, 6). – pp. 331–339, Rahden/Westf. (Marie Leidorf).
- ABD EL KAREM, M. (2015): Die Tierknochenfunde. – In: TIEFENGRABER, G. & WILTSCHKE-SCHROTTA, K. (eds): Der Dürrnberg bei Hallein – Die Gräbergruppen Lettenbühel und Friedhof. (Dürrnberg-Forschungen, 8). – pp. 192–197, Rahden/Westf. (Marie Leidorf).
- ABŁAMOWICZ, R. (1996): Kości zwierzęce w grobach kultury łużyckiej jako wyznaczniki wieku i płci zmarłego. – In: CHOCHOROWSKI, J. (ed.): Problemy epoki brązu i wczesnej epoki żelaza w Europie Środkowej. – pp. 45–48, Kraków (Cracovia).
- AMBROS, C. (1960a): Zvierací inventár halštatských hrobov vo Vrádišti. – Slovenská archeológia, 8: 173–175.
- AMBROS, C. (1960b): Zvierací inventár laténskych hrobov v Bajči-Vlkanove. – Slovenská archeológia, 8: 452–456.

- AMBROS, C. (1975): Tierreste aus den Früheisenzeitlichen Hügelgräbern in Nové Košariská. – Slovenská archeológia, **23**: 217–225.
- AMBROS, C. (1984): Katalog der Tierbeigaben aus den hallstattzeitlichen, latènezeitlichen und frühmittelalterlichen Gräbern in der Slowakei. – Acta Interdisciplinaria Archaeologica, **3**: 8–85.
- ARNOLD, B. (1999): “Drinking the feast”: alcohol and the legitimization of power in Celtic Europe. – Cambridge Archaeological Journal, **9**: 71–93.
- BEECH, M. (1995): The animal bones from the Hallstatt settlement of Jenštejn, central Bohemia, Czech Republic. – In: DRESLEROVÁ, D. (ed.): A Late Hallstatt Settlement in Bohemia. Excavation at Jenštejn, 1984. – pp. 99–140, Praha (The City of Prague Muzeum & Institute of Archaeology of the Czech Academy of Sciences, Prague).
- BENECKE, N. (1994): Archäozoologische Studien zur Entwicklung der Haustierhaltung in Mitteleuropa und Südkandinavien von den Anfängen bis zum ausgehenden Mittelalter. (Schriften für Ur- und Frühgeschichte, 46). – 451 pp., Berlin (Akademie Verlag).
- BIEL, J. (1985): Der Keltenfürst von Hochdorf. – 172 pp., Stuttgart (Theiss).
- BIEL, J., STEPHAN, E. & SCHATZ, K. (2006): Archäozoologische Untersuchung der Faunenfunde aus hallstatt- und frühlatènezeitlichen Siedlungen und Gräbern. – pp. 1–10, Studien zur Wirtschaftsgeschichte im Umfeld frühkeltischer Fürstensitze. Available online at: http://www.fuerstensitze.de/dna_media/www3-Biel+445f0383a228c.pdf
- BOENKE, N., POKORNÝ, P. & KYSELÝ, R. (2006): Zur Rekonstruktion des Siedlungsumfeldes auf dem Burgwall Vladař – Archäobotanische und zoologische Untersuchungen aus späthallstatt-/frühlatènezeitlichem Kontext. – In: CHYTRÁČEK, M., MICHALEK, J. & SCHMOTZ, K. (eds): Archäologische Arbeitsgemeinschaft Ostbayern /West- und Südböhmen, 15. Treffen 15. bis 18. Juni 2005 in Altdorf bei Landshut. – pp. 68–86, Rahden/Westf. (Marie Leidorf).
- BOESSNECK, J., VON DEN DRIESCH, A., MEYER-LEMPENAU, U. & WECHSLER VON OHLEN, E. (1971): Die Tierknochenfunde aus dem Oppidum von Manching. – Die Ausgrabungen in Manching, Band 6. – 332 pp., Wiesbaden (Franz Steiner Verlag).
- BÖKÖNYI, S. (1974): History of domestic mammals in central and eastern Europe. – 596 pp., Budapest (Akadémiai Kiadó).
- BÖKÖNYI, S. (1993): Pferdedomestikation, Haustierhaltung und Ernährung: archäozoologische Beiträge zu historisch-ethnologischen Problemen. – Budapest (Archaeolingua Alapítvány).
- BUJNA, J. (1982): Spiegelung der Sozialstruktur auf latènezeitlichen Gräberfeldern im Karpatenbecken. – Památky archeologické, **73/2**: 321–431.
- ČERVINKA, I.L. (1948): Holásky (okr. Brno). Mohyly s halštatskými hroby na „Čtvrtích od Tuřan“. – Časopis Vlasteneckého spolku musejního v Olomouci, **57**: 16–19.
- CHYTRÁČEK, M., DANIELISOVÁ, A., POKORNÝ, P., KOČÁR, P., KYSELÝ, R., KYNCL, T., SÁDLO, J., ŠMEJDA, L. & ZAVŘEL, J. (2012): Vzestupy a pády regionálního mocenského centra. Přehled současného stavu poznání pravěkého opevněného areálu na Vladari v západních Čechách. – Památky archeologické, **103**: 273–338.
- CHYTRÁČEK, M., CHVOJKA, O., EGG, M., JOHN, J., KŘIVÁNEK, R., MICHALEK, J., KYSELÝ, R., STRÁNSKÁ, P., KOZÁKOVÁ, R. & FIKRLE, M. (2014): Die Untersuchung eines späthallstattzeitlichen Fürstengrabhügels bei Rovná (Kr. Strakonice) im Lichte naturwissenschaftlicher Analysen. – In: CHVOJKA, O., CHYTRÁČEK, M., GRUBER, H., HUSTY, L., MICHALEK, J., SANDNER, R., SCHMOTZ, K. & TRAXLER, S. (eds): Archäologische Arbeitsgemeinschaft Ostbayern/West- und Südböhmen/Oberösterreich 23. – pp. 39–52, Rahden/Westf. (Marie Leidorf).

- CHYTRÁČEK, M., CHVOJKA, O., EGG, M., JOHN, J., KYSELÝ, R., MICHÁLEK, J., RITTER, S. & STRÁNSKÁ, P. (2015): Zu einem Fürstengrab aus der Späthallstattzeit mit zweirädigem Wagen und Bronzegefäß bei Rovná in Südböhmen. Ein Vorbericht. – Archäologisches Korrespondenzblatt, **45**: 71–89.
- CHYTRÁČEK, M., CHVOJKA, O., JOHN, J., METLÍČKA, M. & MICHÁLEK, J. (2016) Rekonstruierte Grabkammern vorgeschichtlicher Grabhügel in Süd- und Westböhmien. – In: CHVOJKA, O., CHYTRÁČEK, M., GRUBER, H., HUSTY, L., MICHÁLEK, J., SANDNER, R., SCHMOTZ, K. & TRAXLER, S. (eds): Archäologische Arbeitsgemeinschaft Ostbayern/West- und Südböhmen/Oberösterreich 25. – pp. 139–145, Rahden/Westf. (Marie Leidorf).
- CHYTRÁČEK, M., CHVOJKA, O., EGG, M., JOHN, J., KOZÁKOVÁ, R., KŘIVÁNEK, R., KYSELÝ, R., MICHÁLEK, J. & STRÁNSKÁ, P. (2017a): A disturbed Late Hallstatt Period Princely Grave with a two wheeled chariot and bronze vessels in Sedlina forest near Rovná in south Bohemia: Preliminary report. – In: IRLINGER, W. & SUHR, G. (eds): Archaeological sites in forests: Strategies for their protection. (Schriftenreihe des Bayerischen Landesamtes für Denkmalpflege, 14). – pp. 83–90, München (Volk Verlag München).
- CHYTRÁČEK, M., CHVOJKA, O., EGG, M., JOHN, J., KYSELÝ, R., MICHÁLEK, J. & STRÁNSKÁ, P. (in print): Späthallstattzeitliches Fürstengrab von Rovná in Südböhmen. Symbolische Kunstform der Elite 6./5. Jahr. v. Ch., ihre Inspiration und Funktion. – In: Inspirations and functions of prehistoric and early medieval art. Biskupin, 27.–29.6.2016. (Biskupiner Archäologische Arbeiten). – Poznań & Biskupin.
- DOBISÍKOVÁ, M., GEISLER, M., KALA, J., KOS, P., MIKULKOVÁ, Z., PARMA, D. & PŘICHYSTAL, A. (2010): Halštatské pohřebiště ze Slavkova u Brna (okr. Vyškov). – In: FURMÁNEK, V. & MIROŠAYOVÁ, E. (eds): Popolnicové polia a doba halštatská. Archaeologica slovaca monographiae, Communicationes, 11. – pp. 57–100, Nitra (Institute of Archaeology of the Slovak Academy of Sciences, Nitra).
- DVOŘÁK, F. (1934–1935): Nálezy bylanského typu na Kolínsku. – Památky archeologické, skupina pravěká, **40**: 72–82.
- DVOŘÁK, F. (1939): Nálezy bylanského typu na Kolínsku II. – Památky archeologické, skupina pravěká, **41**: 59–86.
- DVOŘÁK, F. & SCHRÁNIL, J. (1938): Knížecí pohřby na vozech ze starší doby železné. (Praehistorica, 1). – 100 pp., Praha (Charles University).
- FRIDRICHOVÁ, M., KOUTECKÝ, D. & SLABINA, M. (1996): Die Gräberfelder der Bylaner Kultur in Praha. I. Die Gräber der Bylaner Kultur in Praha-Bubeneč. – Památky archeologické, **87**: 104–178.
- FRIDRICHOVÁ, M., KOUTECKÝ, D. & SLABINA, M. (1997): Die Gräberfelder der Bylaner Kultur in Praha II. – Památky archeologické, **88**: 5–64.
- FRIDRICHOVÁ, M., KOUTECKÝ, D. & SLABINA, M. (1999): Die Gräberfelder der Bylaner Kultur in Praha – III. Teil. – Památky archeologické, **90**: 319–396.
- FROLÍKOVÁ, D. (2015): Dva hroby „knížat“ z doby halštatské v Praze-Letňanech. – Akademický Bulletin, **6**: 18–20. Available online at: <http://abicko.avcr.cz/2015/06/06/hroby.html>
- GARDELKOVÁ-VRTELOVÁ, A. (2014): Nálezy drůbeže v keltských hrobech z území Slovenska (Funde von Geflügel in keltischen Gräbern auf dem Gebiet der Slowakei). – In: ČIŽMÁŘOVÁ, J., VENCLOVÁ, N. & BŘEZINOVÁ, G. (eds): Moravské křížovatky. Střední Podunají mezi pravěkem a historií. – pp. 515–525, Brno (Moravské zemské muzeum).
- GOLEC, M. (2003–2004): Rožně, řecko-etruské vlivy ve střední Evropě. – Studia Minora Facultatis Philosophicae Universitatis Brunensis, **8/9**: 101–110.

- GOLEC, M (2005): Horákovská kultura. – Unpublished PhD thesis, Masaryk University Brno, Faculty of Arts, Department of Archaeology and Museology.
- GOLEC, M (2017): The Phenomenon of Býčí Skála Cave – Landscape, Cave and Mankind. (*Archaeologica Olomucensia*, 1). – 171 pp., Olomouc (Palacký University).
- GREEN, M. (1992): Animals in Celtic Life and Myth. – 283 pp., London & New York (Routledge).
- HABERMEHL, K.H. (1961): Die Alterbestimmung bei Haustieren, Pelztieren und beim jagdbaren Wild. – 223 pp., Berlin & Hamburg (Paul Parey Verlag).
- HELMER, D. (1987): Fiches descriptives pour les relevés d'ensembles osseux animaux. (Fiches d'ostéologie animale pour l'archéologie, Série B, Mammifères, 1). – 11 pp., Juan-les-Pins (Centre de recherches archéologiques du CNRS, APDCA).
- HENNIG, H. (2001): Gräber der Hallstattzeit in Bayerisch-Schwaben. (Monographien der Archäologischen Staatssammlung, 2). – 304 pp., Stuttgart (Theiss).
- JAMES, S. (2002): Exploring the world of the Celts. – 195 pp., London (Thames & Hudson).
- JIRÁŇ, L., CHVOJKA, O., ČUJANOVÁ-JÍLKOVÁ, E., HRALA, J., HŮRKOVÁ, J., KOUTECKÝ, D., MICHÁLEK, J., MOUCHA, V., PLEINEROVÁ, I., SMŽ, Z. & VOKOLEK, V. (2013): Prehistory of Bohemia 4. The Bronze Age. – 285 pp., Praha (Institute of Archaeology of the Czech Academy of Sciences, Prague).
- JEREM, E. (2006): Pannonia, Celts in. – In: KOCH, J.T. (ed.): Celtic Culture: A Historical Encyclopedia, vol. 4. – pp. 1419–1423, Santa Barbara, Denver, Oxford (ABC-CLIO).
- KMEŤOVÁ, P. (2013): The spectacle of the horse: on early Iron Age burial customs in the Eastern-Alpine Hallstatt region. – *Archaeological Review from Cambridge*, **28**/2: 67–81.
- KMEŤOVÁ, P. (2014): Deponovanie koní na pohrebiskách z doby halštatskej v priestore Panónskej panvy. (Dissertationes Archaeologicae Bratislavenses, 2). – 385 pp., Bratislava (Comenius University).
- KMEŤOVÁ, P. (2017a): Guláš či stehienko? Zvieracie kostrové zvyšky z halštatských mohýl v Dunajskej Lužnej-Nových Košariskách ako doklad mäsitej stravy? – *Studia Historica Nitriensis*, **21** (supplementum – Sedem decénii Petra Romsauera): 137–154.
- KMEŤOVÁ, P. (2017b): Animals to honour the ancestors: on animal depositions in barrows of North-East Alpine Hallstatt region. – In: VAN DER VAART-VERSCHOOF, S. & SCHUMANN, R. (eds): Connected Elites and Regions in the Early Hallstatt Period (Ha C). – pp. 67–84, Leiden (Sidestone Press).
- KOLDA, J. (1936): Srovnávací anatomie zvířat domácích, II: Nauka o kostech a chrupavkách. – 913 pp., Brno (Vlastním nákladem).
- KOS, P. (2011): Halštatské hroby z Hrušovan u Brna. – In: KORENÝ, R. (ed.): Doba popelnicových polí a doba halštatská (Příspěvky z XI. konference Příbram 7.–10.9.2010). – pp. 173–184, Příbram (Hornické muzeum).
- KOS, P. (2014): Pět nových hrobů horákovské kultury na jižní Moravě. – *Studia Archaeologica Brunensia*, **19**/2: 27–43.
- KOS, P. & GOLEC, M. (2008): Hrob č. K 895 v Modřicích u Brna. „Proces smíchání horákovské a kalenderberské materiální kultury“. – *Pravěk NŘ*, **17**(2007): 301–328.
- KOUTECKÝ, D. (1966): Bylanský knížecí hrob ze Rvenic u Postoloprt. – *Archeologické rozhledy*, **18**: 12–21.
- KOUTECKÝ, D. (1968): Velké hroby, jejich konstrukce, pohřební ritus a sociální struktura obyvatelstva bylanské kultury. – *Památky archeologické*, **59**: 400–487.

- KOUTECKÝ, D. (2003): Příspěvky k době halštatské v severozápadních Čechách. Příspěvky k pravěku a rané době dějinné severozápadních Čech, 13. – Most (Ústav archeologické památkové péče severozápadních Čech).
- KOUTECKÝ, D. (2013): The Bylany culture. – In: VENCLOVÁ, N. (ed.): Prehistory of Bohemia 5. The Early Iron Age – the Hallstatt Period. – pp. 52–73, Praha (Institute of Archaeology of the Czech Academy of Sciences, Prague).
- KOUTECKÝ, D. & FRIDRICHOVÁ, M. (1980): Bylanský kostrový hrob z Prahy-Suchdola. – Archeologické rozhledy, **32**: 501–511.
- KOUTECKÝ, D. & SMRŽ, Z. (1991): Pohřebiště bylanské kultury v Polákách, okr. Chomutov, I. díl. – Památky archeologické, **82**: 166–223.
- KOUTECKÝ, D. & ŠAPČEK, J. (1982): Bylanská pohřebiště na Čelákovicku. – Památky archeologické, **73**: 57–85.
- KOUTECKÝ, D. (1993): Das Bylaner Gräberfeld in Poláky, Kr. Chomutov, II. Teil. – Památky archeologické, **84**: 5–55.
- KOZÁKOVÁ, R., KYSELÝ, R., TREFNÝ, M., DRÁBKOVÁ, K., KOČÁR, P., FROLÍKOVÁ, D., KOČÁROVÁ, R. & MORAVCOVÁ, K. (2017): Food offerings, flowers, a bronze bucket and a wagon: A multidisciplinary approach regarding the Hallstatt princely grave from Prague–Letňany, Czech Republic. – Archaeological and Anthropological Sciences. DOI: 10.1007/s12520-017-0538-x
- KRAUSSE, D., EBINGER-RIST, N., MILLION, S., BILLAMBOZ, A., WAHL, J. & STEPHAN, E. (2017): The ‘Keltenblock’ project: discovery and excavation of a rich Hallstatt grave at the Heuneburg, Germany. – Antiquity, **91**: 108–123.
- KUNST, G.K. (2005): Tierreste aus dem hallstattzeitlichen Gräberfeld von Führholz in Unter-kärnten. – In: WEDENIG, R. (ed.): Hallstattkultur im Trixnertal. Begleitheft zur Ausstellung in Völkermarkt und Klagenfurt 2005. – pp. 47–57, Völkermarkt (Verlag Hermagoras – Mohorjeva založba).
- KYSELÝ, R. (2004): Die Ergebnisse der Analyse der Tierknochen. – In: CHYTRÁČEK, M. & METLICKA, M. (eds): Die Höhensiedlungen der Hallstatt- und Latènezeit in Westböhmen. – Památky archeologické, supplementum, **16**: 89–92.
- KYSELÝ, R. (2010): Review of the oldest evidence of domestic fowl (*Gallus gallus* f. *domestica*) from the Czech Republic in its European context. – Acta Zoologica Cracoviensia, **53A**(1–2): 9–34.
- KYSELÝ, R. (2011): Zvířecí skelet z laténského objektu v Nových Dvorech, okr. Kutná Hora. – Archeologické rozhledy, **63/2**: 253–255.
- KYSELÝ, R. (2012a): Osteozoologické analýzy z Hoštic I. – In: MATĚJÍČKOVÁ, A. & DVOŘÁK, P. (eds): Pohřebiště z období zvoncovitých pohárů na trase dálnice D1 Vyškov-Mořice. – Pravěk, Supplementum **24/I**: 453–466.
- KYSELÝ, R. (2012b): Souhrnná analýza osteozoologických nálezů z období kultury zvoncovitých pohárů v Čechách a na Moravě. – In: MATĚJÍČKOVÁ, A. & DVOŘÁK, P. (eds): Pohřebiště z období zvoncovitých pohárů na trase dálnice D1 Vyškov-Mořice. – Pravěk, Supplementum, **24/I**: 431–452.
- KYSELÝ, R. (2016): The size of domestic cattle, sheep, goats and pigs in the Czech Neolithic and Eneolithic Periods: Temporal variations and their causes. – Archaeofauna, **25**: 33–78.
- LOCHNER, M. (2016): The Late Bronze age cemetery of Franzhausen–Kokoron (Abstract). Available online at: <http://epub.oeaw.ac.at/franzhausen-kokoron2>

- MAY, E., REICHERT, M. & HANNEMANN, K. (1996): Allometric aspects to the determination of the withers height in pigs on the basis of the data of M. TEICHERT. – *ArchaeoZoologia*, **8**/1–2: 125–139.
- MAY, E. & TEICHERT, U.M. (2001): Berechnung der Widerristhöhe bei Schafen aus Extremitätenmaßen mit Hilfe von Regressionsgleichungen oder Faktoren? – In: BUITENHUIS, H. & PRUMMEL, W. (eds): *Animals and Man in the Past*. – pp. 33–37. Groningen (ARC-Publicatie).
- MÉNIER, P. (2001): *Les Gaulois et les animaux: élevage, repas et sacrifice*. – 127 pp., Paris (Éditions Errance, Collection des Hespérides).
- MÉNIER, P. (2006): *Lamadelame* – In: KOCH, J.T. (ed.): *Celtic Culture: A Historical Encyclopedia*, vol. III. – pp. 1085–1086, Santa Barbara, Denver, Oxford (ABC-CLIO).
- MICHÁLEK, J. & CHYTRÁČEK, M. (2013): The Hallstatt Tumulus culture – In: VENCLOVÁ, N. (ed.): *Prehistory of Bohemia 5. The Early Iron Age – the Hallstatt Period*. – pp. 73–91. Praha (Institute of Archaeology of the Czech Academy of Sciences, Prague).
- MORAN, N.C. & O'CONNOR, T.P. (1994): Age Attribution in Domestic Sheep by Skeletal and Dental Maturation: A Pilot Study of Available Sources. – *International Journal of Osteoarchaeology*, **4**: 267–285.
- MÜLLER-SCHEESSEL, N. & TREBSCHE, P. (2007): Das Schwein und andere Haustiere in Siedlungen und Gräbern der Hallstattzeit Mitteleuropas. – *Germania*, **85**: 61–94.
- NEKVASIL, J. (1970): Pohřebiště horákovské kultury v Ořechově u Brna. – In: KLÍMA, B. (ed.): *Sborník Josefu Poulikovi k šedesátinám*. – pp. 55–73, Brno (Institute of Archaeology ČSAV, Brno).
- NEKVASIL, J. (1993): Horákovská kultura. – In: PODBORSKÝ, V. (ed.): *Pravěké dějiny Moravy*. – pp. 337–351, Brno (Muzejní a vlastivědná společnost).
- NÉMETH, P.G., ZOFFMANN, K.Z. & BARTOSIEWICZ, L. (2002): Kelta temető és telep Ordacsehi határában (Celtic cemetery and settlement near Ordacsehi). – *Somogy Megyei Múzeumok Közleményei*, **15**: 57–74.
- NÝVLTOVÁ FIŠÁKOVÁ, M. & PARMA, D. (2014): Hrátky s kostmi. Astragaly jako doklady her v mladém pravěku. – *Studia archaeologica Brunensia*, **19**/1: 113–122.
- NÝVLTOVÁ FIŠÁKOVÁ, M. & ZACHAR, T. (2010): Analýza zvieracieho osteologického materiálu z lokality Zvolen-Balkán. Príspevok k problematike zvieracích pozostatkov na pohrebiskách lužickej kultúry na Slovensku. – In: FURMÁNEK, V. & MIROŠŠAYOVÁ, E. (eds): *Popolnicové polia a doba halštatská. (Archaeologica slovaca monographiae, Communications, 11)*. – pp. 277–288, Nitra (Institute of Archaeology of the Slovak Academy of Sciences, Nitra).
- OSTERHAUS, U. (1981): Zur Funktion und Herkunft der frühlatènezeitlichen Hiebmesser. (Kleine Schriften aus dem Vorgeschichtlichen Seminar der Philipps-Universität Marburg, 9). – 31 pp., Marburg (Vorgeschichtliches Seminar).
- PEŠKE, L. (1975): Osteologický materiál z knovízskeho mohylníku v Levousích. – *Archeologické rozhledy*, **27**: 628.
- PEŠKE, L. (1978a): Zpráva o rozboru osteologického materiálu: Praha-Suchdol. Unpublished report. – Praha (Archiv of the Institute of Archaeology of the Czech Academy of Sciences, Prague).
- PEŠKE, L. (1978b): Zpráva o rozboru osteologického materiálu: Poláky. Unpublished report. – Praha (Archiv of the Institute of Archaeology of the Czech Academy of Sciences, Prague).

- PEŠKE, L. (1979): Zpráva o rozboru osteologického materiálu: Praha-Střešovice. Unpublished report. – Praha (Archiv of the Institute of Archaeology of the Czech Academy of Sciences, Prague).
- PEŠKE, L. (1980): Osteologické nálezy z bylanské zemnice v Cerhenicích, okr. Kolín. – Archeologické rozhledy, **32**: 551–554.
- PEŠKE, L. (1994): The History of Natural Scientific Methods in the Archaeological Institute and Their Present Objectives. – In: FRIDRICH, J. (ed.): 25 Years of Archaeological Research in Bohemia. – Památky archeologické, Supplementum, **1**: 259–278.
- PICHLEROVÁ, M. (1969): Nové Košariská: kniežacie mohyly zo staršej doby železnej. Bratislava: Slovenské národné muzeum. (Fontes historického odboru Slovenského národného múzea v Bratislave, 3). – 292 pp., Bratislava (Slovenské národné muzeum).
- PLESL, E. (1996): K problematice výskytu zvířecích pohřbů v období popelníkových polí. – In: CHOCHOROWSKI, J. (ed.): Problemy epoki brązu i wczesnej epoki zelaza w Europie Środkowej. – pp. 423–435, Kraków (Uniwersytet Jagielloński, Instytut Archeologii).
- PODBORSKÝ, V. (1993): Pravěké dějiny Moravy. – 543 pp., Brno (Muzejní a vlastivědná společnost).
- PUCHER, E. (1995): Die Tierknochen. – In: PARZINGER, H., NEKVASIL, J. & BARTH, F.E. (eds): Die Býčí skála-Höhle: ein hallstattzeitlicher Höhlenopferplatz in Mähren. Römisch-Germanische Forschungen, Band 54. – pp. 146–160, Mainz am Rhein (Philipp von Zabern).
- PUCHER, E. (1998): Der Knochenabfall einer späthallstatt-/latènezeitlichen Siedlung bei Inzersdorf ob der Traisen (Niederösterreich). – In: RAMSL, P.C. (ed.): Inzersdorf-Walpersdorf. Studien zur späthallstatt-/latènezeitlichen Besiedlung im Traisental, Niederösterreich. Fundberichte aus Österreich, Materialhefte A6. – pp. 56–67, Wien (Berger).
- PUCHER, E. (2000): Tierreste. – In: LANTSCHNER, M. (ed.): Eine Hallstatt C-zeitliche Webhütte aus Großmugl-Flur Todtenweg, NÖ. – Unpublished MSc thesis, Universität Wien. – pp. 138–139.
- PUCHER, E. (2003): Die Tierknochen. – In: PREINFALK, F. (ed.): Die hallstattzeitlichen Hügelgräber von Langenlebarn, Niederösterreich. – Fundberichte aus Österreich, Materialheft **A12**: 95.
- PUCHER, E. (2004): Hallstattzeitliche Tierknochen aus Göttlesbrunn, p. B. Bruck an der Leitha, Niederösterreich. – In: GRIEBL, M. (ed.): Die Siedlung der Hallstattkultur von Göttlesbrunn, Niederösterreich. – Mitteilungen der Prähistorischen Kommission der Österreichischen Akademie der Wissenschaften, Philosophisch-historische Klasse, **54**: 309–328.
- PŮLPÁN, M. (2009): Kostrový hrob kultury bylanské se zlatou spirálkou z Lovosic, okr. Litoměřice. – In: KULJAVCEVA HLAVOVÁ, J. & SÝKORA, M. (eds): Archeologické výzkumy v severozápadních Čechách za rok 2008 (Příspěvky k pravěku a rané době dějinné severozápadních Čech). – pp. 73–107, Most (Ústav archeologické památkové péče severozápadních Čech).
- PŮLPÁN, M. (2012): Pohřebiště bylanské kultury v Lovosicích. – Unpublished diploma thesis, Charles University, Faculty of Arts, Institute of Archaeology.
- PŮLPÁN, M. (2014): Pohřebiště bylanské kultury na poloze Aoyama v Lovosicích, okr. Litoměřice (Základní charakteristika). – In: JUCHELKA, J. (ed.): Doba popelníkových polí a doba halštatská ve střední Evropě. Materiál z XIII. mezinárodní konference “Popelnicová pole a doba halštatská”. – pp. 78–99, Opava (Silesian University in Opava).
- REBAY, K.C. (2002): Die hallstattzeitliche Grabhügelgruppe von Zagersdorf im Burgenland. (Wissenschaftliche Arbeiten aus dem Burgenland, 107). – 174 pp., Eisenstadt (Amt der Burgenländischen Landesregierung).

- RIEK, G. & HUNDT, H.J. (1962): Der Hohmichele: Ein Fürstengrabhügel der späten Hallstattzeit bei der Heuneburg. (*Römisch-Germanische Forschungen*, 25). – 214 pp., Berlin (de Gruyter).
- RIECKHOFF, S., ABELS, B.U. & BIEL, J. (2001): Die Kelten in Deutschland. – 542 pp., Stuttgart (Theiss).
- ROLLEY, C. (2003): *La tombe princière de Vix*. – 383 pp., Paris (Picard).
- SALIARI, K., PUCHER, E. & KUCERA, M. (2016): Archaeozoological investigation of the La Tène A-C1 salt-mining complex and the surrounding graves of Putzenkopf Nord (Bad Dürrnberg, Austria). – *Annalen des Naturhistorischen Museums in Wien, Serie A*, **118**: 245–288.
- SANKOT, P. (2013): Burial in Lt B–C1. – In: VENCLOVÁ, N. (ed.): *The Prehistory of Bohemia 6. The Late Iron Age – The La Tène Period*. – pp. 88–97, Praha (Institute of Archaeology of the Czech Academy of Sciences, Prague).
- SCHATZ, K. & STIKA, H.P. (2009): Hochdorf VII: Archäobiologische Untersuchungen zur frühen Eisenzeit im mittleren Neckarraum. (*Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg*, 107). – 339 pp., Stuttgart (Theiss).
- SCHATZ, K. & STEPHAN, E. (2005): Die Tierknochenfunde aus den Rechteckhöfen im Gewann „Zaunäcker“ bei Osterholz, Gde. Kirchheim am Ries. – In: *Frühe Zentralisierungs- und Urbanisierungsprozesse nördlich der Alpen: Kolloquien u. Arbeitsberichte des DFG SPP 1171*. – pp. 1–12, Tübingen (Universität Tübingen).
- SCHMID, E. (1972): *Atlas of Animal Bones. For Prehistorians, Archaeologists and Quaternary Geologists*. – 159 pp., Amsterdam – New York (Elsevier Pub. Co.).
- SCHMITZBERGER, M. (2006): Tierknochen aus dem hallstattzeitlichen Gräberfeld von Statzendorf, Nö. – In: REBAY, K.C. (ed.): *Das hallstattzeitliche Gräberfeld von Statzendorf in Niederösterreich. (Universitätsforschungen zur prähistorischen Archäologie*, 135). – pp. 342–355, Bonn (Habelt).
- SEDLÁČKOVÁ, H. (1973): Bylanské hroby z Kolají, okr. Nymburk. – *Archeologické rozhledy*, **25**: 129–138.
- SILVER, I.A. (1969): The ageing of domestic animals. – In: BROTHWELL, D. & HIGGS, E. (eds): *Science in archaeology: survey of progress and research*. – pp. 283–302, London (Thames & Hudson).
- ŠOLLE, M. (1955): Jižní Morava v době halštatské. – *Památky archeologické*, **46**: 101–133.
- STADLER, J. (2010): Nahrung für die Toten? Speisebeigaben in hallstattzeitlichen Gräbern und ihre kulturhistorische Deutung. (*Universitätsforschungen zur prähistorischen Archäologie*, 186). – 226 pp., Bonn (Habelt).
- STEGMANN-RAJTÁR, S. (1992): Grabfunde der älteren Hallstattzeit aus Südmähren. – 70 pp., Košice (Institute of Archaeology of the Slovak Academy of Sciences, Nitra).
- ŠUMBEROVÁ, R. (1996): Pohřebiště bylanské kultury v Kutné Hoře–Karlově. – *Archeologické rozhledy*, **48**: 460–489.
- ŠUMBEROVÁ, R. & VALENTOVÁ, J. (2011): Dům mrtvých, nebo živých? Laténský objekt s lidskými kostry z Nových Dvorů, okr. Kutná Hora. – *Archeologické rozhledy*, **63**: 220–250.
- TEICHERT, M. (1969): Osteometrische Untersuchungen zur Berechnung der Widerristhöhe bei vor- und frühgeschichtlichen Schweinen. – *Kühn-Archiv*, **83**: 237–292.
- TEICHERT, M. (1970): Größenveränderungen der Schweine vom Neolithikum bis zum Mittelalter. – *Archiv für Tierzucht*, **13**: 229–240.

- TEICHERT, M. (1975): Osteologische Untersuchungen zur Berechnung der Widerristhöhe bei Schafen. – In: CLASON, A. (ed.): Archaeozoological studies. – 51–69 pp., Amsterdam-New York (North Holland and American Elsevier).
- TECCO HVALA, S. (2017): Molnik pri Ljubljani v železni dobi – The Iron Age site at Molnik near Ljubljana. (Opera Instituti Archaeologici Sloveniae, 36). – 272 pp., Ljubljana (ZRC SAZU, Inštitut za arheologijo, Založba ZRC).
- TORBRÜGGE, W. (1979): Die Hallstattzeit in der Oberpfalz. 1 (Materialhefte zur Bayerischen Vorgeschichte, Reihe A, 39). – 422 pp., Kallmünz (Lassleben).
- TREBSCHE, P. (2013): Hunting in the Hallstatt and Early La Tène Cultures: the economic and social importance. – In: GRIMM, O. & SCHMÖLCKE, U. (eds): Hunting in northern Europe until 1500 AD: Old traditions and regional developments, continental sources and continental influences. – Schriften des Archäologischen Landesmuseums Ergänzungreihe, 7: 215–238.
- TUREK, J. (1997): Laténské pohřebiště v Tišicích (okr. Mělník). Předběžná zpráva o výzkumu v roce 1996. – Archeologie ve středních Čechách, 1: 237–262.
- VALENTOVÁ, J. & SANKOT, P. (2011): Das latènezeitliche Gräberfeld in Kutná Hora-Karlov (okr. Kutná Hora), Mittelböhmen, Tschechische Republik. Eine Rettungsgrabung aus den Jahren 1988–1989. – Jahrbuch des Römisch-germanischen Zentralmuseums Mainz, 58: 279–401.
- VENCLOVÁ, N., CHYTRÁČEK, M., DRDA, P., KOUTECKÝ, D., MICHALEK, J., SANKOT, P. & VOKOLEK, V. (2013): The Prehistory of Bohemia 5. The Early Iron Age – The Hallstatt Period. – 196 pp., Praha (Institute of Archaeology of the Czech Academy of Sciences, Prague).
- VOKOLEK, V. (2013): The Silesian-Platěnice culture. – In: VENCLOVÁ, N. (ed.): Prehistory of Bohemia 5. The Early Iron Age – The Hallstatt Period. – pp. 92–107, Praha (Institute of Archaeology of the Czech Academy of Sciences, Prague).
- VON DEN DRIESCH, A. (1976): A guide to the measurement of animal bones from archaeological sites. – Peabody Museum Bulletin, 1: 136 pp.
- VON DEN DRIESCH, A. (1993): Haustierhaltung und Jagd bei den Kelten in Süddeutschland. – In: DANNHEIMER, H. (ed.): Das keltische Jahrtausend. Ausstellungskataloge der Prähistorischen Staatssammlung München. – pp. 126–133, München (Museum für Vor- und Frühgeschichte).
- VON DEN DRIESCH, A. & BOESSNECK, J. (1989): Abschlußbericht über die zooarchäologischen Untersuchungen an Tierknochenfunden von der Heuneburg. – In: GERSBACH, E. (ed.): Ausgrabungsmethodik und Stratigraphie der Heuneburg. Heuneburgstudien VI. (Römisch-Germanische Forschungen, 45). – pp. 131–157, Mainz am Rhein (Philipp von Zabern).
- WĘGRZYNOWICZ, T. (1982): Szczątki zwierzęce jako wyraz wierzeń w czasach ciałopalenia zwłok. – 333 pp., Warszawa (Państwowe Muzeum Archeologiczne).
- ZÍKMUNDOVÁ, E. (1961): Zvířecí pozůstatky z lužických žárových hrobů v oblasti severozápadních Čech. – In: PLESL, E. (ed.): Lužická kultura v severozápadních Čechách. – Monumenta archaeologica, 8: 233–237, 291–293.