



## Research Article

# New burial rites at the end of the Linearbandkeramik in south-west Slovakia

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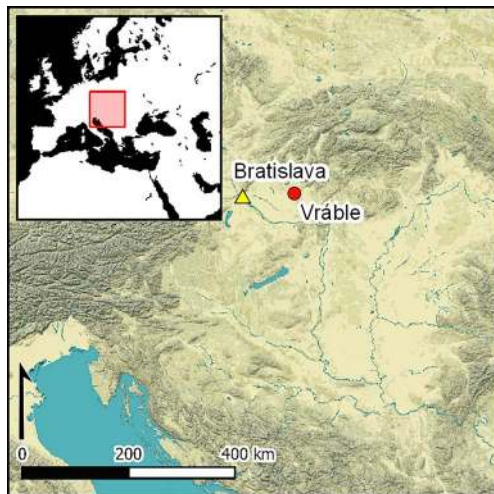
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The recent discovery of several late Linearbandkeramik (LBK) sites in Central Europe, including Vrábľa in south-west Slovakia, has revealed evidence for increasing diversity in Neolithic mortuary practices, which may reflect inter-community war and socio-political crisis at the end of the LBK. Here, the authors combine osteological and radiocarbon analyses of inhumations from Vrábľa. Rather than a straightforward sign of inter-community conflict and war, this development reflects a culmination of internal conflict and a diversification in the ritual treatment of human bodies. The emerging variability in LBK methods of manipulating and depositing dead bodies can be interpreted as an experimental approach in how to negotiate social conflicts and community boundaries.

Keywords: Central Europe, Slovakia, Neolithic, Linearbandkeramik, mortuary practice

## Introduction

The Linearbandkeramik (LBK, *c.* 5500–4950 cal BC) is considered one of the few examples of a Neolithic culture with an individualised, clearly gendered and elaborate mortuary tradition (Robb & Harris 2018). LBK cemeteries are concentrated in Central Europe, and sometimes contain several hundred individuals (Bickle & Whittle 2013a). In the past few years, a number of late LBK sites in Central Europe have been discovered, revealing evidence that, to the modern eye, may be viewed as unsettling methods of both putting

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the living to death and handling the dead. These sites include Herxheim in south-west Germany, which has yielded hundreds of cases of post-mortem manipulation (for contrasting interpretations, see Orschiedt & Haidle 2012; Boulestin & Coupey 2015; Zeeb-Lanz 2019), and sites with clear evidence for severe inter-personal violence (Asparn-Schletz in Austria: Teschler-Nicola 2012; Talheim in south-west Germany: Wahl & Trautmann 2012; Kilianstädten in central Germany: Meyer *et al.* 2015; Halberstadt in eastern Germany: Meyer *et al.* 2018). It has been claimed that these sites reflect a state of crisis at the end of the LBK, during which increased tension between groups—sometimes posited to have stemmed from deteriorating climatic conditions (Gronenborn 2007)—could only be resolved by violence (e.g. Farruggia 2002; Wild *et al.* 2004). Others, however, have challenged this view on chronological grounds, and because the number of such sites is still limited and the patterns of violence very diverse (Link 2014a; Stäuble 2014; Zeeb-Lanz 2019: 460).

Vráble is a newly discovered LBK site in south-west Slovakia that has yielded evidence for diverse ways of handling the dead. Some of the buried individuals show clear signs of post-mortem manipulation, and the overall context hints at the use of specific burial rituals. Vráble therefore adds a specific point of reference for interpretation of the previously mentioned examples, further sharpening understanding of the ways in which the first farmers in Central Europe engaged with death and the deceased. Vráble also adds to our understanding of the role that violence played in such practices and in the social dynamics within communities.

## Archaeological features

The site of Vráble is located in the valley of the upper Žitava River, one of the many north-south-flowing tributaries of the Danube (Figure 1). The site is situated on undulating terrain on a fertile loess river terrace. Large-scale magnetic surveys and subsequent excavations have shown that the site comprised three contemporaneous LBK house clusters (Furholt *et al.* 2014, 2020; Müller-Scheeßel *et al.* 2016; Meadows *et al.* 2019). Similar to practices elsewhere (e.g. Bogaard *et al.* (2011) for Vaihingen an der Enz), we refer to these spatially separated clusters—the largest social units within the settlement of Vráble—as ‘neighbourhoods’ (Wunderlich *et al.* 2020). Only the south-western neighbourhood was enclosed by a ditch system, and most of the human remains discussed in this article were found in proximity to two of the five entrances of this enclosure (Figure 2).

The settlement of Vráble dates to between *c.* 5250 and 4950 cal BC (Furholt *et al.* 2014; Meadows *et al.* 2019). The enclosure surrounding the south-western neighbourhood has a maximum perimeter of approximately 1450m, and consists of three concentric components: two ditches and one palisade. The outer ditch is around 2.5–3.5m wide, and a distinct phase of re-cutting is visible in the profile sections. The inner ditch is smaller at only 1.5m wide.

Although the excavation of the ditches yielded no direct evidence concerning their temporal relationship, their parallel courses suggest either that they were contemporaneous, or that one was still clearly visible when the other was dug. The absence of fine-grained fill layers that would indicate slow silting suggests that the fills of the ditches formed rapidly. We therefore assume that the ditches were dug shortly before the oldest of the human burials were placed towards the bottom of the re-cut ditch deposits.

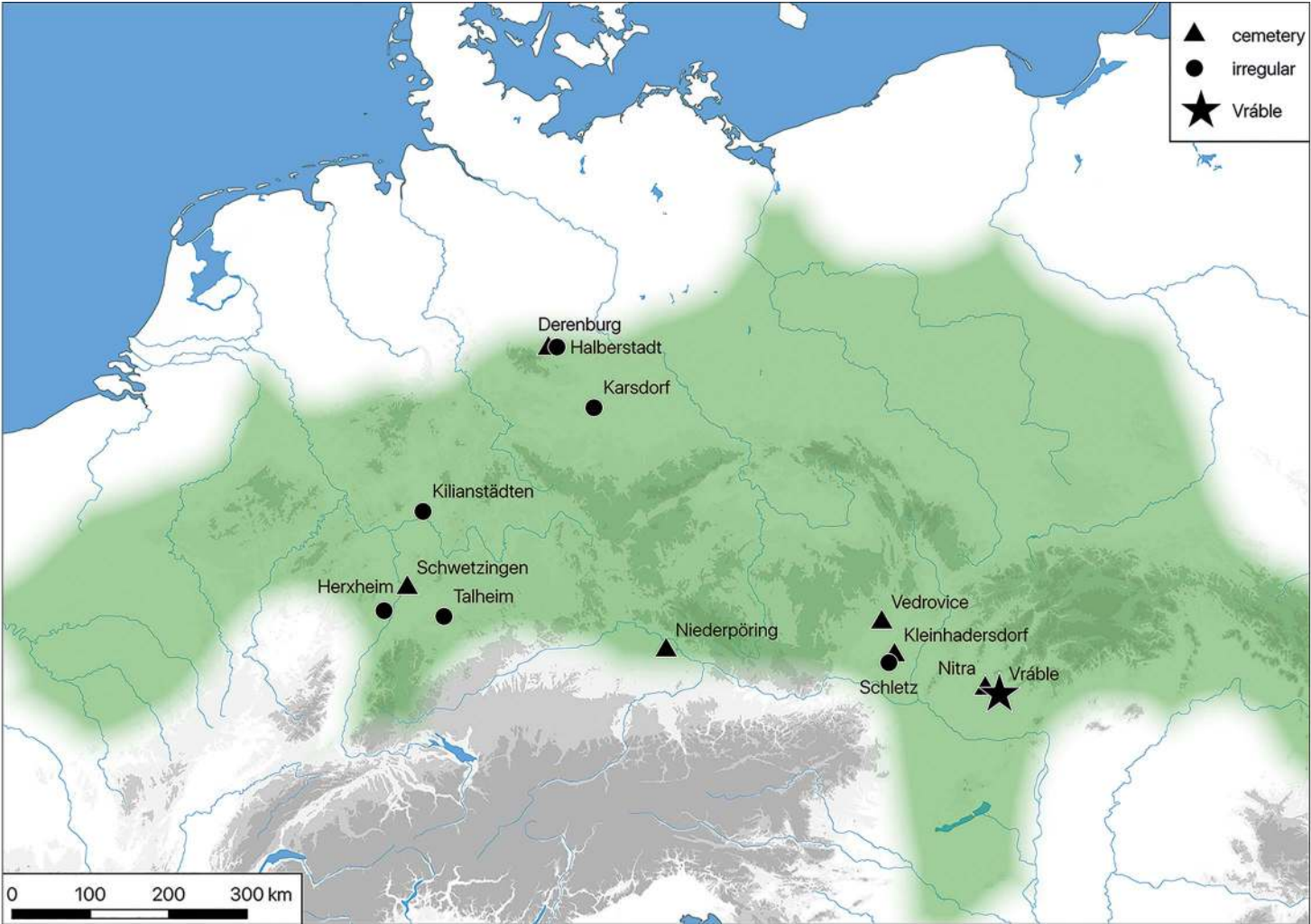


Figure 1. Vráble (star) and other sites mentioned in the text in relation to the general distribution of early LBK sites (shown in green, after Lüning 1988: 32 & fig. 4) (figure by N. Müller-Scheeßel).



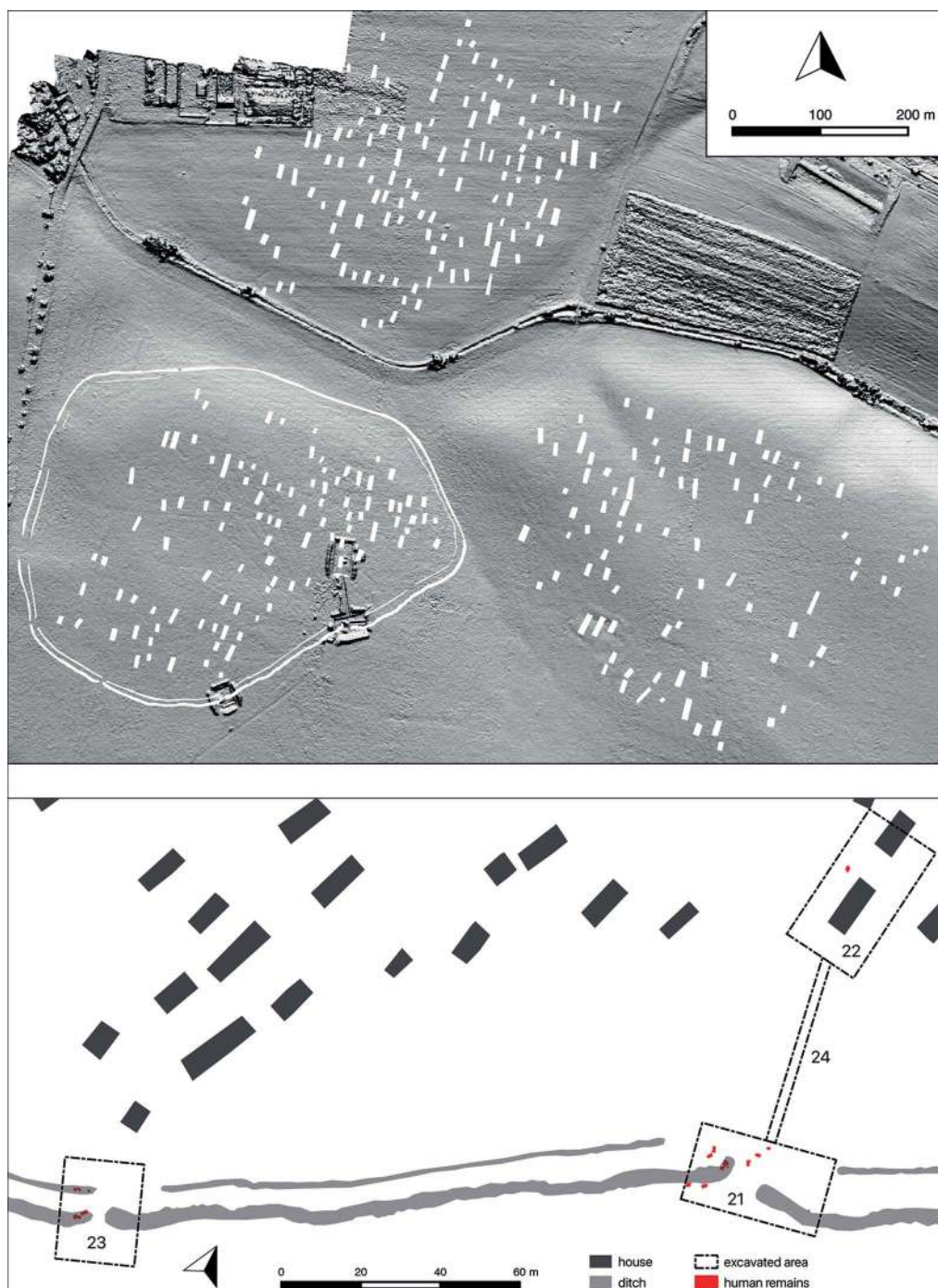


Figure 2. Above) the three separate neighbourhoods of Vråble shown in the magnetic prospection data, with the interpreted houses as white rectangles, the ditches around the south-western neighbourhood as white lines and a high-resolution shaded elevation model as backdrop; the excavated areas in the south-western neighbourhood are clearly visible. Below) the southern entrances to the enclosure around the south-western neighbourhood of Vråble and the excavated areas (figure by N. Müller-Scheefel).

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## The human remains

Excavations in Vrábľe have so far yielded the remains of approximately 19 human individuals (see Table S1 in the online supplementary material (OSM)). Without extensive aDNA work, however, we cannot establish whether bones found considerable distances apart belong to the same individual, or whether disarticulated bones found close together originate from different individuals. The grouping of bone scatters was based on both proximity and plausibility, and was referenced against other evidence, such as the osteological analysis, stable isotope values and radiocarbon-dating of single bones.

One almost complete, articulated individual (G1/S14) was discovered in the south-eastern neighbourhood. A further relatively complete but disarticulated individual (G11/S22) was found associated with house 23 in the south-western neighbourhood, and an isolated frontal bone (I19/S10) was found in the northern neighbourhood. The remaining bones were found in or near the two entrances in the south-western neighbourhood's ditch system. Despite extensive geophysical surveys and systematic field walking in the locality (Falkenstein *et al.* 2008; Furrholt *et al.* 2014), no evidence for a 'regular' LBK cemetery, as briefly described below, has so far been discovered.

At least two distinct patterns in the treatment of human remains are apparent at Vrábľe (Figure 3). The first corresponds to the well-known LBK burial custom in which the deceased were placed in shallow individual burial pits in a crouched position on their left side, with a few grave goods (referred to here as the 'regular' burial type) (Bickle & Whittle 2013b: 17–20). At Vrábľe, six of these 'regular' burials were placed on either side of the large outer ditch (G2/S21, G3/S21, G6/S21, G7/S21, G8/S21 & G9/S21; Figure 3.3–4 & 3.6). As is usual with LBK settlement burials (Hedges *et al.* 2013: 374), no dominant orientation is apparent. In three cases, ceramic sherds were found below the human remains (G2/S21, G3/S21, G6/S21). Additionally, the upper body of individual G2/S21 (Figure 3.7) seems to have sloped within the grave. The ceramic vessels associated with individual G8/S21 (Figure 3.4) were found on their sides and appear to have fallen from a raised level. Together, these observations suggest that the individuals were laid out within the graves on low, raised structures of perishable materials that have not survived. The presence of gnawing marks affecting individuals G2/S21 and G6/S21 (Figure 4.1) suggests that at least some of the bodies may not have been covered immediately, leaving them accessible to scavengers.

The second category of mortuary treatment (referred to here as the 'irregular' burial type) is represented by three headless individuals (G4/S21, G12/S23, G13/S23; Figure 3.1–2 & 3.5), who were each placed in an extended position at the bottom of the outer ditch. Stratigraphically, their deposition seems to have coincided with, or immediately post-dated, the re-cutting of the ditch. The individuals lack cut marks on their cervical vertebrae, and their atlases (first cervical vertebra) and mandibles are missing. The bodies were therefore probably sufficiently decomposed for the skulls to have been removed without the use of any tools, yet at the stage when the atlas (and perhaps also the mandible) were still held in position by tendons. One of the individuals (G13/S23; Figure 3.1) is also missing their left hand. Again, a lack of cut marks indicates that it was probably removed following a period of decomposition. The removal of the skulls and the single hand is also



Figure 3. Selection of burials from Vrąble: 1) G13/S23; 2) G12/S23; 3) G7/S21; 4) G8/S21; 5) G4/S21; 6) G9/S21; 7) G2/S21 (figure by N. Müller-Scheefel).



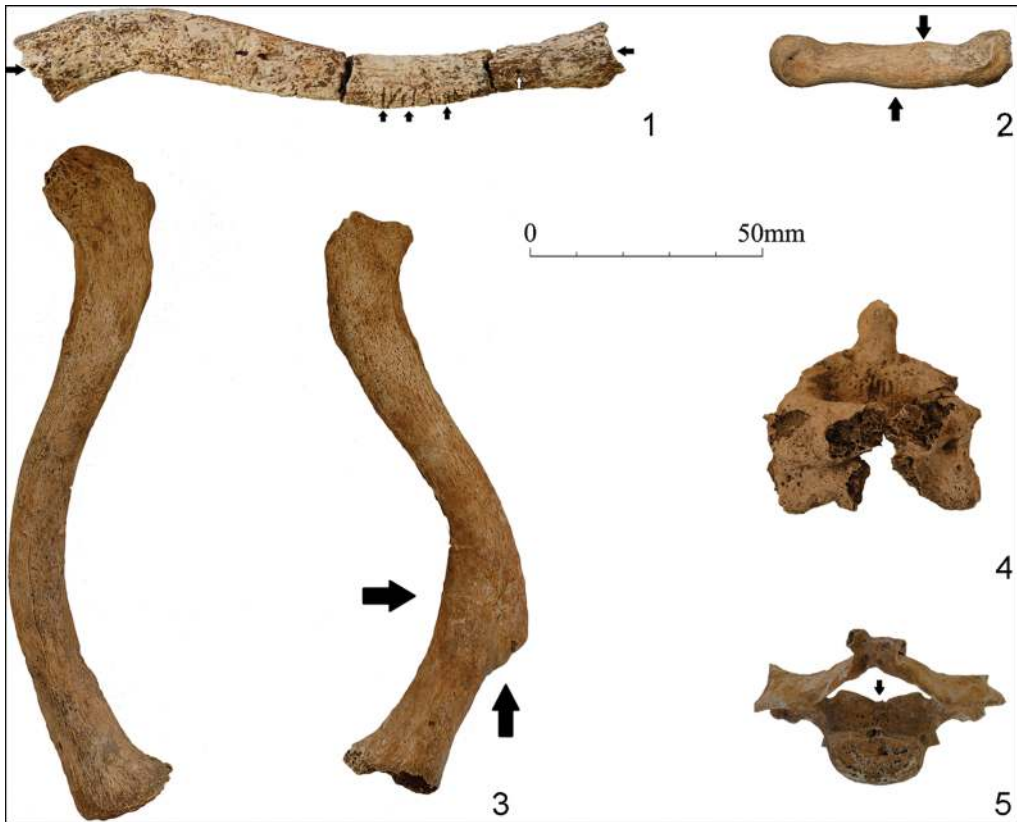


Figure 4. Examples of skeletal pathology at Vrábce: 1) left clavicle from G3/S21, with signs of animal activity (arrows); 2) probable fractured and healed right metacarpal bone ('boxer's fracture') of G13/S23 (Figure 3.1); 3) clavicles from G13/S23, with the fracture affecting the left clavicle marked by arrows; 4) fused cervical vertebrae from G5/S21; 5) notochord defect on a cervical vertebra from G12/S23 (Figure 3.2) (figure by Z. Hukelová).

consistent with the hypothesis that the bodies were left uncovered for a period of time following deposition. A particularly heavily disturbed individual (G5/S21), with no skull or mandible, was also found at the bottom of the ditch, although it is unclear when these elements were separated from the post-cranial skeleton, due to extensive disturbance of the extant remains.

Depositions of single human bones and, sometimes, larger body parts (G10/S21, G14/S21, I15/S21, I16/S23, I17/S23 & I18/S21) were found in the fills of the ditches. These finds are more problematic to subsume under one specific burial custom, as they potentially result from a number of different depositional processes. They may, for example, originate from older burials that were disturbed and re-deposited during the digging of the ditches, or from corpses that were left exposed on the ditch bank for an extended period, so that only very few elements became incorporated into the ditch fill. It seems very likely that further excavation of the outer ditch will yield many more individuals, as only 50m of the 1450m circuit has so far been excavated.

## Burial goods

Table S1 in OSM1 provides an overview of the artefacts from Vráble that could be considered as grave goods (Figure 5). A strong disparity in associated goods between the individuals is immediately apparent. Two individuals—both older males—were comparatively richly equipped: G8/S21 (Figure 5.2) was accompanied by six ceramic vessels and a flint blade, while G7/S21 had one ceramic vessel, one adze (Figure 5.4), one rubbing or abrading stone, two flint blades and the left extremities of a sheep (the latter identified by U. Schmöcke). Three other individuals (G2/S21, G3/S21, G6/S21) had either one or two ceramic vessels in their burial pits, and an obsidian bladelet was found with individual G6/S21. One further obsidian bladelet was discovered close to the disarticulated bones of individual G10/S21.

In addition, a *Spondylus* medallion (Figure 5.3) was discovered in an animal burrow near the inner ditch. This cannot be directly associated with any of the individuals, but such medallions are characteristic burial items (Müller-Scheessel 2019), and were almost exclusively associated with women (Bardec'kyj *et al.* 2016: 187). We suggest that the medallion probably derives from a now destroyed grave.

## Osteological analysis

Most of the Vráble individuals are adults. Males outnumber females by eight to two, although the sex of eight individuals cannot be determined. Due to the relatively small sample size and the restricted excavation area, palaeodemographic analyses seem unnecessary, especially as only one child and no elderly adults (60+) were present. Most of the adult individuals died between the ages of 18 and 35 years, with only two males and one female surviving past 35 years of age (see OSM4 for the methods used to assess age, sex and pathologies).

One individual (G1/S14) exhibits degenerative changes to the spine, one displays a congenital spinal defect (G5/S21; Figure 4.4), and two individuals exhibit both types of pathological condition (G12/S23 and G13/S23; Figure 4.5). Healed trauma was observed in four individuals. In one case (male G1/S14), healed blunt-force trauma was recorded on the supero-posterior area of the cranium. Two individuals (males G8/S21 & G13/S23; Figure 4.3) exhibit poorly healed left clavicles. Although broken clavicles are common, the specific fracture type exhibited by the two Vráble individuals (Robinson's Type 1B and 2B1) is today usually associated with sporting activity or violence (Robinson 1998). Furthermore, one of these individuals (G13/S23) probably had a healed fracture affecting the right fifth metacarpal (Figure 4.2). This type of fracture is known as a 'boxer's fracture', as it "is most frequently seen in hand-to-hand combat" (Hedges *et al.* 2013: 371). A fully healed fracture of the mid-shaft of the right tibia was observed in one individual (female G12/S23).

## Radiocarbon dating

Thirty-five human bones attributed to the 19 putative individuals were dated, either at the Poznan Radiocarbon Laboratory in Poland (Poz-, 26 samples), or at the Leibniz Laboratory in Kiel, Germany (KIA-, 9 samples; one of these was replicated at the Royal Institute for





*Figure 5. Selection of grave goods from Vrábce: 1) ceramic vessel from the upper layer of the outer ditch; 2) flint blade from burial G8/S21; 3) Spondylus medallion from an animal burrow; 4) flat adze from G7/S21. 1) Scale = 1:3; 2–4) scale = 1:2. (figure by E. Bakytová & G. Müller-Scheeßel).*

Cultural Heritage in Brussels, Belgium [RICH-]). Additionally, five animal bones—one from the ‘regular’ burial G7/S21, one associated with the dislocated ‘irregular’ burial G5/S21 and three from two shallow pits of unknown function near the inner ditch—were dated at Poznan. Brock *et al.* (2010) and Meadows *et al.* (2019) describe the laboratory methods used in this study. Results are provided in Table S1, including collagen yields, which were, on average, significantly higher than those from animal bones elsewhere on the site, thus increasing the chances of obtaining reliable results (Meadows *et al.* 2019). Figure 6 (OSM3) shows our chronological model for mortuary activity at Vráble based on a combination of stratigraphic, osteological and archaeological data. Created using the Bayesian modelling package in OxCal v.4.3 (Bronk Ramsey 2009), the model suggests little, if any, chronological overlap between the ‘irregular’ burials, whose median dates cluster in the mid fifty-first century cal BC, and ‘regular’ burials, which span several decades either side of 5000 cal BC (Figure 7). The apparently rapid accumulation of human remains within the outer ditch fills, however, concurs with the lack of natural, fine-grained silting. It seems likely, therefore, that the ditch was intentionally, rather than naturally, filled, either immediately or in the few months or years following deposition of the human remains.

Towards the end of, or immediately after, the deposition of the human remains in the ditches (but before 5000 cal BC), the first ‘regular’ burial was interred near the ditches. The latest ‘regular’ burial took place before 4950 cal BC (Figure 8), and more or less contemporaneously with the abandonment of the south-western neighbourhood (Meadows *et al.* 2019: fig. 9). Regarding the chronological order of the crouched, ‘regular’ burials, G8/S21 appears to be the earliest (Figure 8). The next in the sequence may be G6/S21, followed by G9/S21 and G3/S21, G2/S21 and, finally, G7/S21. The richest burials in terms of grave goods seem to be restricted to the beginning and the end of the sequence. The timespan covered by these crouched burials, however, is too short for the order of the burials to be determined unequivocally.

## Discussion

### *Treatment of the dead*

The treatment of the dead at Vráble—as attested by the burials in the vicinity of the ditch system—is remarkable. Firstly, possible open-air staging of the dead for a certain period of time presents a burial ritual not previously taken into consideration for the LBK. Such a practice could explain seemingly disturbed burials found elsewhere (e.g. at Sondershausen and Bruchstedt: Kahlke 2004). Occasional reports of postholes in or near burial pits (Kahlke 2004: graves SO24 & SO28, Bickle *et al.* 2013b: 303), or wooden constructions (Baumann 1960), could therefore represent much more widespread practices than currently known. In Alsace, for example, Bickle *et al.* (2013b: 301) suggest that voids in grave fills created by perishable internal structures are a late LBK development (see also Thevenet 2004). A thorough, *in situ* examination of the displacement of bones of LBK burials along the line of an ‘*anthropologie de terrain*’ (see Duday *et al.* 1990; Duday 2009) certainly warrants more consideration in the future.

Secondly, the differences in mortuary treatment at Vráble are striking. While some individuals were buried (with clear investment in terms of time, labour and grave goods), others

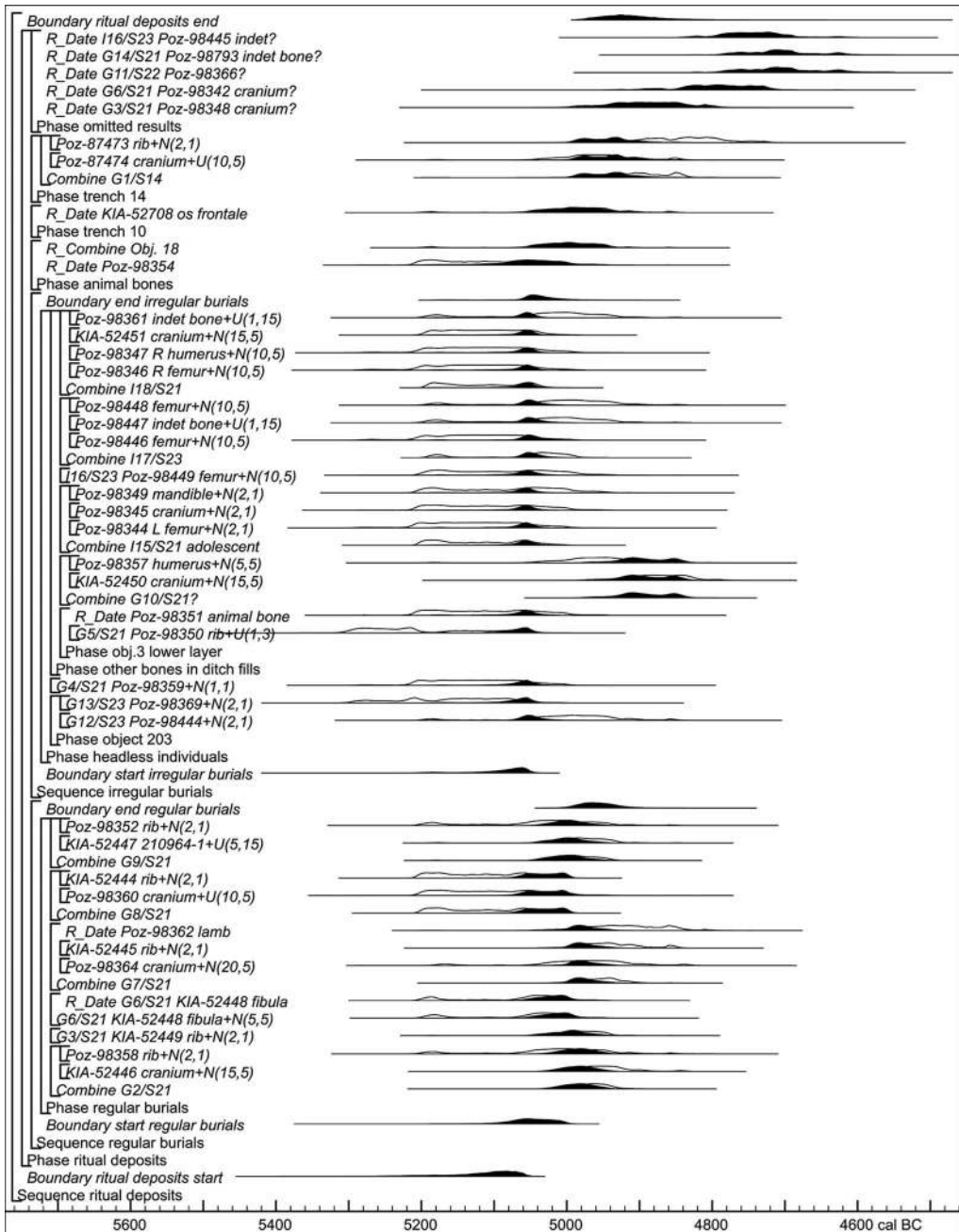


Figure 6. Bayesian model of mortuary activity at Vrable (cf. OSM1). For underlying assumptions, see OSM2. Full model code is provided in OSM3 (figure by J. Meadows).

were left exposed for a certain period of time. Furthermore, the skulls of at least three skeletons from the ‘irregular’ group were removed during the decomposition process. The true prevalence of this practice at Vrable cannot yet be assessed properly, as some of the bone

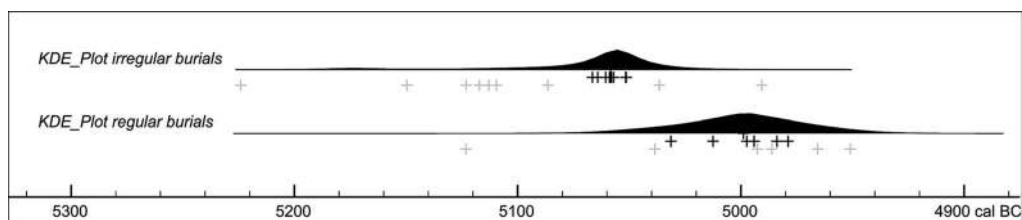


Figure 7. Summaries of modelled radiocarbon data (cf. Figure 6) of crouched and non-crouched burials from Vrąble, obtained using the OxCal function KDE\_Plot (Bronk Ramsey 2017) within each bounded phase of the model shown in Figure 6. Crosses indicate the median calibrated (grey) and modelled (black) date of each individual, and thus the number of dated individuals of each type (figure by J. Meadows).

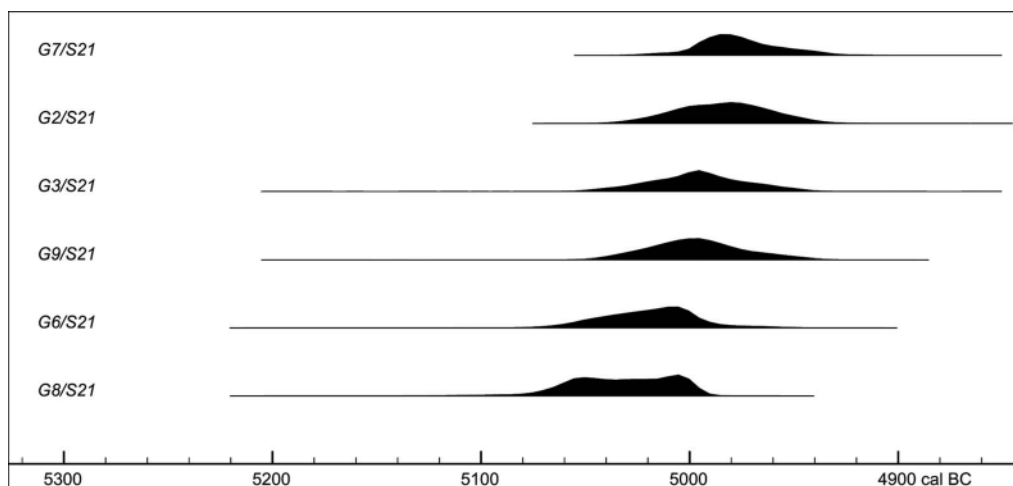


Figure 8. Modelled dates of crouched burials (cf. Figure 6) from Vrąble (figure by J. Meadows).

scatters were too poorly preserved. Nevertheless, as the *modus operandi* with the three articulated skeletons was identical, this behaviour seems to have been part of a regular ritual practice within the Vrąble community.

Similar finds of skeletons without skulls from LBK contexts are known, for example, from France, Germany and Hungary (Kahlke 2004: 76; Lefranc & Boës 2009: 202; Bickle & Whittle 2013a: 75). None of these cases, however, display such a clear *modus operandi* as at Vrąble. A particular interest in the skull seems to be a universal human characteristic (Zalai-Gaál 2009; Armit 2012), and so we should be careful not to postulate too readily a pan-Neolithic skull-cult related to ancestor worship (Perschke 2013). Such ancestor worship seems particularly unlikely in the case of the child from Vrąble (G4/S21).

### *Pathologies and trauma*

Unfortunately, it is not easy to form a reliable overview of the general health of LBK individuals or the level of violence that they experienced. Four out of the eleven (36.4 per cent) well-preserved adult individuals from Vrąble exhibit spinal defects. Tvrđý (2016) reports a



similar prevalence of spinal defects in 12 of the 37 (32.4 per cent) adult individuals from the nearby LBK cemetery at Nitra. Thus, it seems that the prevalence of degenerative pathologies was similar at both Vrábľe and Nitra (only degenerative conditions are reported for the latter site).

In terms of trauma, we compiled information from different datasets, differentiating between LBK individuals from cemeteries and those from settlement contexts (Figure 9). Accordingly, a cranial trauma rate of 2–6 per cent seems to be typical among LBK populations, and with one affected individual from among the eleven adults, Vrábľe is broadly within this range. The picture differs, however, for post-cranial trauma. Three Vrábľe individuals—one ‘regular’ and two ‘irregular’—exhibit a total of four post-cranial fractures. This is a much higher prevalence than observed in ‘regular’ LBK cemeteries elsewhere, but is similar to other datasets for settlement burials. While the skull trauma, the ‘boxer fracture’ and perhaps also the two broken clavicles could be associated with combat-related activities, we have no evidence that affected Vrábľe individuals were killed in conflict—as is reported,

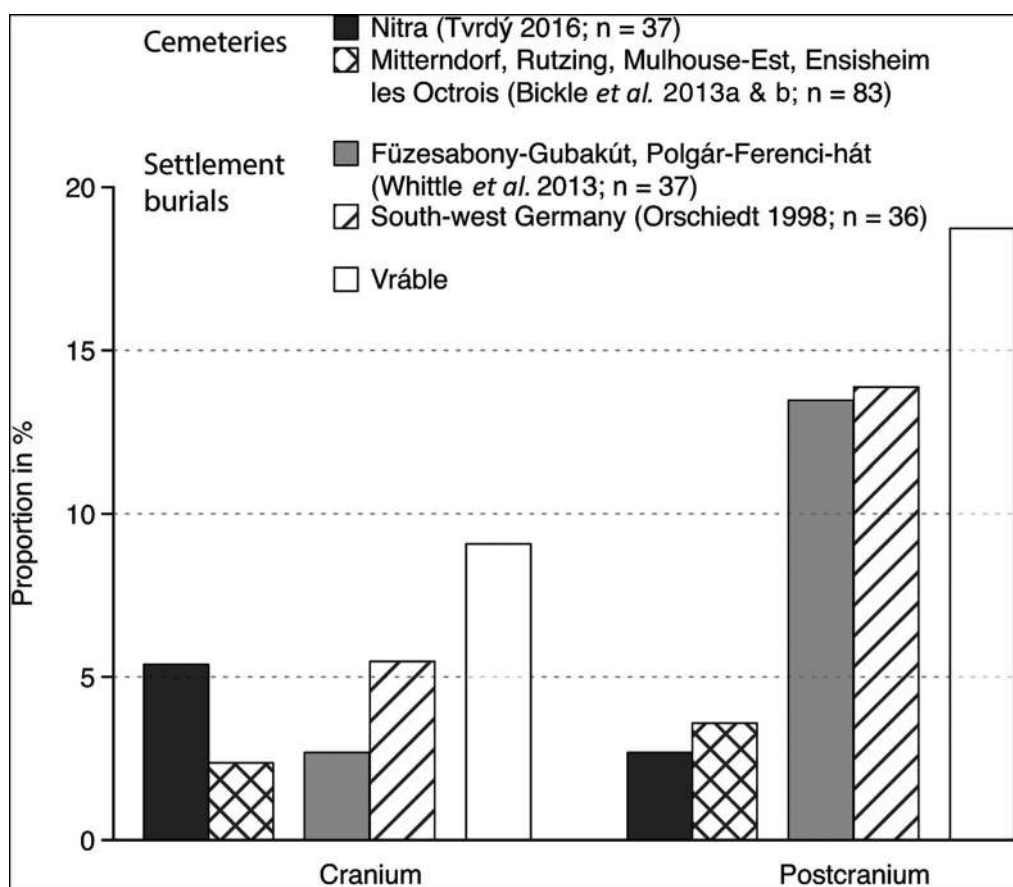


Figure 9. Cranial and post-cranial trauma observed in adult individuals from LBK cemeteries and settlement contexts (figure by N. Müller-Scheeßel).

for example, for the individuals from the ditch in Asparn-Schletz (Teschler-Nicola 2012)—as they lack evidence of peri-mortem injuries.

### *Absolute chronology*

Chronological modelling places the dated human individuals towards the end of LBK settlement at Vráble. This is late in comparison to radiocarbon dates from other LBK sites (Figure 10; OSM4). The Nitra and Vedrovice cemeteries clearly begin in the fifty-third century cal BC. While both probably ended shortly after 5200 cal BC, formal cemetery burial continued elsewhere through the fifty-second and fifty-first centuries cal BC (e.g. at Schwetzingen, Niederpörling, Derenburg and Kleinhadersdorf). Settlement burials (e.g. at Halberstadt ‘Sonntagsfeld’ and Karsdorf) as well as unusual depositions (represented by the Tiefenellern Cave, Herxheim, Schletz, Halberstadt, Kilianstädten and Talheim), however, only begin after 5200 cal BC. Indeed, Herxheim (for a late dating, see Riedhammer 2019), Halberstadt, Kilianstädten and Talheim could all date to shortly before or around 5000 cal BC.

### *‘Violent breakdown’ vs diversity in burial rites*

Vráble provides evidence with which to address two key current debates around LBK communities: their supposed ‘violent’ ends and, second, the variability of their burial practices. Some scholars envisage a direct connection between these two issues, seeing increasing mortuary variability towards the end of the LBK as further evidence for the violent termination of the LBK cultural model (e.g. Farruggia 2001/2002: 120).

The prevailing paradigm of a violent breakdown of LBK communities has recently received criticism. This paradigm developed both in relation to sites such as Talheim or Schletz (e.g. Farruggia 2002 [STP1]; Wild *et al.* 2004; Gronenborn 2007) and to the existence of enclosures, which have been interpreted as defensive structures (Golitzko & Keeley 2007). Link (2014b), for example, points out that the end of the LBK phenomenon appears far less abrupt in the east than in the west. A recent evaluation of available radiocarbon dates (Riedhammer 2019) attests a hiatus between LBK sites and those occupied by later groups in the western LBK area, while supporting a continuation of settlement after the end of LBK material culture in the eastern area. This accords with the evidence from Vráble, where settlement and burial activity seem to end after 5000 cal BC—50–100 years after the end of the LBK in the western areas (Riedhammer 2019)—and some of the latest pottery in Vráble can be considered as early ceramic forms of the succeeding Lengyel Culture (Cheben *et al.* 2020). While there is no direct continuation of settlement at Vráble itself, such as seen in Saxony (Link 2014b), there are plenty of dispersed Lengyel settlements in the surrounding areas (Gabulová 2015).

Although the prevalence of individual trauma at Vráble is comparatively high, none of the recorded traumatic lesions is clearly connected with the death of the affected individuals. Thus, they cannot directly support a primarily military function of the enclosure. On the contrary, we see the erection of the enclosure as driven by internal tensions between the three neighbourhoods, as it lacks entrances towards the other two neighbourhoods (Wunderlich *et al.* 2020).

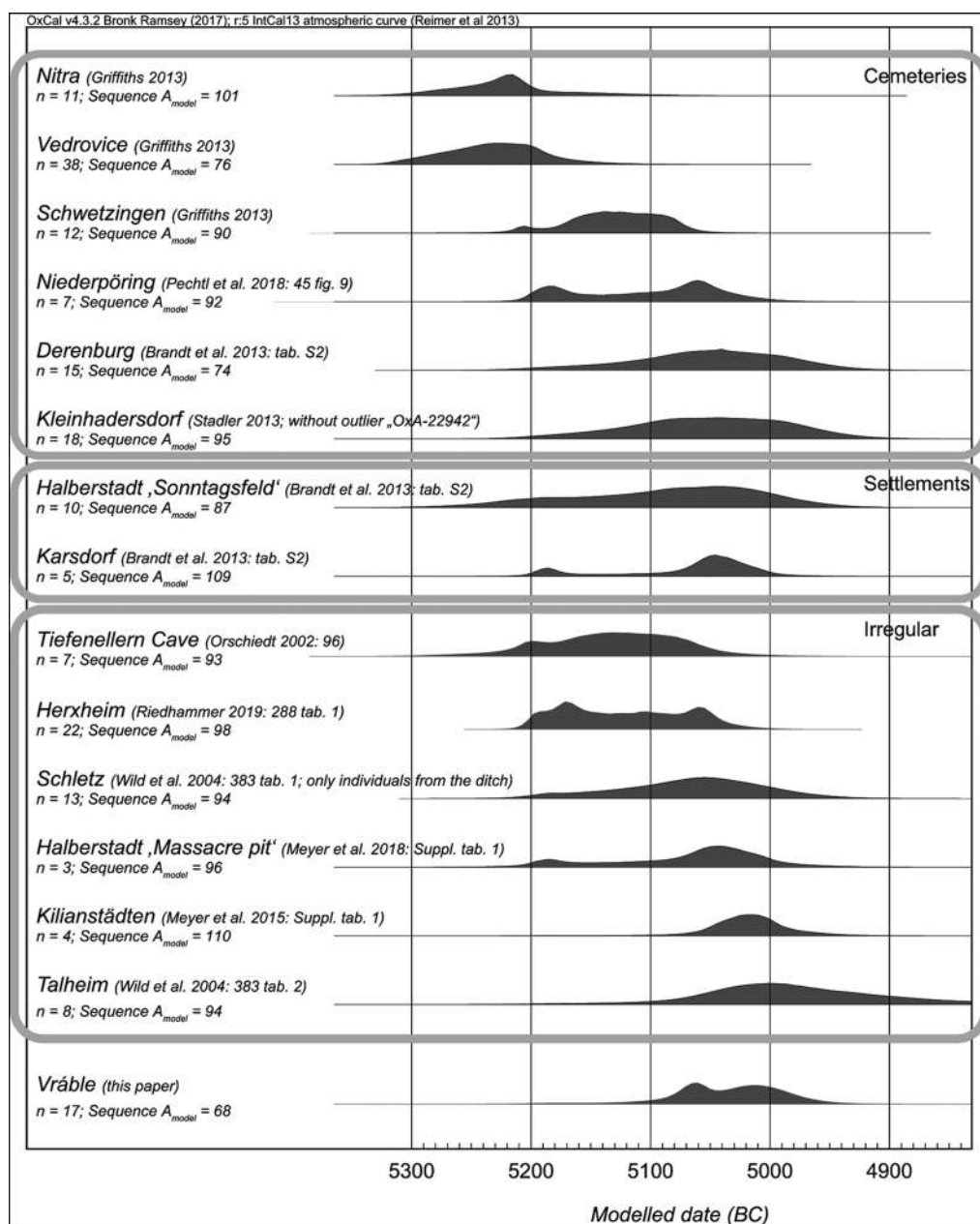


Figure 10. Models of all available AMS radiocarbon dates of LBK human bone samples. All dates at each site are placed between uniform phase boundaries, and the OxCal function KDE\_Plot (Bronk Ramsey 2017) is used to summarise the modelled dates (figure by N. Müller-Scheffel).

While the evidence from Vráble seems to confirm the wider observation of diversification in burial rites towards the end of the LBK, it counters the general assumption that, to the modern eye, gruesome methods of handling the dead must represent the last stage of burial

activity at a site. At Vrábľe, crouched burials clearly post-date the headless individuals placed in the ditch. Nevertheless, we consider that the differential treatment of the dead was also probably driven by intra-community tensions.

## Conclusion

One general chronological trend in LBK burial customs stands out: a decreasing emphasis on extramural burial over the course of the LBK (e.g. Hofmann 2015: 122). Although the practice did exist in later phases, most individuals were buried within settlement areas, or even in mass graves. While Herxheim, for example, is impressive in its scale, similar practices are found elsewhere, albeit on a much smaller scale (Hofmann 2015: 119; Zeeb-Lanz 2019: 465). If we interpret the evidence from Herxheim and the other contemporaneous sites not as evidence of increasing inter-communal conflict, but as representing alternative forms of disposal of the dead, the situation at Vrábľe in south-western Slovakia—burial in and around the settlement rather than in a formal cemetery—could be seen as mirroring general trends elsewhere in the LBK world. Formal cemeteries seem to lose their importance during the later LBK, with deposition in and around settlements taking preference. The later LBK therefore seems to be characterised by greater variation in mortuary practice, and this also continues into the following period in both Slovakia (Lengyel: Pažinová & Bistáková 2013), and elsewhere (Stichbandkeramik in Bohemia: Zápotočká 1998; see also Hofmann & Orschiedt 2015: 994).

Vrábľe further emphasises the variability in motives for manipulating and depositing human bodies in enclosure ditches in LBK settlements. Traditional cultural-historical research tended to reify prehistoric cultural practices, assuming that they constituted strict rules that must be followed. Conversely, we see a proliferation of different LBK ways of handling dead bodies, including violence, rituals and acts of magic—all of which can be interpreted as experimental approaches. Conceptualising LBK methods of manipulating human bodies in this way allows us to avoid the automatic attribution of evidence of interpersonal violence to functional explanations, such as droughts, climate change or population pressure.

This is not intended to negate any of the suffering that some individuals of, for example, Talheim endured, but it calls into question a simplified differentiation between ‘war’—where people suffer violent deaths—and ‘peace’, where the dead are buried in neat burial pits. Vrábľe demonstrates much variation between the two.

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## Supplementary material

To view supplementary material for this article, please visit <https://doi.org/10.15184/aqy.2020.103>

## References

- ARMIT, I. 2012. *Headhunting and the body in Iron Age Europe*. Cambridge: Cambridge University Press.  
<https://doi.org/10.1017/CBO9781139016971>
- BARDEC'KYJ, A., M. DEBIEC & T. SAILE. 2016. Zwei runde Spondylusklappen aus der bandkeramischen Siedlung von Rovanci in Wolhynien: ein Beitrag zu Tausch und Status im frühen Neolithikum. *Sprawozdania Archeologiczne* 68: 183–92.  
<https://doi.org/10.23858/SA68.2016.010>
- BAUMANN, W. 1960. Körpergräber und Siedlung der Bandkeramik in Dresden-Nickern. *Arbeits- und Forschungsberichte zur sächsischen Bodendenkmalpflege* 7: 95–138.
- BICKLE, P. & A.W.R. WHITTLE (ed.). 2013a. *The first farmers of Central Europe: diversity in LBK lifeways*. Oxford: Oxbow.
- 2013b. LBK lifeways: a search for difference, in P. Bickle & A.W.R. Whittle (ed.) *The first farmers of Central Europe: diversity in LBK lifeways*: 1–27. Oxford: Oxbow.
- BICKLE, P. *et al.* 2013a. Austria, in P. Bickle & A.W.R. Whittle (ed.) *The first farmers of Central Europe: diversity in LBK lifeways*: 159–204. Oxford: Oxbow.
- BICKLE, P., R.-M. ARBOGAST, A.R. BENTLEY, L. FIBIGER, J. HAMILTON, R.E.M. HEDGES & A.W.R. WHITTLE. 2013b. Alsace, in P. Bickle & A.W.R. Whittle (ed.) *The first farmers of Central Europe: diversity in LBK lifeways*: 291–342. Oxford: Oxbow.
- BOGAARD, A., R. KRAUSE & H.-C. STRIEN. 2011. Towards a social geography of cultivation and plant use in an early farming community: Vaihingen an der Enz, south-west Germany. *Antiquity* 85: 395–416.  
<https://doi.org/10.1017/S0003598X00067831>
- BOULESTIN, B. & A.-S. COUPEY. 2015. *Cannibalism in the Linear Pottery Culture: the human remains from Herxheim*. Oxford: Archaeopress.  
<https://doi.org/10.2307/j.ctvr43kkd>
- BRANDT, G. *et al.* 2013. Ancient DNA reveals key stages in the formation of Central European mitochondrial genetic diversity. *Science* 342: 257–61.  
<https://doi.org/10.1126/science.1241844>
- BROCK, F., T. HIGHAM, P. DITCHFIELD & C. BRONK RAMSEY. 2010. Current pretreatment methods for AMS radiocarbon dating at the Oxford Radiocarbon Accelerator Unit (ORAU). *Radiocarbon* 52: 103–12.  
<https://doi.org/10.1017/S0033822200045069>
- BRONK RAMSEY, C. 2009. Bayesian analysis of radiocarbon dates. *Radiocarbon* 51: 337–60.  
<https://doi.org/10.1017/S0033822200033865>
- 2017. Methods for summarizing radiocarbon datasets. *Radiocarbon* 59: 1809–33.  
<https://doi.org/10.1017/rdc.2017.108>
- CHEBEN, I., A. BISTÁKOVÁ, B. WOLTHOFF, W. MAINUSCH, N. MÜLLER-SCHEESSEL & M. FURHOLT. 2020. Chronological analyses of the ceramic material from the LBK and Želiezovce settlement site of Vráble, in M. Furrholt, I. Cheben, J. Müller, A. Bistáková, M. Wunderlich & N. Müller-Scheessel (ed.) *Archaeology in the Zitava Valley 1: the Early Neolithic LBK settlement site of Vráble*: 237–47. Leiden: Sidestone.
- DUDAY, H. 2009. *The archaeology of the dead: lectures in archaeoethnology*. Oxford: Oxbow.  
<https://doi.org/10.2307/j.ctt1cd0pkv>
- DUDAY, H., P. COURTAUD, E. CRUBÉZY, P. SELLIER & A.-M. TILLIER 1990. Anthropologie ‘de terrain’: reconnaissance et interprétation des gestes funéraires. *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 2: 29–50.  
<https://doi.org/10.3406/bmsap.1990.1740>
- FALKENSTEIN, F., J. BÁTORA, B. EITEL & K. RASSMANN. 2008. Fidvár bei Vráble: Archäologische Prospektionen auf einer befestigten Zentralsiedlung der Frühbronzezeit in der Slowakei. *Mitteilungen der Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte* 29: 39–49.
- FARRUGGIA, J.-P. 2001/2002. Le cimetière de la Céramique Linéaire d'Aiterhofen (Bavière orientale) dans le contexte de l'Europe centrale:

- une crise majeure de la civilisation du Néolithique Danubien des années 5100 avant notre ère. *Bulletin de la Société Préhistorique Luxembourgeoise* 23/24: 75–127.
- 2002. Une crise majeure de la civilisation du Néolithique Danubien des années 5100 avant notre ère. *Archeologické Rozhledy* 54: 44–98.
- FURHOLT, M., J. BÁTORA, I. CHEBEN, H. KROLL, K. RASSMANN & P. TÓTH. 2014. Vráble-Velké Lehemy: eine Siedlungsgruppe der Linearbandkeramik in der Südwestslowakei. *Slovenská Archeológia* 52: 227–66.
- FURHOLT, M., I. CHEBEN, J. MÜLLER, A. BISTÁKOVÁ, M. WUNDERLICH & N. MÜLLER-SCHEESSEL (ed.). 2020. *Archaeology in the Zitava Valley 1: the Early Neolithic LBK settlement site of Vráble*. Leiden: Sidestone.
- GABULOVÁ, M. 2015. Štúdium krajiny a osídlenia na hornom Požitaví v praveku až včasnej dobe dejinnej. *Študijné Zvesti* 58: 97–168.
- GOLITKO, M. & L.H. KEELEY. 2007. Beating ploughshares back into swords: warfare in the Linearbandkeramik. *Antiquity* 81: 332–42. <https://doi.org/10.1017/S0003598X00095211>
- GRIFFITHS, S. 2013. Appendix B1: radiocarbon dates from Nitra, Schwetzingen and Vedrovice, in P. Bickle & A.W.R. Whittle (ed.) *The first farmers of Central Europe: diversity in LBK lifeways*: 443–58. Oxford: Oxbow.
- GRONENBORN, D. 2007. Climate change and socio-political crises: some cases from Neolithic Central Europe, in T. Pollard & I. Banks (ed.) *War and sacrifice: studies in the archaeology of conflict*. 13–32. Leiden & Boston (MA): Brill. [https://doi.org/10.1163/9789047418924\\_003](https://doi.org/10.1163/9789047418924_003)
- HEDGES, R.E.M. et al. 2013. The supra-regional perspective, in P. Bickle & A.W.R. Whittle (ed.) *The first farmers of Central Europe: diversity in LBK lifeways*: 343–84. Oxford: Oxbow.
- HOFMANN, D. 2015. The burnt, the whole and the broken: funerary variability in the Linearbandkeramik, in Z.L. Devlin & E.-J. Graham (ed.) *Death embodied: archaeological approaches to the treatment of the corpse*: 109–28. Oxford: Oxbow.
- HOFMANN, D. & J. ORSCHIEDT. 2015. Mortuary practices, bodies, and persons in Central Europe, in C. Fowler, J. Harding & D. Hofmann (ed.) *The Oxford handbook of Neolithic Europe*: 987–1004. Oxford: Oxford University Press.
- KAHLKE, H.-D. 2004. *Sondershausen und Bruchstedt: zwei Gräberfelder mit älterer Linienbandkeramik in Thüringen*. Weimar: Thüringisches Landesamt für Archäologische Denkmalpflege.
- LEFRANC, P. & E. BOËS. 2009. Les restes humains manipulés du site rubané d’Ittenheim ‘Complexe sportif’ (Bas-Rhin), in A. Zeeb-Lanz (ed.) *Krisen—Kulturwandel—Kontinuitäten: zum Ende der Bandkeramik in Mitteleuropa*: 197–212. Rahden: M. Leidorf.
- LINK, T. 2014a. Gewaltphantasien? Kritische Bemerkungen zur Diskussion über Krieg und Krise am Ende der Bandkeramik, in T. Link & H. Peter-Röcher (ed.) *Gewalt und Gesellschaft: Dimensionen der Gewalt in ur- und frühgeschichtlicher Zeit*: 271–86. Bonn: Habelt.
- 2014b. Welche Krise? Das Ende der Linienbandkeramik aus östlicher Perspektive, in T. Link & D. Schimmelpfennig (ed.) *No future? Brüche und Ende kultureller Erscheinungen Fallbeispiele aus dem 6–2 Jahrtausend v. Chr.*: 95–111. Kerpen-Loogh: Welt und Erde.
- LÜNING, J. 1988. Frühe Bauern in Mitteleuropa im 6 und 5 Jahrtausend v. Chr. *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 35: 27–93.
- MEADOWS, J., N. MÜLLER-SCHEESSEL, I. CHEBEN, H. AGERSKOV ROSE & M. FURHOLT. 2019. Temporal dynamics of Linearbandkeramik houses and settlements, and their implications for detecting the environmental impact of early farming. *Holocene* 29: 1653–70. <https://doi.org/10.1177/0959683619857239>
- MEYER, C., C. LOHR, D. GRONENBORN & K.W. ALT. 2015. The massacre mass grave of Schöneck-Kilianstädten reveals new insights into collective violence in Early Neolithic Central Europe. *Proceedings of the National Academy of Sciences of the USA* 112: 11217–22. <https://doi.org/10.1073/pnas.1504365112>
- MEYER, C., C. KNIPPER, N. NICKLISCH, A. MÜNSTER, O. KÜRBIS, V. DRESELY, H. MELLER & K.W. ALT. 2018. Early Neolithic executions indicated by clustered cranial trauma in the mass grave of Halberstadt. *Nature Communications* 9: 2472. <https://doi.org/10.1038/s41467-018-04773-w>
- MÜLLER-SCHEESSEL, N. 2019. Gender in Linearbandkeramik research, in J.K. Koch & W. Kirleis (ed.) *Gender transformations in prehistoric and archaic societies*: 29–48.

- Amsterdam: Sidestone.  
<https://doi.org/10.1177/0959683619857236>
- MÜLLER-SCHEESSEL, N., I. CHEBEN, D. FILIPOVIĆ, Z. HUKELOVÁ & M. FURHOLT. 2016. The LBK site of Vrábľa in southwestern Slovakia: selected results of the excavation season 2016. *Bericht der Römisch-Germanischen Kommission* 97: 83–130.  
<https://doi.org/10.11588/berrgk.2016.0.76637>
- ORSCHIEDT, J. 1998. *Bandkeramische Siedlungsbestattungen in Südwestdeutschland*. Rahden: M. Leidorf.
- 2002. Die Jungfernhöhle bei Tiefenellern: eine Neuinterpretation, mit einem Exkurs zur Interpretation der ‘Knochenstäbchen’, in B. Mühldorfer (ed.) *Kulthöhlen: Funde, Deutungen, Fakten. Beiträge des Symposiums vom 7. Dezember 1996*: 93–112. Nürnberg: Naturhistorische Gesellschaft Nürnberg.
- ORSCHIEDT, J. & M.N. HAIDLE. 2012. Violence against the living, violence against the dead on the human remains from Herxheim, Germany: evidence of a crisis and mass cannibalism?, in R.J. Schulting & L. Fibiger (ed.) *Sticks, stones, and broken bones: Neolithic violence in a European perspective*: 121–37. Oxford: Oxford University Press.  
<https://doi.org/10.1093/acprof:osobl/9780199573066.003.0007>
- PAŽINOVÁ, N. & A. BISTÁKOVÁ. 2013. Die Bestattungssitten der Lengyel-Kultur im Lichte ausgewählter Beispiele aus der südwestlichen Slowakei, in N. Müller-Scheessel (ed.) *Irreguläre Bestattungen in der Urgeschichte: Norm, Ritual, Strafe...? Akten der Internationalen Tagung in Frankfurt a. M. vom 3 bis 5 Februar 2012*: 151–66. Bonn: R. Habelt.
- PECHTL, J., A. HANÖFFNER, A. STASKIEWICZ & H. OBERMAIER. 2018. Die linienbandkeramische Gräbergruppe von Niederpörling, Leitensiedlung Gde: Oberpörling, Lkr. Deggendorf, in L. Husty & K. Schmotz (ed.) *Vorträge des Niederbayerischen Archäologentages* 36: 29–84. Rahden: Leidorf.
- PERSCHKE, R. 2013. Kopf und Körper: der ‘Schädelkult’ im vorderasiatischen Neolithikum, in N. Müller-Scheessel (ed.) *Irreguläre Bestattungen in der Urgeschichte: Norm, Ritual, Strafe...?*: 95–110. Bonn: R. Habelt.
- RIEDHAMMER, K. 2019. The radiocarbon dates from Herxheim and their archaeological interpretation, in A. Zeeb-Lanz (ed.) *Ritualised destruction in the Early Neolithic: the exceptional site of Herxheim (Palatinate, Germany)*, volume 2: 285–303. Speyer: Generaldirektion Kulturelles Erbe, Direktion Landesarchäologie.
- ROBB, J. & O.J.T. HARRIS. 2018. Becoming gendered in European prehistory: was Neolithic gender fundamentally different? *American Antiquity* 83: 128–47.  
<https://doi.org/10.1017/aaq.2017.54>
- ROBINSON, C.M. 1998. Fractures of the clavicle in the adult. *Journal of Bone and Joint Surgery* 80: 476–84.  
<https://doi.org/10.1302/0301-620X.80B3.0800476>
- STADLER, P. 2013. Appendix B2: radiocarbon dates from Kleinhadersdorf, in P. Bickle & A.W.R. Whittle (ed.) *The first farmers of Central Europe: diversity in LBK lifeways*: 458–62. Oxford: Oxbow.
- STÄUBLE, H. 2014. Die Krise am Ende der Linienbandkeramik? Oder ist es am Ende eine Krise der Bandkeramik-Forschung?! Ein archäologisches Feuilleton, in T. Link & D. Schimmelpfennig (ed.) *No future? Brüche und Ende kultureller Erscheinungen Fallbeispiele aus dem 6–2 Jahrtausend v. Chr.*: 11–48. Kerpen-Loogh: Welt und Erde.
- TESCHLER-NICOLA, M. 2012. The Early Neolithic site Asparn/Schletz (Lower Austria), in R.J. Schulting & L. Fibiger (ed.) *Sticks, stones, and broken bones: Neolithic violence in a European perspective*: 101–20. Oxford: Oxford University Press.  
<https://doi.org/10.1093/acprof:osobl/9780199573066.003.0006>
- THEVENET, C. 2004. Une relecture des pratiques funéraires du Rubané récent et final du Bassin parisien: exemple des fosses sépulcrales dans la vallée de l’Aisne. *Bulletin de la Société Préhistorique Française* 101: 815–26.  
<https://doi.org/10.3406/bspf.2004.13070>
- TVRDÝ, Z. 2016. Anthropology of the Neolithic population from Nitra-Horné Krškany (Slovakia). *Anthropologie (Brno)* 54: 231–84.
- WAHL, J. & I. TRAUTMANN. 2012. The Neolithic massacre at Talheim, in R.J. Schulting & L. Fibiger (ed.) *Sticks, stones, and broken bones: Neolithic violence in a European perspective*: 77–100. Oxford: Oxford University Press.  
<https://doi.org/10.1093/acprof:osobl/9780199573066.003.0005>

- WHITTLE, A.W.R. *et al.* 2013. Hungary, in P. Bickle & A.W.R. Whittle (ed.) *The first farmers of Central Europe: diversity in LBK lifeways*: 49–100. Oxford: Oxbow.
- WILD, E.M., A. HÄUSSER, P. STADLER, W. KUTSCHERA, P. STEIER, M. TESCHLER-NICOLA, J. WAHL & H.J. WINDL. 2004. Neolithic massacres. *Radiocarbon* 46: 377–85. <https://doi.org/10.1017/S0033822200039680>
- WUNDERLICH, M., J. MÜLLER, I. CHEBEN, A. BISTÁKOVÁ, M. FURHOLT & N. MÜLLER-SCHEESSEL. 2020. The political economy of the LBK and Želiezovce settlement site of Vráble, in M. Furholt, I. Cheben, J. Müller, A. Bistáková, M. Wunderlich & N. Müller-Scheessel (ed.) *Archaeology in the Zitava Valley 1: the Early Neolithic LBK settlement site of Vráble*: 513–33. Leiden: Sidestone.
- ZALAI-GAÁL, I. 2009. *Zur Herkunft des Schädelkults im Neolithikum des Karpatenbeckens*. Budapest: Archaeolingua.
- ZÁPOTOCKÁ, M. 1998. *Bestattungsritus des böhmischen Neolithikums (5500–4200 BC): Gräber und Bestattungen der Kultur mit Linear-, Stichband- und Lengyelkeramik*. Prague: Archäologisches Institut der Akademie der Wissenschaften der Tschechischen Republik.
- ZEEB-LANZ, A. 2019. The Herxheim ritual enclosure: a synthesis of results and interpretation approaches, in A. Zeeb-Lanz (ed.) *Ritualised destruction in the Early Neolithic: the exceptional site of Herxheim (Palatinate, Germany), volume 2*: 423–82. Speyer: Generaldirektion Kulturelles Erbe, Direktion Landesarchäologie.