



## Research Article

# Warriors from the south? Arrowheads from the Tollense Valley and Central Europe

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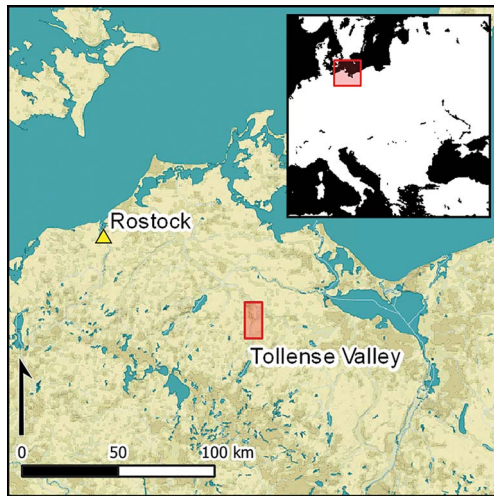
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Investigations in the Tollense Valley in north-eastern Germany have provided evidence of a large and violent conflict in the thirteenth century BC. Typological analysis of arrowheads from the valley (10 flint and 54 bronze specimens) and comparison with type distributions in Central Europe, presented here for the first time, emphasise the supra-regional nature of the conflict. While the flint arrowheads are typical for the local Nordic Bronze Age, the bronze arrowheads show a mixture of local and non-local forms, adding to the growing evidence for a clash between local groups and at least one incoming group from southern Central Europe.

Keywords: Western Europe, Germany, Bronze Age, warfare, conflict, arrowheads

## Introduction

The Tollense Valley in north-eastern Germany is well known as the site of a large conflict in the thirteenth century BC. Since 2008, diving surveys, excavations and metal-detecting have revealed evidence of the conflict at numerous locations along an almost 3km stretch of the river Tollense (Jantzen *et al.* 2011; Lidke *et al.* 2015; Terberger *et al.* 2018). About 12 500 bones from a minimum of 150 individuals have been recovered so far, most of them (about 90 individuals) during excavation at the site of Weltzin 20 (Brinker *et al.* 2018; Lidke *et al.* 2019). The predominance of young males in the skeletal assemblage and the

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repeated evidence of perimortem trauma support a context of conflict and violence. More than 300 metal finds, many of them dated to Period III of the Nordic Bronze Age (1300–1100 BC), have been retrieved from dredged sediments, excavations and from the river (Dombrowsky 2014; Krüger & Terberger 2020). A Bronze Age valley crossing identified at the southern limit of the find distribution might have been the starting point of the conflict (Jantzen *et al.* 2014, 2017; Krüger *et al.* 2020) but the scale and cause of the conflict are a matter of an ongoing debate (e.g. Terberger *et al.* 2023). It is assumed that many more human bones are preserved in the valley, which would represent hundreds of victims (Terberger *et al.* 2018).

But what do we know about the participants in this conflict? Palaeogenetic analysis of 14 individuals from the Tollense Valley reveals a shared central and northern European ancestry, with no identifiable regional groupings (Burger *et al.* 2020: fig. 1). Further analyses may allow a more precise differentiation in the future, however, as analysis of strontium isotope values from 52 teeth does suggest a non-local origin for some of the sampled individuals (Price *et al.* 2019).

Arrowheads from the Tollense Valley have been discussed in general before (Dombrowsky 2017) and microwear studies were performed on a small series (Harten-Buga *et al.* 2022). In this contribution, we analyse the distribution of arrowhead types over Central and southern Northern Europe during the Bronze Age and consider the artefacts from the Tollense Valley in the light of this analysis. A total of 4743 arrowheads from southern Scandinavia, Germany, Poland, Czechia, Slovakia, Austria, Switzerland and the Netherlands, with special consideration of northern Germany, were recorded from the literature and their find locations mapped via QGIS (see online supplementary material (OSM)). Most of the arrowheads are dated to Period III, which corresponds with Bronze Age D and Hallstatt A in Southern Central Europe, though precise dating is not always possible as arrowhead morphology does not change substantially through time. Through the application of typological studies, we analyse the distribution of the various shapes of arrowhead during this period. In doing so, we also investigate whether the data permit assessment of the origins of weapons and their users in the Tollense Valley.

## Arrowheads in the central Tollense Valley

Multiple types of weapons were found in the Tollense Valley—wooden clubs, flint arrowheads and bronze knives, palstaves, spearheads, arrowheads and a sword (Dombrowsky 2014, 2017)—most of which are associated with the conflict. Most numerous are arrowheads: so far 54 bronze and 10 flint arrowheads have been found in the central Tollense Valley (Figure 1; Table S1), and another eight bronze and 14 flint arrowheads have been recorded from dredged sediments further up- and downstream. This assemblage—especially of bronze arrowheads—by far outnumbers the evidence from all other sites of the Nordic Bronze Age. However, the systematic survey of dredged sediments with metal detectors in the Tollense Valley—undertakings which are not comparable with excavations at other Nordic Bronze Age sites—may contribute to a positive bias in the recovery of material and thus the interpretation of a conflict. Yet, bronze arrowheads do regularly appear as detector finds from other places—for example, in Mecklenburg-Western Pomerania and Brandenburg—but never in comparable quantity and typological variability.

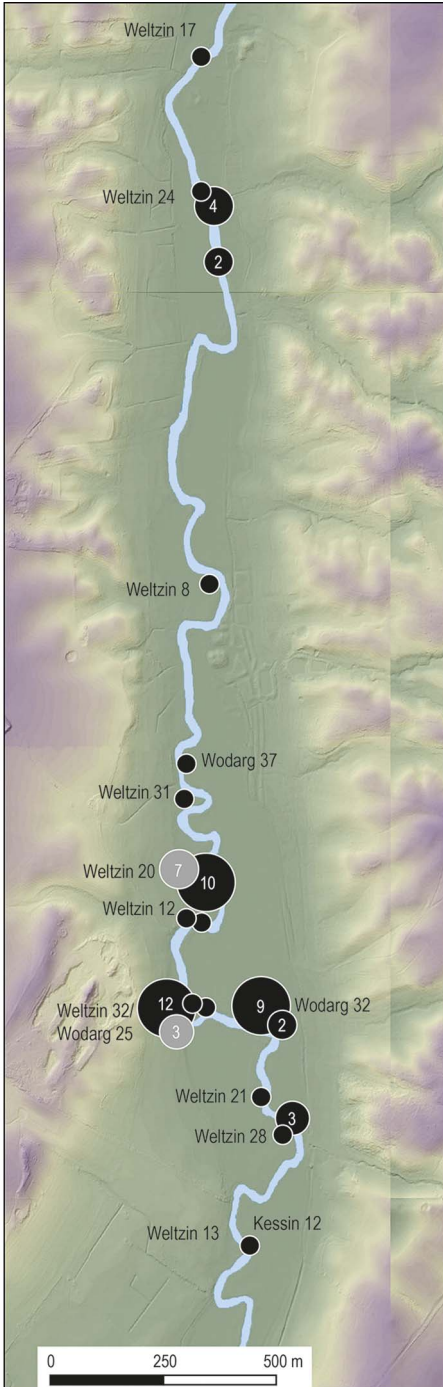


Figure 1. Distribution of Bronze Age arrowheads in the Tollense Valley (black symbols: bronze arrowheads; grey symbols: flint arrowheads) (figure by authors).

In addition to the large number of arrowheads, the find context of some of these artefacts is indicative of violent interactions; prominent among these are a human skull cap with a perforating bronze arrowhead (Figure 2) and a humerus with a flint arrowhead thrust into the shoulder joint (Jantzen *et al.* 2011: fig. 7). At Weltzin 20 and Weltzin 32, bones are generally intermingled in the find layer. Correct anatomical position is preserved in some cases but it is likely that bones were moved by water on a small scale after body decomposition. Some of the four bronze and seven flint arrowheads recovered from these sites were lying in a cluster of bones and we can suppose that they ended up there with a victim. Three flint arrowheads sticking vertically in the sediment—in one case next to the articulated bones of a lower arm (Figure S1)—were probably originally embedded in flesh. Many lesions recorded on bones from Weltzin 20 indicate sharp-force trauma probably caused by arrows. These lesions cluster on the trunk but are also present in other areas, including the skull, and may be observed on the posterior aspect of skeletal elements, suggesting individuals were struck as they fled (Figure 3).

The use of the bow and arrow in the conflict in the Tollense Valley is therefore amply testified. Scratches and small impact fractures on seven flint arrowheads also confirm their use as projectiles (cf. Harten-Buga *et al.* 2022). Isolation of micro-residues may further indicate the presence of blood and tissue on some arrowheads.

A 240mm portion of a wooden shaft tipped with a socketed bronze arrowhead was documented at Weltzin 28 (Figure S2). The shaft is made of dogwood (*Cornus* sp.). The rectangular cross section towards the tip parallels an arrow from burial 5 at Behringersdorf, Bavaria (Hundt 1974–75; Krüger



Figure 2. Skull with perforating bronze arrowhead (approx. 35mm) found at Weltzin 20 (North). Note the damage to the tip of the arrowhead caused by the impact (photograph by Volker Minkus).

2020). Small shaft fragments are also preserved on a flint arrowhead found during underwater surveys (Weltzin 32). The split shaft and tar hafting compare with specimens from Dabel (Lisch 1857: 282) and Grebs (Just 1968: 202), Mecklenburg-Western Pomerania. Wooden remains in some sockets yielded radiocarbon dates (Terberger/Heinemeier 2014: tab. 2; Terberger *et al.* 2018: fig. 15) and allowed identification of the principal use of ash ( $n = 7$ ) and dogwood ( $n = 6$ ) for shafts, while hardwood ( $n = 3$ ) and rose plant ( $n = 1$ ) were also sometimes used.

Arrowheads were found more frequently at four sites within the valley (Figure 1), which in part reflects present excavation areas. Most of the bronze arrowheads were recovered during metal detecting of dredged sediments. Flint arrowheads are more difficult to identify as stray finds and are almost certainly underrepresented in the total record from the valley.

## The Tollense Valley arrowheads and their regional context

Flint arrowheads can be subdivided into types with a concave base, a straight base, tang and barbs, and a leaf shape (cf. Nicolas 2016). The specimens found in the Tollense Valley show a considerable variety, but with two exceptions all belong to the concave based type. Flint arrowheads are in general slightly lighter than those made of bronze (Terberger 2014: fig. 5). Experiments by Harm Paulsen did not show significant differences in the effectiveness



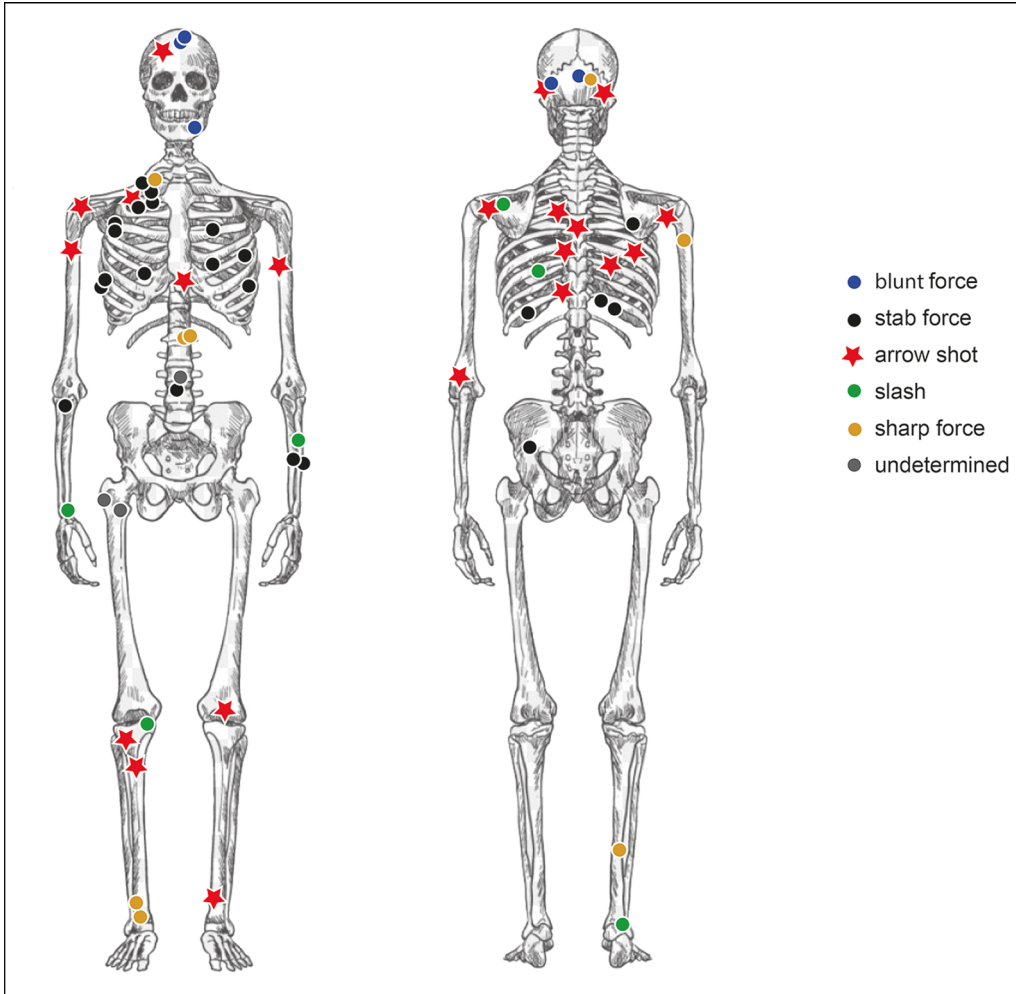


Figure 3. Different trauma observed on human bones from Weltzin 20 projected on a single skeleton (figure by Ute Brinker).

of flint and bronze tipped arrows (Lidke 2020), although flint arrowheads tend to cause larger lesions.

Bronze arrowheads from Central Europe can be differentiated into five types (Figures 4 and S3; Eckhardt 1996). Most of the 54 bronze arrowheads (2–4g) from the Tollense Valley are socketed (types 4 and 5) and only a single specimen with a spherical tang (type 2A) is present (Figures 4 & 5a). Among the socketed specimens, winged (type 4) and heart to willow leaf shapes (type 5) are dominant. Type 5 is separated into variants A and B, but it is likely that the variant with the narrow leaf shape (type 5B) is the result of (repeated) resharpening of the willow-leafed socketed arrowhead (type 5A). Two barbed socketed bronze arrowheads (type 4C) also were recorded.

In Mecklenburg-Western Pomerania only an isolated arrowhead can be attributed to Period II (1500–1300 BC; Stolzenburg, Rassmann 1993: 226) and none to the period before.

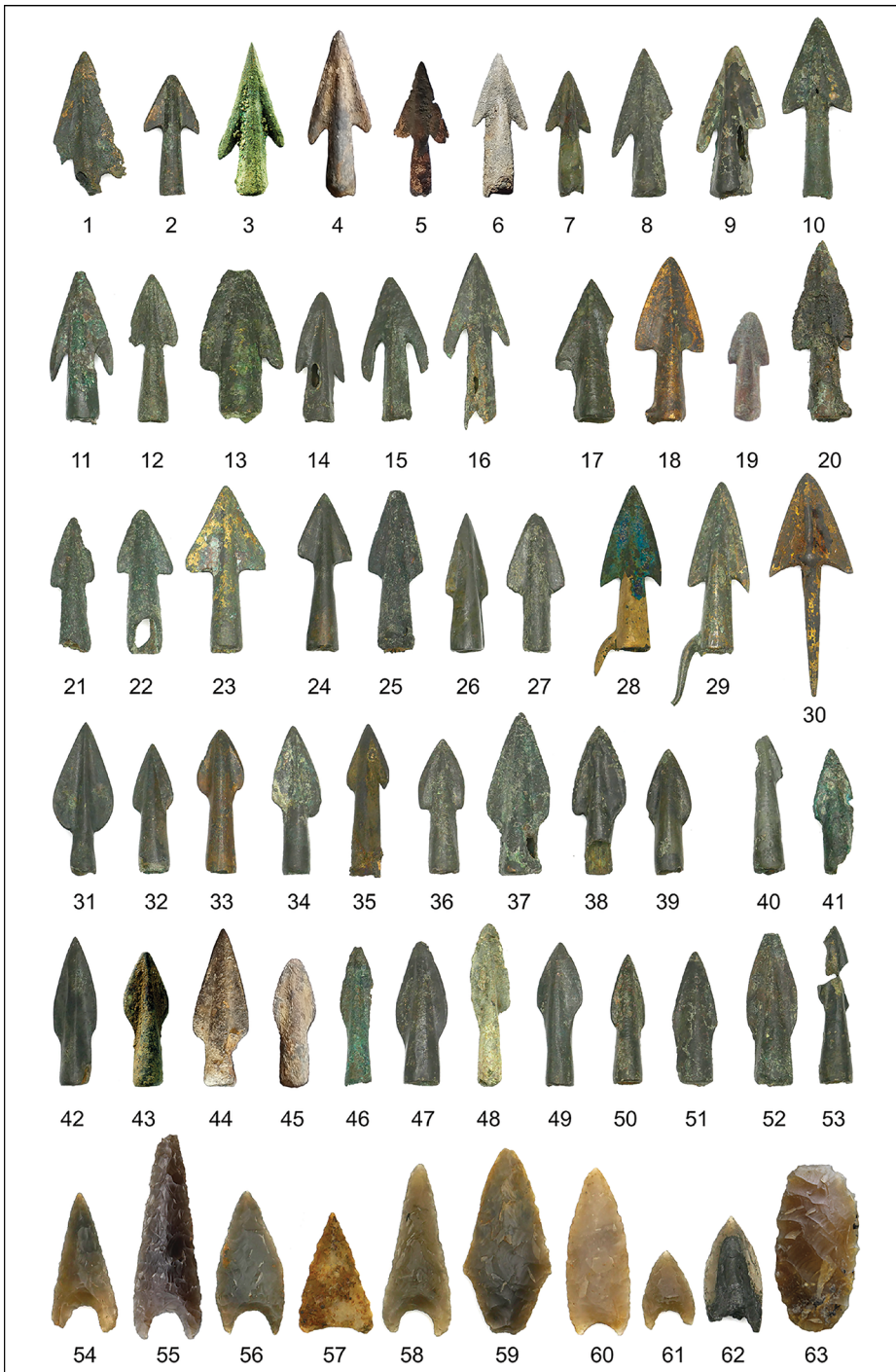


Figure 4. Arrowheads from the Tollense Valley. Nos. 1–16: type 4 A; 17–23: type 4 B1; 24–27: type 4 B2; 28–29: type 4 C; 30: type 2 A; 31–39: type 5 A; 40–53: type 5 A/B; 54–63: flint arrowheads (photographs by Leif Inselmann, Joachim Krüger (nos. 4–6, 44–45), LAKD M-V/Sabine Suhr (nos. 3, 19, 43), Jana Dräger (nos. 55, 63)).

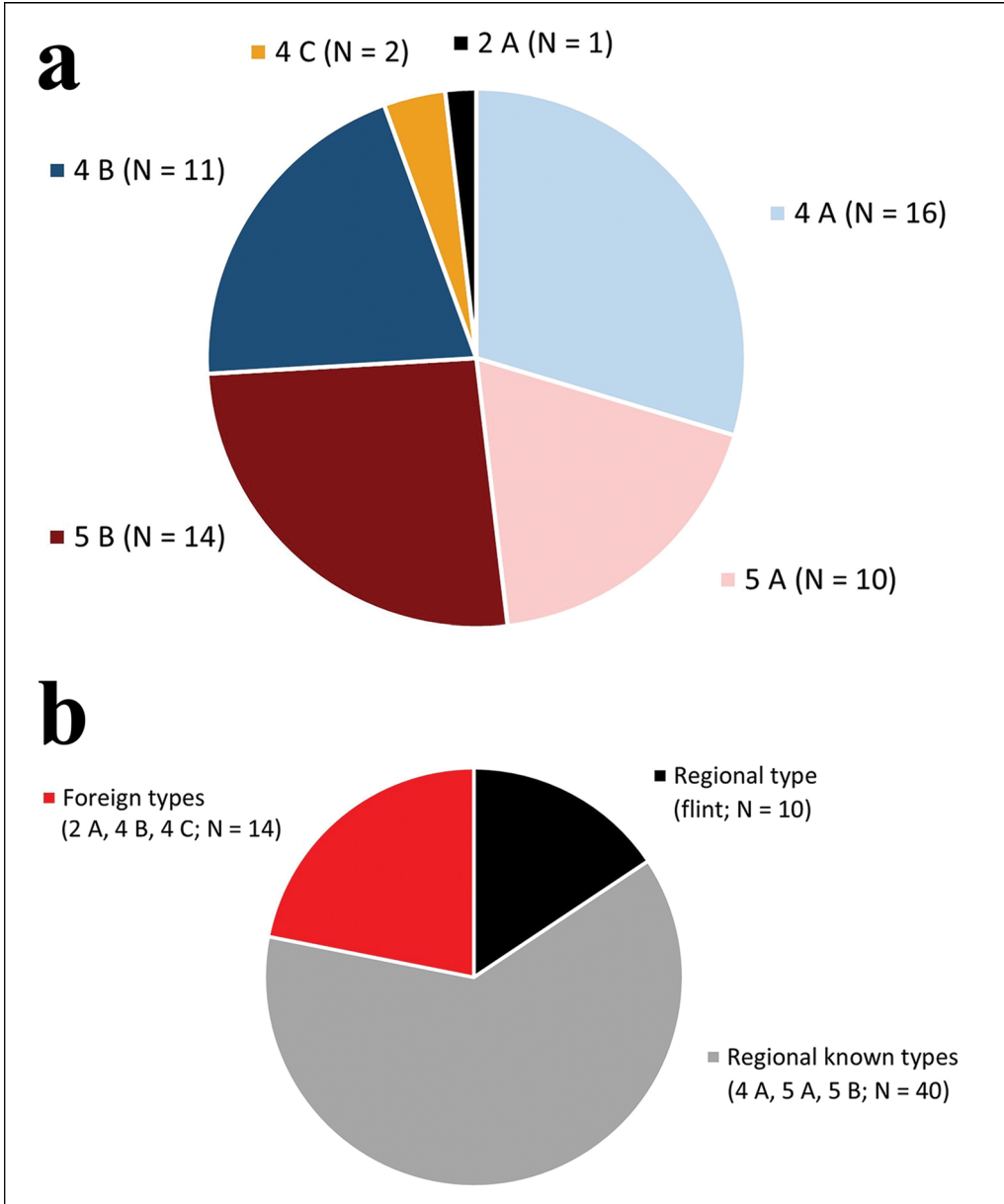


Figure 5. Bronze arrowheads from the central Tollense Valley: a) frequency by type; b) frequency of regional, regional known and foreign types (figure by Leif Inselmann).

During Period III arrowheads become frequent grave inclusions (Schubart 1972: 58). Arrowheads made of flint (74 specimens) are much more numerous than those made of bronze (16 specimens). Sometimes arrowheads of both flint and bronze are present in the same burial (e.g. Just 1967, 1968).

## The Tollense Valley arrowheads and their supra-regional context

### *Flint arrowheads*

Flint arrowheads are common in northern Central Europe and southern Scandinavia (Figure S5), where such raw material is widely available. They are regularly present in Bronze Age burials, with up to 10 specimens found in Period III graves in north-east Germany (Friedrichsruhe, Schubart 1972: 97, pl. 16 B1), and variation in type is similar to that recorded in the Tollense Valley, with the exception of two heavier specimens from Tollense (weighing 3.44 and 3.57g, respectively). Flint arrowheads are typical for the Nordic Bronze Age from Lower Saxony in the west to Poland in the east. A few examples are found in the upland zone further south but flint arrowheads are almost absent in southern Central Europe, where high-quality flint is less common, while copper and tin are more available. The specimens found in the Tollense Valley are probably of local or regional origin.

### *Bronze arrowheads in the north*

In sharp contrast to this, bronze arrowheads are almost unknown in the Early Nordic Bronze Age in Denmark and Schleswig-Holstein (where they are only found at Hasenthal, Kersten 1951: 62, 75, fig. 40:2; and Gülzow, Laux 1989: 54, fig. 3:5; Figures 6, 7 & 8). Bronze arrowheads are present in rich burials from Mecklenburg-Western Pomerania, such as at Peckatel where one was found alongside a golden arm ring and a cauldron (Kesselwagen) that was probably manufactured in the Carpathian Basin (Hänsel 2013; Lippert 2022). These sites represent the northern periphery of the distribution of (socketed) bronze arrowheads, which are widespread in Central and south-eastern Europe. This distribution might suggest that the bronze arrowheads from the Tollense Valley are of local or regional origin but a closer look at the different types recorded from the Tollense Valley strongly suggests that the situation is more complex.

### *Bronze arrowheads in the Tollense Valley: type by type*

Bronze type 5A arrowheads are found throughout eastern Germany, with small clusters of artefacts in south-western Mecklenburg and northern Saxony-Anhalt (Figure 6). Type 5B shows a similar distribution, consistent with the suggestion that reworking of type 5A resulted in the narrow-leafed arrowheads of type 5B.

Type 4A arrowheads are widely distributed from eastern Germany and Bavaria in the west to Slovakia in the east (Figure 7). Bronze arrowheads of this type are present in the Tollense Valley and in a few Bronze Age burials of Period III in Mecklenburg-Western Pomerania, such as Peckatel (Schubart 1972: 134, pl. 48 F2) and Dabel (Schubart 1972: 88, pl. 9 D2); further specimens are not reliably dated.

Socketed bronze arrowheads of types 4B1 and 4B2 show a contrasting distribution to that of type 4A (Figure 8). Both are frequent in the area from southern Brandenburg and Bavaria to Saxonia, Silesia and Moravia. Further north, isolated examples are present in Altmark and Mecklenburg-Western Pomerania (Stolzenburg, Period II, Hellmundt 1964: 68, pl. 41:1737; Schubart 1972: 57) and the only site in north-east Germany with a considerable



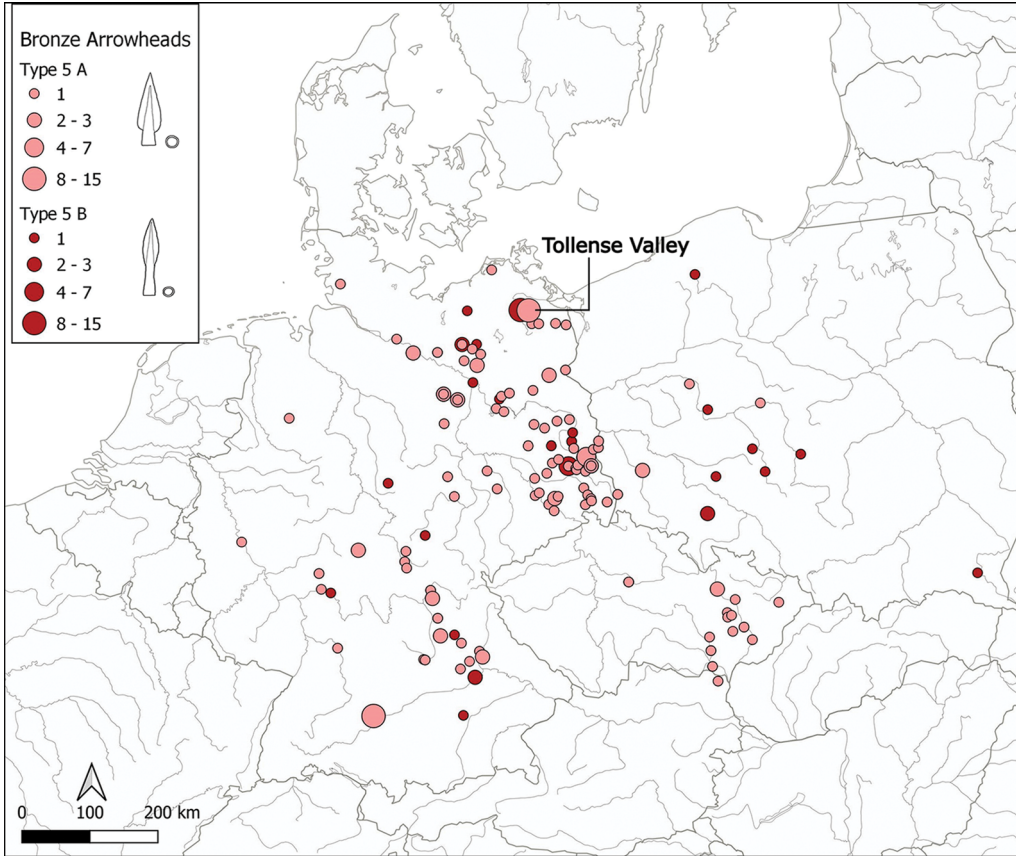


Figure 6. Distribution of bronze arrowheads of types 5A and 5B (figure by Leif Inselmann).

number in Period III is the Tollense Valley. Type 4B2 might be the result of reworking arrowheads of type 4B1 or 5A.

Type 4C arrowheads are distributed from southern Hesse and northern Austria in the west to Moravia in the east (Figure 8). They are absent from Bohemia and north of the upland zone, except for two specimens from the Tollense Valley and five further examples from three sites in Brandenburg—Heckelberg-Beerbaum (Schulz 1977: 62, fig. 3k), a presumed hoard from Burg (Hänsel 1997: 118–20) and three specimens from the Period IV (1100–950/920 BC) ritual site of Hertefeld (unpublished, BLDAM 2019/123,34–36).

Type 2A arrowheads (with a spherical tang) are frequently found from eastern France and the central Rhineland in the west to Bavaria and Moravia in the east (Figure 8). The arrowhead found in the Tollense Valley provides the only example of this type from northern Germany.

Almost three-quarters of bronze arrowheads (types 4A and 5A/B, see Figure 5a) from the Tollense Valley are types also known from burials of Period III in south-western Mecklenburg, approximately 150km to the west. But while only 2.42 per cent of the total type 4A arrowhead assemblage (30 out of 1242 specimens; Tollense Valley excluded) were found

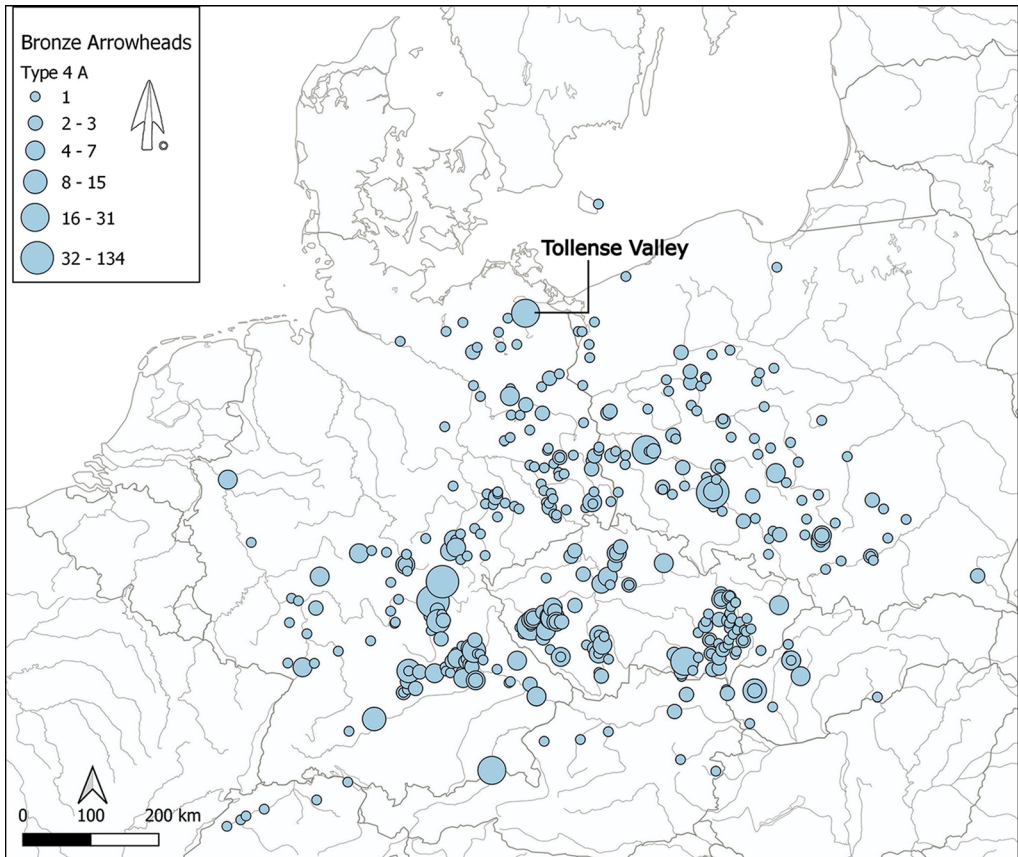


Figure 7. Distribution of bronze arrowheads of types 4A (figure by Leif Inselmann).

north of the rivers Elbe and Havel, 17.39 per cent of type 5A/B arrowheads (32 out of 184 specimens; Tollense Valley excluded) are from this geographic area. Therefore type 5A/B is a more common arrowhead type in the north, and it is more likely that these arrowheads rather than type 4A arrowheads were used routinely by groups north of the Elbe and Havel.

This contrasts with type 4B arrowheads, which are—apart from in the Tollense Valley—typically only used further south. In the case of type 4C (two specimens) and type 2A (one specimen) the items from the Tollense Valley represent clear outliers and are again of non-local origin.

## Discussion

### *Comparative sites*

Outside of the Tollense Valley, bronze arrowheads have been detected in large numbers at only a small number of sites in Central Europe (Figure 9). The recent excavations at the Bronze Age hillfort of Sängersberg near Bad Salzschlirf (Hesse) uncovered a bronze spearhead and 23 bronze arrowheads from close to the presumed entrance to the site. Most of the

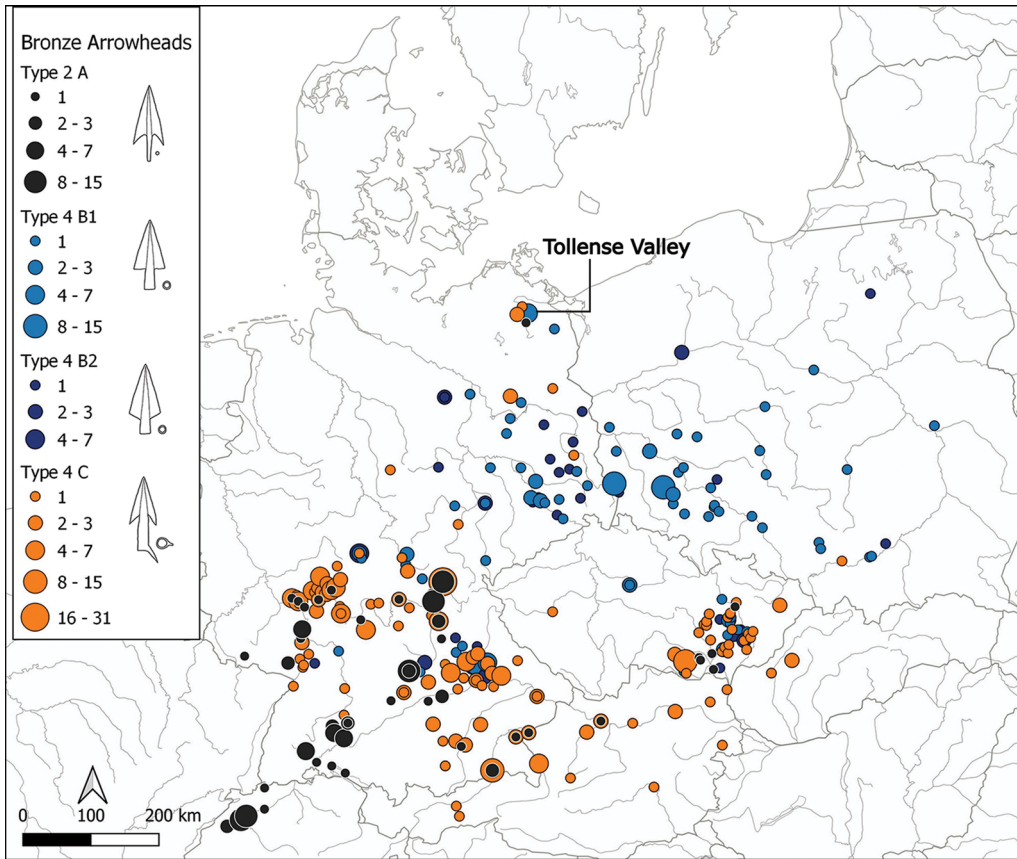


Figure 8. Distribution of bronze arrowheads of types 4B, 4C and 2A (figure by Leif Inselmann).

arrowheads belong to socketed types (types 4 and 5) and only a few are tanged specimens with flat cross sections (type 1). The finds, many of which had bent tips caused by impact damage, testify to an attack on the hillfort, *c.* 1300 BC (Blitte *et al.* 2019; Krause 2019: 19).

The hillfort of Rachelburg near to Flintsbach am Inn (Bavaria) was also apparently attacked during Bz D–Ha A1. Bronze weapons are well represented among the archaeological assemblage, including two sword fragments, five daggers, two spearheads, 10 adze fragments and 41 bronze arrowheads. Socketed arrowheads dominate (type 4) while the tanged type with spherical midrib (type 2) are less relevant. Again, damaged tips suggest the use of the projectiles during an attack on the hill’s flank (Möslein 2001). While also confirming the significance of the bow and arrow in Bronze Age conflicts, Sängersberg and Rachelburg date to roughly the same time period as the Tollense Valley finds, which may indicate increased levels of tension around the thirteenth century BC.

Further evidence of a violent encounter is documented at the hillfort of Heunischenburg close to Kronach (Oberfranken), which is dated to the late Urnfield Culture (Hallstatt B2/3, 950–800 BC). One hundred and seven bronze arrowheads found in the pincer gate area indicate an attack during the ninth century BC (Abels 2002). In this case, types 4A, 4C and 1D

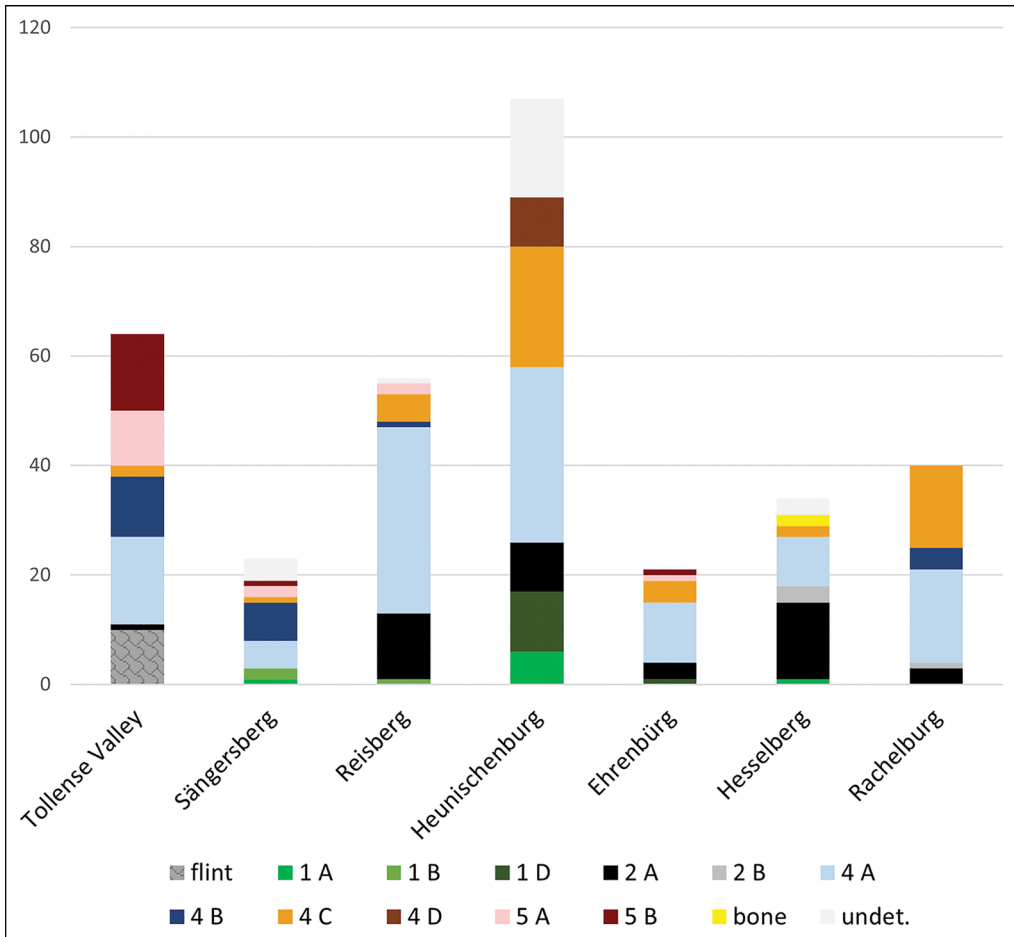


Figure 9. Frequency of bronze arrowhead types reported from the Tollense Valley and different hillfort sites in Hesse (Sängersberg) and Bavaria (Reisberg, Heunischenburg, Ehrenbürg, Hesselberg, Rachelburg) (figure by Leif Inselmann).

are most frequent. More bronze arrowheads were found at the Bavarian hillforts of Reisberg (n = 56), Ehrenbürg (n = 21) and Hesselberg (n = 33), each showing a similar mixture of socketed (4A/C) and spherical tanged specimens (2A) (Ostermeier 2012: 306–9, fig. 86; 321–36, fig. 163; 149–355, fig. 185).

The different sites show the parallel use of different types of bronze arrowheads, as do several well-equipped graves such as those at Behringersdorf in southern Germany. While this might point to a certain functional distinction of types or to personal preferences, mapping of the types shows clear regional distributions which cannot simply be explained by functional purposes. No noteworthy difference in penetrative power was observed in experiments with flint and bronze arrowheads (Lessig-Wehler 2010: 158–9; Lidke 2020: 74). Instead, the preference for each material is most likely due to the regional availability of each material, and the distribution of reworked arrowheads of type 5B supports this view. If the use of different arrowhead types was tied to function, we might expect to see all types appearing in every



region together, including among burials and single detector finds, which is not the case. Instead, the type with the most apparent functional distinction—arrowheads with side spikes—does not appear in the northern regions at all. However, further research in the practical differences of arrowhead types is desirable.

Types 5A and B are suggested to be arrowheads circulating in the north. At Säengersberg in the upland zone of Hesse as well as at Reisberg and Ehrenbürg, a few examples are present, while they are absent at Rachelburg and Hesselberg further south. Arrowhead type 4A is present in the north in a few cases only, including the Tollense Valley, and is more typical of southern sites. Bronze arrowheads, which—except in the Tollense Valley—are absent in northern Germany (types 4C, 2A and to a certain degree 4B), become more frequent moving south. Tanged arrowheads with flat cross-sections (type 1, see Figure S3), which appear at Säengersberg as well as at Heunischenburg, are completely absent from the Tollense Valley and possibly represent a western-influenced type similar to the much younger type 4 D (with double-spurs), which is also found at Heunischenburg but not in the Tollense Valley.

Overall, our analysis of arrowhead distributions across Central and southern Northern Europe allows us to define three categories of arrowheads in the Tollense Valley: those of clear local origin (flint arrowheads;  $n = 10$ , probably underrepresented), types sometimes present at sites in the north (types 4A, 5A and B;  $n = 40$ ) and types typically unknown in the north (type 2A, 4B and 4C;  $n = 14$ ).

#### *Distribution of arrowhead types in the Tollense Valley*

The distribution pattern of the different types of bronze arrowheads in the valley shows some variability (Figure 10). Weltzin 24, a site with almost no human remains about 1.5km further north from the main site, shows almost 50 per cent of potential regional bronze arrowheads (type 5). At the main site (Weltzin 20) the types of possible regional origin (type 5) dominate the bronze arrowhead assemblage. Shortage in bronze arrowhead supply in the north may explain the more frequent reuse of bronze arrowheads evidenced by type 5B. These are found together with some flint arrowheads, which are probably also of regional origin. The pattern is less pronounced for sites Weltzin 32/Wodarg 25, which belong to the same find concentration in the river. Here, close to half of the bronze arrowheads are of type 5 and, including the flint arrowheads, the 'regional specimens' represent more than 50 per cent. The rest of the bronze arrowheads at these sites are of types 4A and 4B. These types are less common or absent in northern Germany (see above) but more frequent at the next site further upstream (Wodarg 32), where one of the barbed bronze arrowheads (type 4C) was also present. The second barbed bronze arrowhead was found at the next site further south (Weltzin 28). Only a small number of bronze arrowheads was recorded at Weltzin 28 and, again, non-regional types prevail.

Downstream sites (Weltzin 20 and Weltzin 32/Wodarg 25) may therefore be seen to be dominated by regional types (bronze arrowhead type 5 and flint arrowheads) (Figure 10). Further upstream (sites Wodarg 32, Weltzin 21 and 28) uncommon or non-local bronze arrowheads (type 4) are more frequent and only here do the foreign barbed bronze arrowheads (type 4 C) appear.

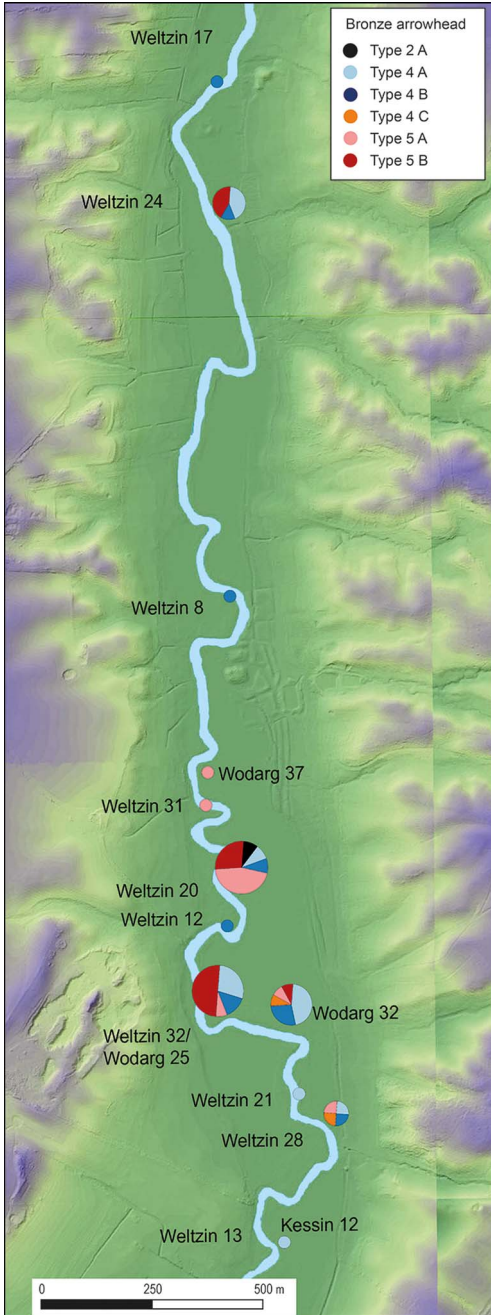


Figure 10. Frequency of bronze arrowheads by type found at different locations in the Tollense Valley (map by Leif Inselmann; graphs by Leif Inselmann & Thomas Terberger).

If a single large event was responsible for many of the finds in the valley, this pattern might describe the course of a fight between a local and an incoming non-local group and possible later activities connected to the conflict. At Weltzin 20 the dominance of regional arrowhead types, including the specimens perforating bones, leads to the hypothesis that the more than 90 individuals preserved at the site mostly represent the incoming group. The same can be suggested at Weltzin 32, although here it is less clear. The sites upstream (Wodarg 32, Weltzin 28) might be interpreted as an area where the regional group was attacked, or where projectiles from the incoming group ended up in the river. In the latter case, the finds might represent later offerings at the river, particularly as they include dress pins and a scrap metal hoard at Weltzin 28 (Uhlig *et al.* 2019).

Examination of the distribution of arrowhead types supports and builds upon previous evidence that the Tollense Valley was the site of a clash between two parties in the Bronze Age. One group was probably of local or regional origin, testified by the presence of flint and type 5 bronze arrowheads. The occurrence of non-regional bronze arrowhead types (4C and 2A, and potentially also 4A, 4B and 5A), as well as further items that point to a southern Central European origin (see below), complements strontium isotope data (Price *et al.* 2019) in suggesting that the second group were non-local.

Burial 5 of Behringersdorf from Bavaria dated to Bronze Age D (c. 1300 cal BC; Hundt 1974–75; Eckhardt 1996: Nr. 20) provides an excellent example of how foreign bowmen or warriors in the Tollense Valley might have been equipped. A quiver with seven bronze arrowheads and a sword of Riegsee type were documented in the

grave. All arrowhead types present in the burial (one type 2A, three type 4A, one type 4C and two type 5A) are also recorded in the Tollense Valley, and the wooden shaft remains have a rectangular cross section that echoes the shaft fragment from Weltzin 28 (see above). Further graves with such arrowheads can be mentioned (e.g. Eckhardt 1996: 242 Gädheim, 251 Langendiebach, 245 f Steinheim am Main).

### *Foreign artefacts from the Tollense Valley*

It is striking that a number of artefacts from the Tollense Valley are not local and not common in the Nordic Bronze Age. These include a palstave of Bohemian type from Weltzin 13 (Jantzen *et al.* 2017: fig. 7) and a Riegsee type sword found some distance downstream from Weltzin 20 (Jantzen & Terberger 2018: fig. 8). Gold spiral rings with twisted ends found at Weltzin 32 are more typically found in southern Central Europe (Schmidt 2019). At Weltzin 28, bronze cylinders and dress pins have been found which find clear parallels, respectively, in south-western and south-eastern Central Europe (Dombrowsky 2014; Uhlig *et al.* 2019). Personal equipment, such as the gold rings and dress pins, probably contributed to the personal identity of combatants (see Knöpke 2009) and provide further arguments for the presence of people from more southerly regions.

## **Conclusion**

Previous analyses of strontium isotopes and bronze artefacts have suggested the presence of a non-local contingent in the Tollense Valley assemblage. Our analysis of the arrowheads used in the conflict supports this hypothesis; while heart-shaped flint arrowheads are typical for the Period III (1300–1100 BC) of Mecklenburg-Western Pomerania and some types of bronze arrowheads (4A, 5A/B) do infrequently appear in burials and as single finds in the region, other types (4C, 2A and probably 4B) are absent and find parallels only in regions further south. The distribution of arrowhead types indicates southern Central Europe, in the region of what is today Bavaria and Moravia, similar to the homeland suggested for other bronze artefacts found in the valley. The mapping of finds from Central and southern Northern Europe thus shows that regional rather than function differences are most apparent in the distribution of arrowhead types. One functional difference is that barbed and spurred arrowheads (types 2A, 4A and 4C) are (much) more common in the south, probably indicating that this brutal innovation is southern in origin.

The arrowhead data hint at the presence of foreign fighters in the Tollense Valley, probably deriving from southern Central Europe. This leads to questions about governance, warfare and mobility at the dawn of the Urnfield period in the thirteenth century BC; for the first time not only trade and cultural exchange, but also warfare on a supra-regional scale, can be documented in Central Europe. The approximately 150 recorded individuals from the Tollense Valley are most likely only the tip of the iceberg. Considering that the number of fighters comprised at least many hundreds up to a few thousand (Terberger *et al.* 2018: 116–18), it seems possible that one or several groups/tribes were involved and that this was not just a small raiding war band.

It remains difficult to make a social differentiation based on the finds alone—if this was present at all. Metal helmets and breastplates, the appearance of which in the archaeological record roughly coincides with the date of the Tollense conflict, have not been recovered from the site (cf. Lehoërff 2022: 128). Horse bones and swords—which have been found in Tollense Valley—may indicate the presence of higher-ranking individuals, although it has been argued that there is no marked social differentiation between individuals with or without swords in the funeral evidence (e.g. at Neckarsulm: Knöpke 2009: 256). Further excavations should aim to narrow down the number of combatants involved and questions surrounding the origins of these individuals should be clarified through further scientific analyses.

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## Online supplementary material (OSM)

To view supplementary material for this article, please visit <https://doi.org/10.15184/aqy.2024.140> and select the supplementary materials tab.

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