An early Bronze Age causeway in the Tollense Valley, Mecklenburg-Western Pomerania – The starting point of a violent conflict 3300 years ago?

By Detlef Jantzen, Gundula Lidke, Jana Dräger, Joachim Krüger, Knut Rassmann, Sebastian Lorenz and Thomas Terberger

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Introduction – a violent Bronze Age battle in the Tollense Valley

Since the discovery of weapons and human skeletal remains with evidence of perimortal lesions, there has been much discussion as to whether the Tollense Valley *(fig. 1)* north of Altentreptow (Mecklenburg-Western Pomerania) is the site of a Bronze Age battlefield. The finds, many of which were dated to around 1300–1250 BCE, have since been interpreted as the conclusive remains of a considerable violent event[1]. The archaeological material predominately consists of disarticulated skeletal remains of numerous human beings and several horses, as well as various weapons such as wooden clubs and arrowheads made

[1] Cf. Jantzen et al. 2014; Terberger et al. 2014; Lidke et al. 2015. For Bronze Age warfare in northern Europe in general see Vandkilde 2013.

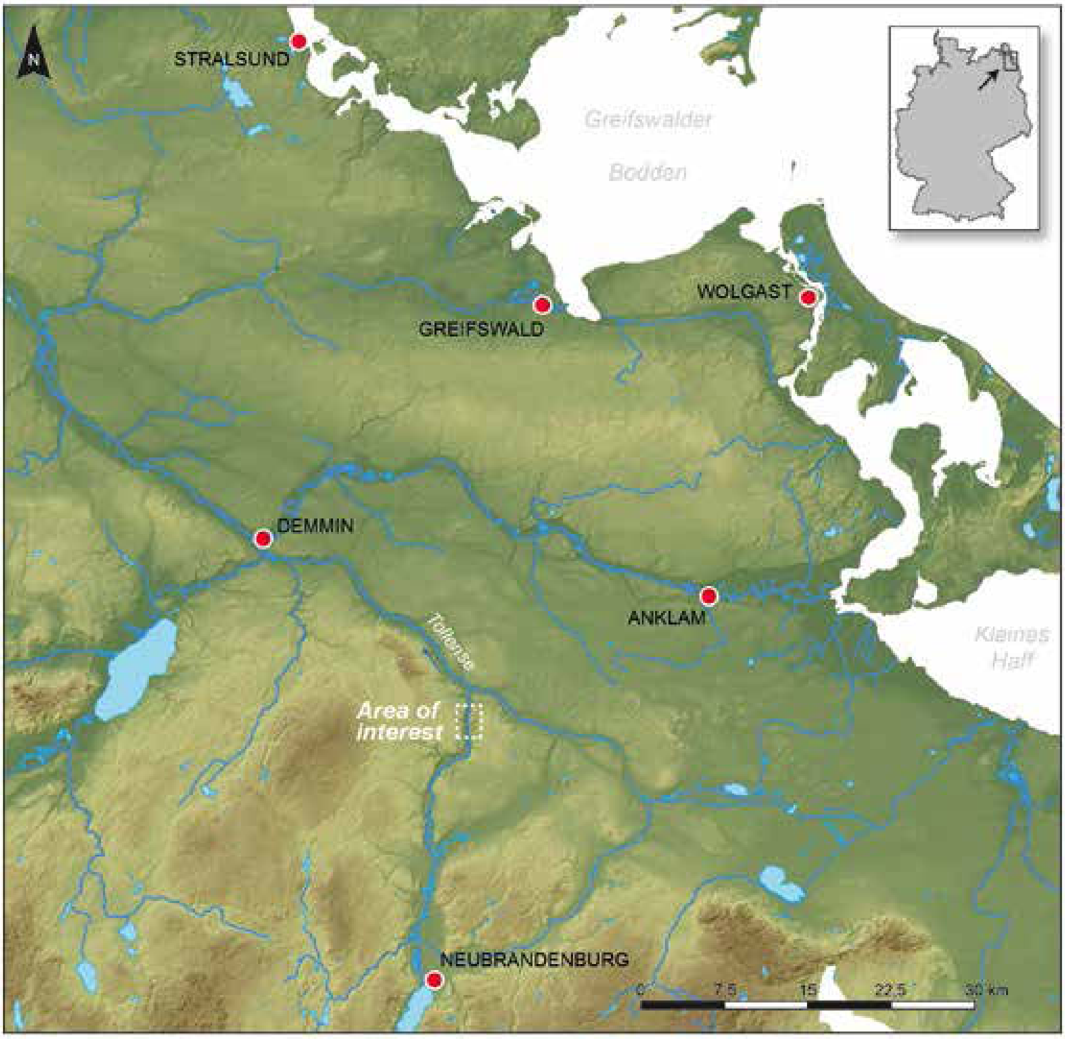

Fig. 1. The Tollense Valley in the Southern Baltic Sea area. Middle reaches of the River Tollense = area of interest (S. Lorenz, using data of the *LAIV Mecklenburg-Vorpommern, © GeoBasis-DE/M-V 2012).*

of bronze and flint. The remains of c. 130 verified individuals are mostly (> 90 % of the individuals), if not exclusively, those of men between the ages of 20 and 40, exhibiting a noticeable number of injuries[2]. Preliminary assessments estimate that more than 2500 warriors could have participated in the battle[3].

[2] While some of the skulls were morphologically identified as belonging to female individuals, all of the pelvic bones uncovered from the excavation layer were conclusively attributed to male persons (Brinker et al. 2014).

[3] Assuming that we are dealing with a one-off scenario, that approximately 20 % of the individuals affected have been found up to now, and that c. 25 % of all participants were fatally wounded, a number of more than 2500 warriors can be estimated to have fought in the battle (cf. Terberger et al. 2014; Brinker et al. 2014). Taking into account a possibly higher percentage of individuals already recovered, and/or a higher death rate, lower numbers are also possible.

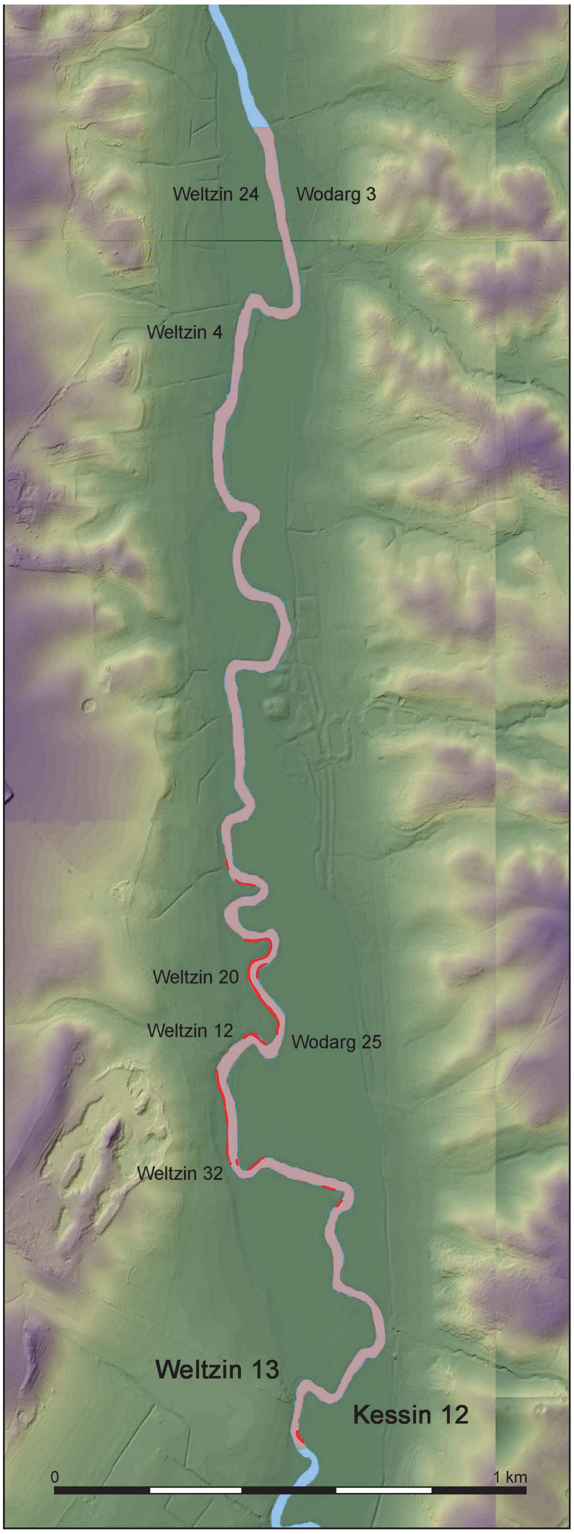

Fig. 2. Important sites in the Tollense Valley. Light red: extension of human bones in general, including stray finds; dark red: recorded find layer with human bones. (J. Dräger, using data of the *LAIV Mecklenburg-Vorpommern, © GeoBasis-DE/M-V 2012).*

The distribution of the archaeological layer(s) with material from the period stretches across an area of more than 2.5 km (linear distance) in the river valley, from the archaeological sites Weltzin 4 and 24 to the north, upstream of Weltzin 13 / Kessin 12 to the south *(fig. 2)*. The various archaeological sites exhibit important similarities as well as clear differences. The main archaeological site (Weltzin) is characterised by the vast number of human remains, together with (fewer) horse bones, found c. 1–1.5 m below surface level, accompanied by weapons, including wooden clubs as well as flint and bronze projectiles. Otherwise only a few inconspicuous individual finds were made. The site of Weltzin 32, situated to the south *(fig. 2)*, presents a different picture: while numerous human remains were found as well – here some 2.5 m below surface level, and again paired with projectiles[4] – remarkable metal objects were also recovered, probably part of the warriors' belongings[5]. The diverse composition of finds seems to reflect the accessibility of the fallen warriors: reachable corpses were probably looted at both sites and perhaps even thrown into the water, whereas at Weltzin 32 several individuals could not be looted because they had fallen into the river. Ritual activities are also possible in this context.

The closer characterisations of the sites, along with the anthropological and scientific analyses, are important elements for the development of a possible scenario of the events[6]. The more southerly, upstream section of the valley, which includes the sites of Weltzin 13 / Kessin 12, plays an important role in the reconstruction of the events as well as the context of the conflict. Here, new findings imply a valley crossing, which may have been the starting point of the battle. This contribution presents results obtained to date at this key site in the Tollense Valley.

The archaeological sites of Weltzin 13 and Kessin 12 – the first finds

Since the beginning of systematic research in the valley, one of the most important tasks of the fieldwork has been to identify the beginning of the archaeological layer with human remains in the river valley, thereby gaining an indication of the starting point of the battle. In this context, the narrow section of the river valley, where the sites Weltzin 13 (western bank) and Kessin 12 (eastern bank) lie, increasingly came into the focus of research *(fig. 3)*.

Dredging operations carried out to deepen the bed of the River Tollense took place mainly in the 1980s. Sediments from the river that were deposited beside it at the archaeological sites mentioned above had already yielded several bronze objects by 2007 when they were surveyed with metal detectors. Among these were a fragment of a socketed object, three semi-finished, partly decorated armrings, the bow of a Mecklenburg plate fibula, a strap-shaped bronze fragment, a fragment of a sword blade, as well as a grip-tongue knife *(figs. 4.1–8)* and a socketed arrowhead[7].

Diving surveys conducted since 2008 have resulted in the localisation of human and animal skeletal remains here as well[8]. AMS dating of the animal and human bones showed that this area was apparently frequented consistently from the Neolithic (from around 3000 BCE) up to the Middle Ages *(table 1)*, but finds from the "battlefield horizon" around 1300/1250 BCE figure prominently among the material. This accumulation of

[4] According to the dating results for wooden arrowshaft remains, a flint arrowhead found in situ between bones and several socketed bronze arrowheads found in dredged sediments belong to the Bronze Age find layer.

[5] Cf. Krüger et al. 2012.

[6] Cf. Jantzen et al. 2011; Terberger et al. 2014; Lidke et al. 2015.

[7] Ulrich 2008.

[8] Brinker et al. 2010.

Fig. 3. Aerial view of the Tollense Valley from the north at the sites Kessin 12 (eastern riverbank, here seen to the left) and Weltzin 13 (western riverbank, to the right). White dots: position of the causeway, red rectangle: approx. area of *figure 6* (photo: S. Lorenz).

Fig. 4. Sites Kessin 12 / Weltzin 13. Bronze objects found during metal detector surveys: 1–3 three semi-finished armrings; 4 fragment; 5 sword blade fragment; 6 knife; 7 fragment of socketed object; 8 bow of a Mecklenburg plate fibula. – Bronze objects detected during underwater surveys: 9 needle of a Mecklenburg plate fibula; 10 fragment of a semi-finished armring; 11 sickle fragment; 12 fragment of a socketed object (photo: G. Lidke).

Fig. 5. Site Weltzin 13. Remains of a wooden construction under water by the east riverbank (photo: A. Grundmann).

finds, which developed over a long period of time, raises the question of whether this part of the valley offered a convenient crossing of the river valley; a hypothesis supported by the discovery of oak piles located during a diving survey in 2008, together with human skeletal remains. A dendrochronological date of 1301 BCE indicates a close correlation between these piles and the Bronze Age (period III)[9].

Archaeological diving surveys

In 2012, the systematic exploration of the surrounding areas of the dendrochronologically dated piles in the River Tollense (site Weltzin 13) commenced[10]. During the diving expe-

[9] Schanz 2008.

[10] We would like to extend our warmest thanks to the members of the Association for Underwater

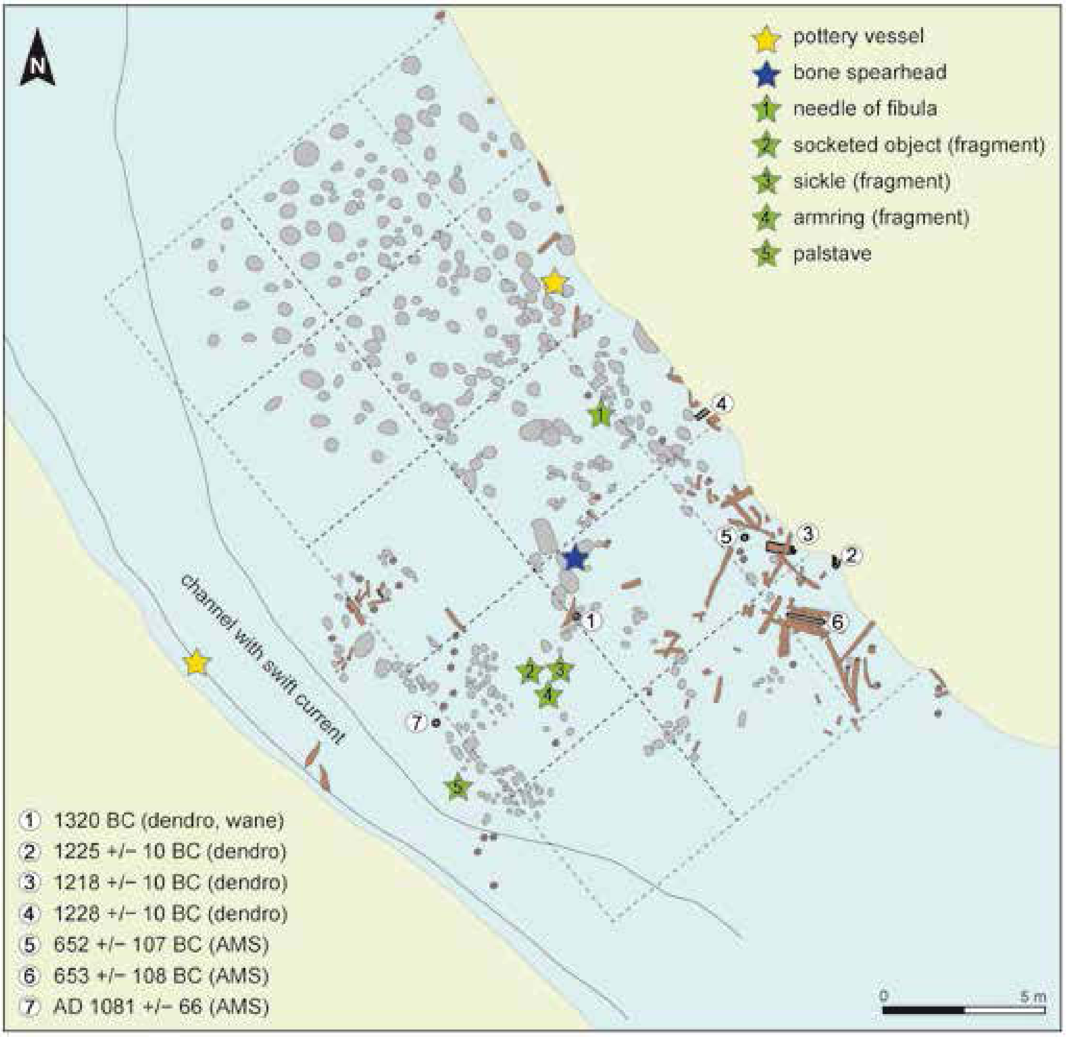

Fig. 6. Site Weltzin 13. Location of finds. The positions of bronze objects and dated wooden remains are marked (J. Dräger, after drawings by J. Krüger).

ditions more posts were found, and a structure consisting of horizontal and upright timbers was also documented on the eastern bank of the river *(figs. 5–6)*.

These wooden elements probably belonged to two different constructions; however, whether they were connected remains unconfirmed. A marl ridge scattered with boulder debris and rubble divides the sections of the river with the timber finds. From the west bank, three parallel rows of posts can be reconstructed over a stretch of 7 m, running diagonally into the present river bed. One of these can now be followed over 17 m to the eastern bank of the river. The posts consist of small stakes (average diameter: c. 5–7 cm) as well as split trunks; a stake removed for sampling had been sharpened at the bottom

Archaeology (Landesverband für Unterwasserarchäologie), Mecklenburg-Western-Pomerania, who participated in the surveys, in particular Sonja and Frank Nagel and Andreas Grundmann.

Fig. 7. Site Weltzin 13. Bohemian palstave in situ under water (photo: J. Krüger).

– presumably with an axe. The result of an AMS dating of one of the posts falls in the 11th century CE *(table 1)*, thus suggesting a much later date for parts of the structures.

The remains documented in the section from the middle of the river to the east bank have different characteristics. Wooden elements, consisting of horizontal timbers as well as upright posts, were discovered extending over a distance of 20 m along the east bank, protruding from it. Round timbers with an average diameter of 15 to 20 cm were used as posts. In addition, there were also a number of split planks that had been worked into irregular quadrangular cross-sections. Longer timbers were made by splitting trunks, in some cases oak, and the worked planks are up to 3 m long. Some of them display construction features such as carved grooves and quadrangular notches. In one case the timbers are still connected to one another: two split planks with a length of around 1.6 m and a width of 21–22 cm remain embedded in the sediment. Planks of similar size and smaller round timbers lay at right angles to them over a width of about one metre. Small pieces of branches were integrated in this upper layer, presumably to offset any unevenness. The two planks from the lower level, and a board from the perpendicular layer, also display grooves and oblong notches. The construction rests on at least one four-sided split post, made of a plank. Timbers protruding from the eastern bank in three other sections are arranged at right angles to each other, or had mortise and tenon joints.

41 wooden elements were sampled for dendrochronological analysis. Four samples – three timbers from the east bank and a post from the middle of the river – produced results indicating a first period of construction and use sometime around the end of the

14th century BCE (1320 denBC, wane present), and a second period during the last third of the 13th century BCE (1225 +/- 10 denBC, 1218 +/- 10 denBC, 1228 +/- 10 den BC)[11]. This demonstrates that the construction in the east bank was evidently in use when the violent battle described above took place in the first half of the 13th century BCE Results from AMS dating imply another period of use in the 7th century BCE *(fig. 6; table 1)*.

During the diving surveys, two prehistoric ceramic vessels, several more sherds, and a number of bronze finds were discovered in the surrounding area. The bronzes include a Bohemian palstave *(fig. 7)*, a fragment of an armring decorated with linear patterns, a fragment of a knob-sickle, a fragment of a socketed object, and the needle of a Mecklenburg plate fibula *(fig. 4.9–11)*. The latter could be fitted to the fibula bow found on the eastern bank in 2007. The socketed object fragment also fits a piece found in 2007, and they are best reconstructed as parts of a socketed maul, or maybe an anvil[12]. The entire material consists mostly of fragments that are no longer usable; almost all of the objects were perhaps part of a scrap metal hoard disturbed in its context by the dredging operations. The fibula and socketed object were probably already fragmented when the hoard was deposited. It is possible that the palstave and the arrowhead also belong to this hoard; however, these weapons could also be closely connected with the violent conflict.

The posts and the construction in the eastern riverbank, which certainly existed between 1320 and 1220 BCE, could have belonged to a trackway or bridge construction that was repaired or reconstructed over time. The logs and timbers in the eastern bank could have also been used as a platform or a jetty, especially considering that the current course of the Tollense river does not correspond to the earlier riverbed (see below). In order to better understand the documented context of the wooden remains, field work was started in the area.

Geomagnetic surveys

In co-operation with the Romano-Germanic Commission (RGK), geomagnetic surveys of the surrounding floodplain were conducted between 2012 and 2015. During several field campaigns (09/2012, 03/2013, 03/2014, 04/2015) a total area of around 6.6 ha were examined on either side of the river, but concentrating on the eastern bank (Kessin 12) *(fig. 8)*. A 5-channel measurement system from Sensys GmbH was used for this. The surveys were conducted with probe distances of 25 cm in the floodplain and 50 cm on the slopes.

Since the wooden structural remains found by divers on the east bank of the Tollense played a decisive role in the selection of the area to be surveyed, the chances of a successful geomagnetic survey were initially predicted to be fairly low, as wooden remains exhibit a very low magnetic contrast. Thus the discovery of the remnants of a pathway in 2013 at the Kessin 12 site was all the more surprising. The pathway was identified as a linear, east-west orientated feature over a length of about 112 m. In the eastern section of the floodplain towards the valley slope it was distinctly visible in the geomagnetic plan, in places as two rows, but it was less clearly visible in the west *(fig. 8)*. The geomagnetic signature

[11] Letter from K.-U. Heußner, DAI Berlin, from 18.06.2012; DAI-sample-nrs. 66196, 66198, 66200 and 66201. See also Terberger / Heinemeier 2014, 113.

[12] Originally, the possibility of it just being a hammer was contemplated (Ulrich 2008, 25).

Fig. 8. Sites Weltzin 13 / Kessin 12. Results of geomagnetic survey. Marked are trenches 1/2013 (blue), and 1-2/2014 (red) (J. Dräger / K. Rassmann / R. Scholz).

indicated two rows of stones c. 3 m apart, which were later confirmed by excavation. They formed the distinct borders of a pathway in the eastern part of the floodplain. Towards the west, nearer the River Tollense, the rows are no longer visible.

This linear track, which according to dating results was built in the Early Bronze Age, does not have any obvious direct relation to the Middle Bronze Age wooden construction found during diving surveys at Weltzin 13 *(fig. 9.2)*. The magnetograph, however, indicates a barely visible anomaly *(fig. 9.3)* diverging from the trail and leading towards the findings documented by the divers. The younger structure, now situated in the riverbank, could represent a change in the direction of the pathway, and thus indicate a later route that diverged south-west towards the River Tollense. The abandonment of the early Bronze Age east-west track, and the construction of a more southerly river crossing, could corre-

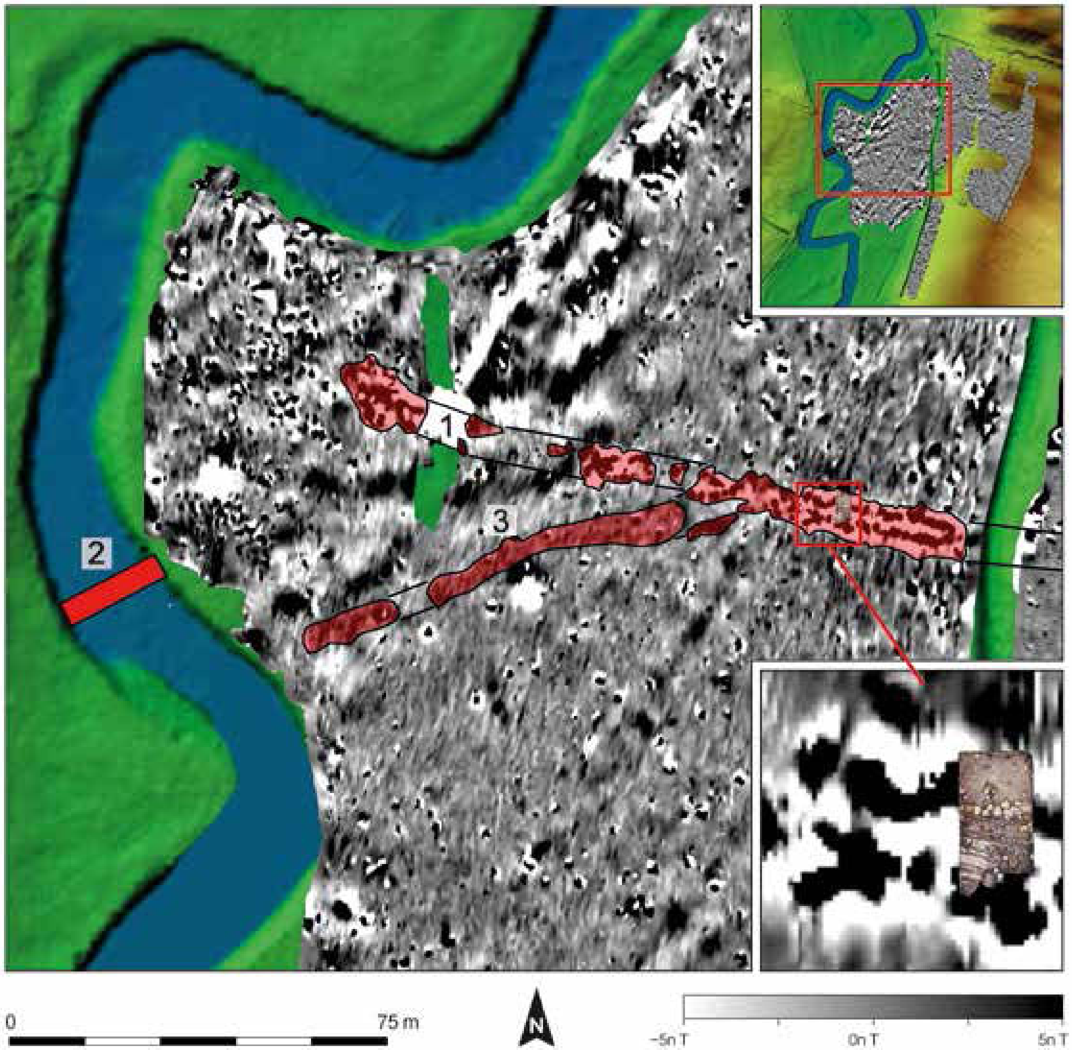

Fig. 9. Site Kessin 12. Results of geomagnetic survey 2014: structures in the floodplain with the anomaly diverging from the line of the causeway. The areas of trench 1-2/2014 (1) and trench 1/2013 (inset bottom right) are also marked (K. Rassmann / R. Scholz).

late to changes in the course of the river caused by erosion. In a linear extension of the east-west track, the riverbed of the Tollense is markedly deeper today (in some sections more than 2 m) than in the area slightly to the south where the wooden construction remains found by the divers lie. In this section a marl ridge marks a seasonally shallow area that is better suited to hold the pile foundations of a bridge construction *(fig. 6)*.

On the western and eastern slopes of the valley, more structures are visible that might be connected with the trackway. Consisting of several linear anomalies with very small measurement dynamics (between -0.5 and -1.5 nT), they are particularly clear on the eastern slope of the valley *(fig. 10)*, where they fan out from the pathway localised on the floodplain. Areas with the gentlest gradient were favoured and these paths were probably not as elaborately constructed as the one in the lowland area.

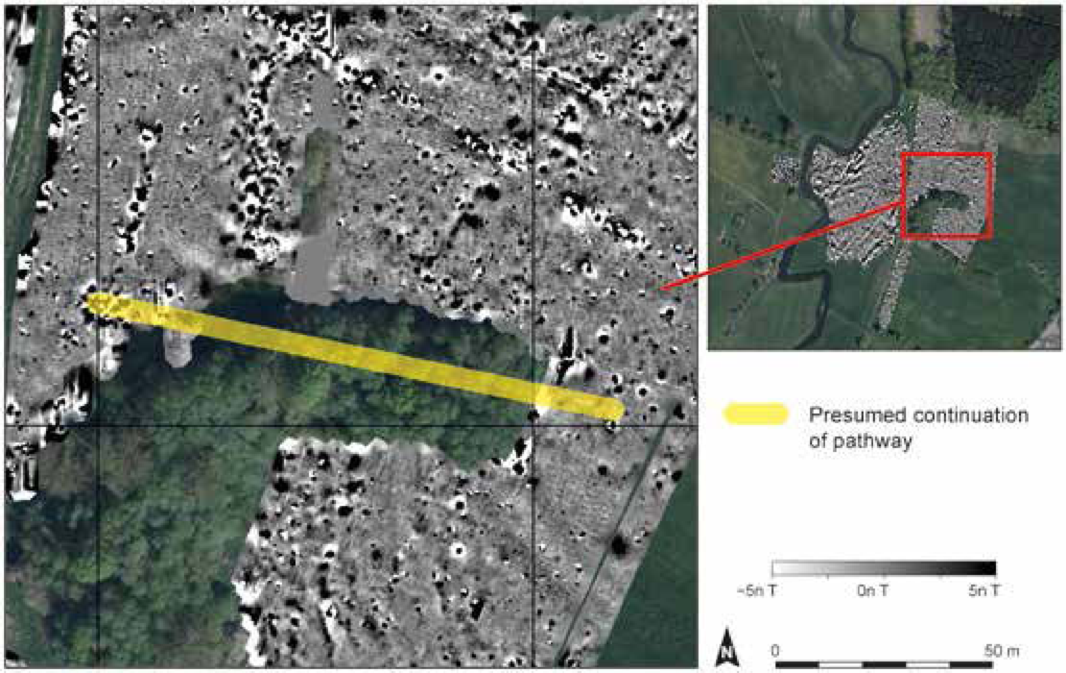

Fig. 10. Site Kessin 12. Results of geomagnetic survey: structures on the eastern slope (K. Rassmann).

A dark, north-south orientated anomaly in the floodplain was first interpreted as a possible earlier river channel; however, this was not confirmed by drill samples and excavation (see below).

The results of the geomagnetic survey show clearly that pathways and tracks in wetlands are easiest to discover where associated stone constructions are present. Differences in sediment, such as the embankment of the track or deposits from flooding, provide a less clear picture. Wooden remains are not recognisable in the geomagnetic plan. It is therefore important to note that the areas with the best opportunities for surveys are not the ones in the floodplain, but those at the periphery, in the transitional area of the valley slopes.

Excavation results

A first test trench measuring 5 × 3 m (Trench 1/2013; *figs. 8* and *11*) was opened in April 2013 on the northern side of the two-rowed linear structure (Kessin 12). Just 0.25 m below the surface (c. 5.50 m a. s. l.), a dense packing of middle-sized boulders and rubble became visible. Some wooden remains, slight discolourations of the soil (post-holes?) and a fragment of a pig mandible were discovered at the edges of the stone packing[13]. The extension of the excavation to the south revealed a second area of smaller stones. Beneath these two layers, two parallel rows of stones, partly made up of large boulders, set at intervals of roughly 3.2 m were detected. Between and close to the rows of stones, several

[13] The jaw fragment likely comes from a domestic pig. Kind information by N. Benecke, DAI Berlin.

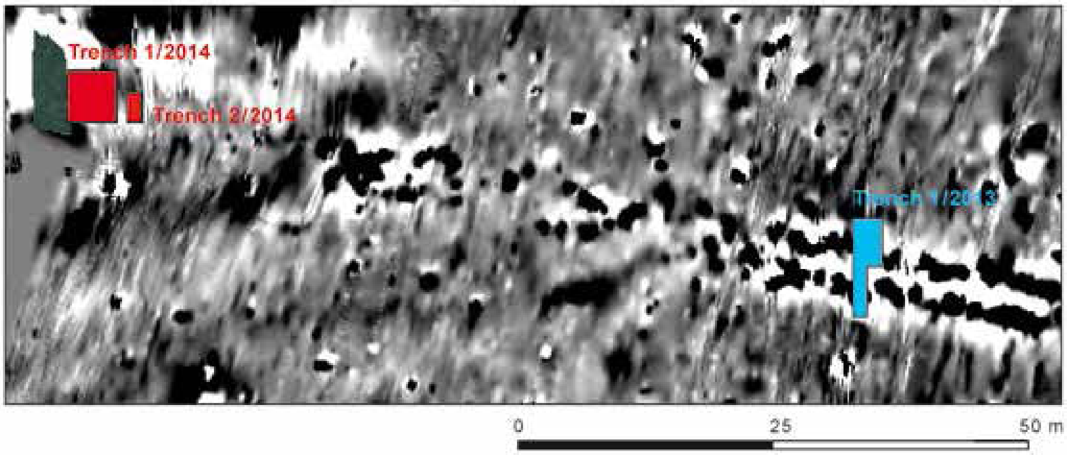

Fig. 11. Site Kessin 12. Location of trenches 1/2013 and 1–2/2014 (J. Dräger).

Fig. 12. Site Kessin 12. Trench 1/2013: archaeological layer with horizontal timbers between two rows of stones (photo: G. Lidke).

horizontal timbers and other wooden remains, as well as an occasional sand infill were also noted. In the deepest layer, c. 0.5 m beneath surface level (5.25 m a. s. l.), the structure could be observed in full *(fig. 12)*. Between the two rows of stones, which partly consisted of carefully arranged large boulders, several badly preserved timbers were observed which had originally been laid lengthways. Only in the south-eastern part of the trench did a few soft, heavily compressed transverse timbers survive. Between the rows of

Fig. 13. Site Kessin 12. Trench 1/2014: sand and turf embankment, seen from the east (photo: G. Lidke).

stones, and in some places over the wood, a thin layer of sand and turf could be documented.

The two-rowed structure seen in the geomagnetic plan can therefore be interpreted as a trackway, 3–3.2 m wide at the base, constructed of sand and turf over a wooden structure, and flanked by two rows of stones. The finds uncovered during excavation – some animal bones in the upper layers of the embankment and small, insignificant flint remains – did not provide clear evidence as to the age of the embankment. The first absolute dates surprisingly indicated an early Bronze Age context (see below).

An additional trench was opened in 2014, c. 80 m to the west, at the edge of an area which was then still interpreted from the geomagnetic plan as an interruption in the pathway (Trench 1/2014; *fig. 11*). Apart from the investigation of the construction of the embankment at what was thought to be its termination, a further aim was to examine whether the dark areas seen in the geomagnetic plan really indicated a former river channel. In the 5 × 5 m excavation, the first indications of two rows of upright posts could be seen c. 0.4 m below surface level (c. 5.2 m a. s. l.). A layer of sand, initially c. 2.2 m wide, was located between the rows. After further excavation, the layer of sand, which had been built up to form an embankment, became clearly visible. It was flanked on its northern and southern sides by numerous posts, including several with an average diameter of up to c. 20 cm *(fig. 13)*. At the highest point of the embankment on the western side of the trench a few timbers were uncovered at the top of the sand layer. The uppermost one, which was badly preserved, lay lengthwise, almost in the centre of the embankment, and covered three parallel timbers that were arranged to lie across the path. As the excavation advanced, the timbers could be documented in their original position *(fig. 14)*, and more timbers laid lengthways emerged, continuing into the west profile. Other wooden

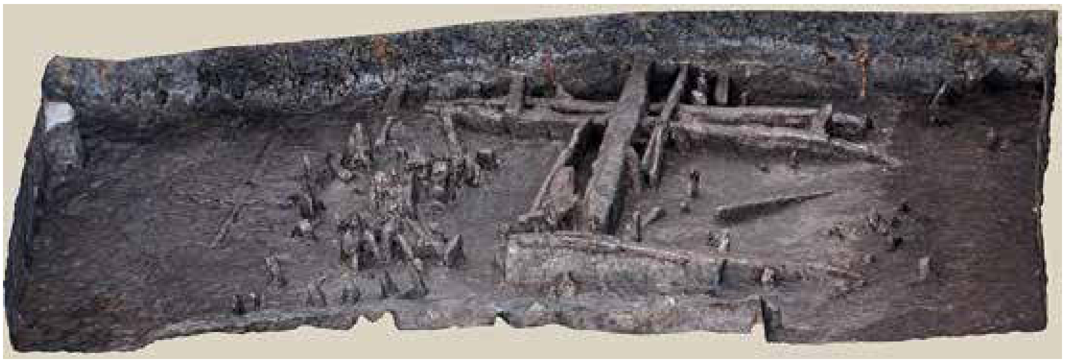

Fig. 14. Site Kessin 12. Trench 1/2014, western area: 3D-view of wooden remains after removal of embankment (C. Hartl-Reiter, based on photos by G. Lidke).

elements found in this area could not be attributed to any obvious construction, and were possibly used to stabilise the subsurface. Stones were not part of the construction here.

Most of the approximately 300 upright posts in this trench were found in the eastern part, where the deposits of sand and turf were initially less distinct. As in the western part, stones were also not used as construction material. Five medium sized boulders which were discovered in between the wood were probably used to ram in the posts, as is perhaps indicated by the damaged tips of several posts *(fig. 15)*. A few timbers that were found in this area were not part of the construction, and so were possibly used as filling or stabilising material along with tightly packed, shorter elements.

At its base, the causeway was between 3.0 and 3.2 m wide in both the east and west sections. An interesting find was discovered in the west of the excavation area: here, beneath the large, horizontal timbers, a piece of bark (birch) measuring approximately 1.3 × 0.4 m, which had been pierced by thin posts, was found. It is unclear whether it was perhaps used to help secure the posts, or merely served as padding. Directly beneath this, a heavily corroded copper flat axe[14] was discovered *(fig. 16)*. In the north-western corner of the trench, 30 cm deeper, in the peat next to the embankment, an antler tip came to light. In the south-eastern corner, a poorly preserved horse bone was found next to the posts, but outside of the sand filling. Trench 2/2014, situated just 1 m further east[15], yielded several more equally poorly preserved horse bones next to individual posts in the sand layer. Only a few horse teeth lying close to each other were found in better condition.

In the south-western part of trench 1/2014, a further interesting discovery was made. Here, a piece of wickerwork was documented in the peat on the edges of the sand

[14] According to a Spektro-X-Lab-Analysis on its surface conducted at Lower Saxony State Office for Cultural Heritage, Hannover, the material consisted of 89–95 % Cu and < 0.5 % Sn. We would like to thank R. Lehmann, TU Hannover, for conducting the measurements.

[15] Trench 1/2014 was originally dug to test the hypothesis that the discolouration seen in the 2013 geomagnetic plan represented an old meander of River Tollense. As this was not confirmed by the excavation, trench 2/2014 (3 × 1.5 m) was placed just 1 m to the east (see *figs. 8* and *11*) to follow the hypothetical "channel". While no river sediments were found, the continuation of the embankment in form of sand / turf deposits was observable.

Fig. 15. Site Kessin 12. Trench 1/2014: bent tip of a post (photo: G. Lidke).

Fig. 16. Site Kessin 12. Trench 1/2014: copper axe (indicated by red arrow) *in situ* (photo: G. Lidke).

Fig. 17. Site Kessin 12. Trench 1/2014: hurdle-like wickerwork (photo: J. Dräger).

embankment *(fig. 17)*. It consisted of two larger parallel wooden elements (roughly 40 cm apart) and numerous thin sticks fixed at right angles, creating a type of mat or rug approximately 1.4 × 1 m in size. It was perhaps (part of) a construction to stabilise the slope, but might also have been a tread mat that had slid downhill over time. Similar, though larger constructions – so called hurdles – are known from the Iron Age site of Killoran in the Derryville Bog in Ireland (400 BCE – 0), where they were used to traverse boggy surfaces[16].

Dating of the causeway and determination of wood species

As the 2013 material did not yield any clues to the chronology of the causeway, its age had to be determined by AMS dating. A sample taken from a timber (HP 11/2013 = timber 7), discovered parallel to the northern row of stones, yielded an age of 1730–1630 calBC (Beta-350974, cf. *table 1*). The causeway was thus assigned to the Early Bronze Age (Period IIA)[17].

Three additional samples, taken from a vertical stake (HP 21/2013 = stake 5, Poz-59403; 1936–1780 calBC), an additional timber (HP 8/2013 = timber 13, Poz-50404;

[16] Stuijts / Gowen 2003, 20–22.

[17] For a chronology of the Bronze Age in Mecklenburg-Western-Pomerania: Rassmann 2004 Abb. 2; for the Nordic Circle including other regions, see also Randsborg / Christensen 2006; Holst 2012a with fig. 3.

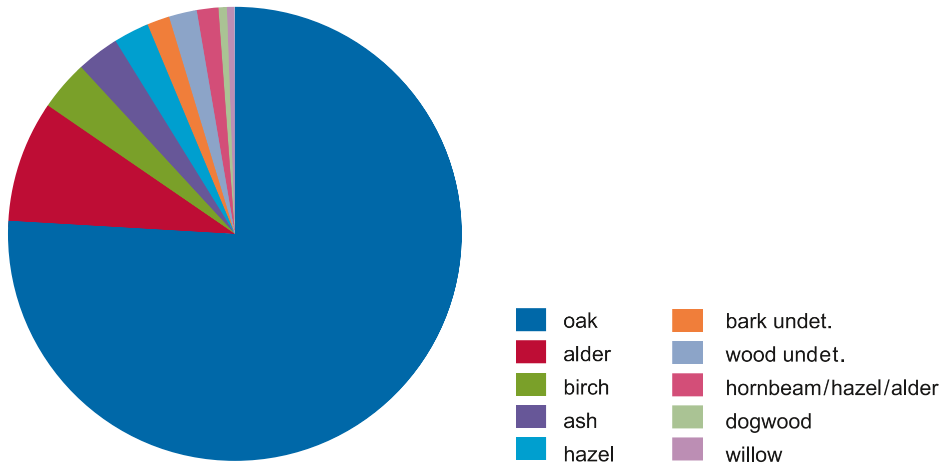

Fig. 18. Site Kessin 12. Determination of wood species sampled 2013–2014 (n = 195) (M. Schult).

2112–1936 calBC) and the only sizeable crossbar (HP 9/2013 = timber 20, Poz-59406 ; 2007–1888 calBC) indicate an even earlier date. Taking into account that larger timbers can be liable to an old wood effect, the age of the thin stake (stake 5) should come closest to the actual time when the embankment was built. And indeed, this sample turned out to be a little younger, indicating that the causeway was built in the 19th century BCE.

Dendrochronological examination of some of the timbers, carried out by K.-U. Heußner (DAI Berlin), produced only one result (HP 11/2013 = timber 7); the date of around / after 1828 denBC corresponds well with the AMS results[18].

Five wood samples from trench 1/2014, situated further west in the floodplain, were also AMS dated *(table 1)*. Two of the timbers were from the construction in the western part of the excavation area. The timbers that were set at right angles to each other (HP 14/2014 and HP 19/2014) yielded dates of 1891–1775 calBC (AAR-21102), and 1871–1696 calBC (AAR-21103), respectively, and thereby seem to indicate a somewhat younger construction than the one from trench 1/2013. Three samples from the eastern profile section – two horizontal timbers from different levels of the embankment (HP 167/2014 and HP 169/2014), as well as an upright post (HP 166/2014) – delivered similar results of 1910–1778 calBC (AAR-21105), 1877–1753 calBC (AAR-21106), and 1931–1782 calBC (AAR-21104). They are in accordance with the presumed construction phase of the causeway in the 19th century BCE. As yet, it is not possible to discern different building phases.

[18] Pers. communication K.-U. Heußner, December 2014. The dendrochronological sample (timber 07=HP 11/2013) first yielded a result of c. 2727 denBC (DAI 73471), a date considerably older than the one from AMS dating on the same timber. In a follow-up examination the sample came up with a result of c. 1828 denBCE, corresponding nicely with radiocarbon results measured in Poznan on other wooden samples from the trackway. The result measured by BETA Analytic therefore seems to have turned out a little too young.

A horse tooth found directly on the embankment in trench 2/2014 was also AMS dated. The results of 1257–1131 calBC (AAR-21703; *table 1*) indicate a connection with Period III and possibly also with the context of the battlefield. The causeway seems to have been in use over a long period of time.

Of the 195 wood samples analysed (2013: 23; 2014: 172), three quarters were identified as oak, while the remaining samples were of alder, birch, ash, hazel, hornbeam, cornel/dogwood and willow *(fig. 18)*[19]. In trench 1/2013, oak had been used exclusively as construction material. A somewhat more extensive spectrum of species was observed in trench 1/2014. However, here too oak (74.4 %) dominated, particularly for upright posts and horizontal timbers, followed by alder (9.9 %), birch (4.1 %), ash (3.5 %) and hazel (2.9 %). As for longer elements, alder, birch and hazel timbers were only noted in individual cases. Oak was thus specifically used as a durable, solid construction material.

Geoscientific work

For the pathway area and the bordering slopes, grid mapping of the results of 47 drillings was carried out. Drills 60–80 mm in diameter were used to sample down to where the minerogenous bottom of the valley was reached. All samples were recorded sedimentologically and pedologically according to the guidelines for pedological mapping[20]. The valley bog areas that had at some time been affected by the course of the River Tollense show the following standard sediment sequence from the base to the surface: glaciolimnic silt; glaciofluvial sand or gravel, partly half-bog soil in the overlying stratum; alternating sequences of fluvial sands and mollusc-rich organic silts; reed-sedge peat, heavily mineralised in the uppermost metre. The mollusc-rich alternating sequences are absent in bog areas not influenced by the river; here, reed-sedge peats formed instead. The depth of the minerogenous bottom of the valley (max. 580 cm below present surface level), the thickness of the fluvial sediments (max. 370 cm) and of the low-moor peats that form the surface (max. 328 cm), as well as of the entire bog (max. 580 cm) were all determined according to the stratigraphic records. In seven drillings the sand body of the causeway could be identified in the upper peat levels. On the slopes of the valley, outside of the main body of the bog, drilling was used mainly to document colluvial sediments and palaeosols.

The profile of the minerogenous base of the valley reveals a channel cut 2 m into the floor of the valley, broadening from south to north *(fig. 19 A)*, that most likely was the result of meltwaters during the late Weichselian glaciation. This channel is an essential feature of the Holocene development of the valley. *Figure 19 B* illustrates that the distribution of the fluvial sediments is closely connected to it. Today, the River Tollense runs at its most westerly edge, while it meandered within this channel during the Holocene[21]. The bog layer is thickest in the eastern part of the meltwater channel *(fig. 19 C)*. Taking into account the fluvial transformations and the standard profiles of the Tollense valley bog[22], three sections of the route taken by the causeway across the valley can be distinguished *(fig. 19 D)*.

The eastern half of the bog documented here is not influenced by the river. It is in this area that the pathway is best visible in the geomagnetic plan *(fig. 19 D3)*. The transition to

[19] We would like to thank M. Schult, University of Greifswald, for identifying the wood species.

[20] Kartieranleitung 2005.

[21] See Lorenz et al. 2014.

[22] Ibid.

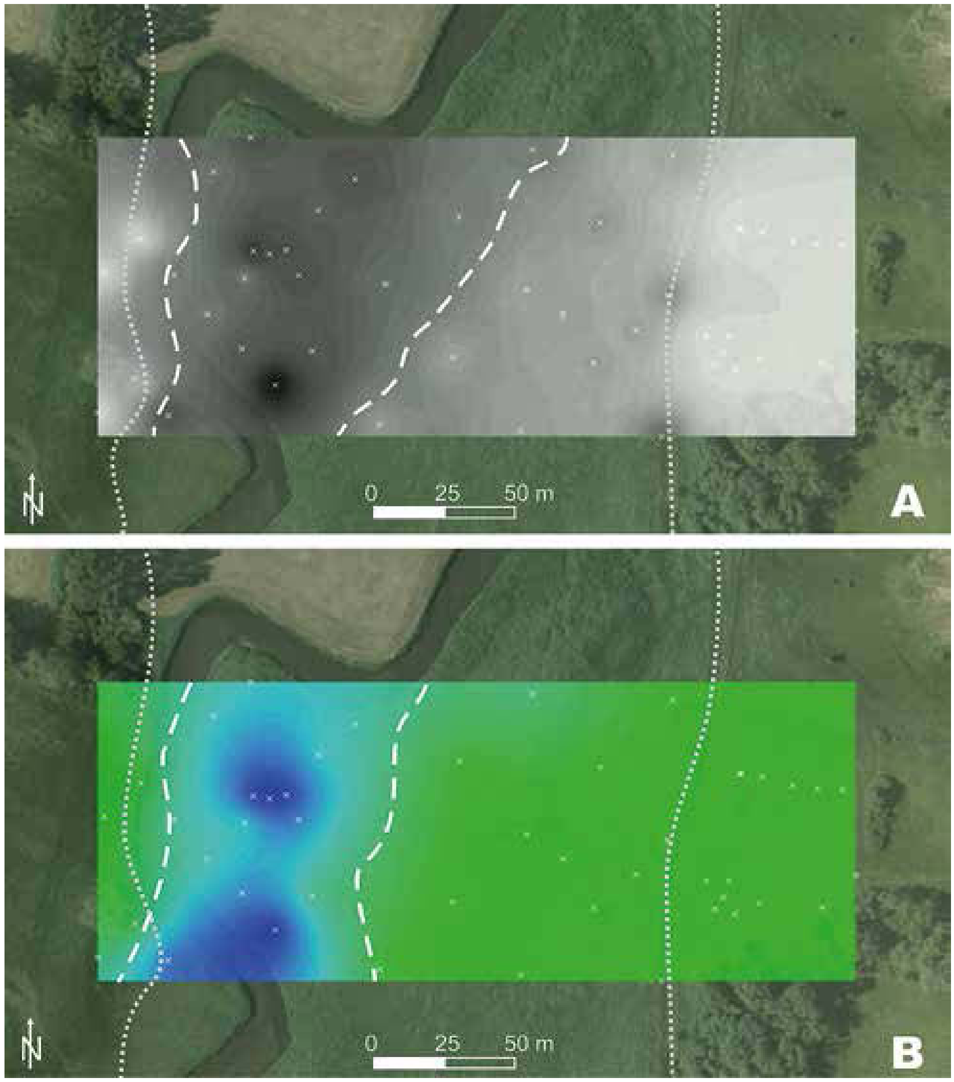

Fig. 19. Results of geoscientific research on bog development in the area of the pathway. The dotted line marks the limits of the bog (representing approx. the 6 m-contour line). – **A** Depth of the minerogenous base of the valley. A meltwater channel, cut 2 m deep into the valley bottom and broadening from south to north to a max. of 140 m, is visible. – **B** Distribution of fluvial sediments, indicating former river courses. The width of this corridor marks the meandering range of the River Tollense during the Holocene, with fluvial sedimentation thicknesses of 30–370 cm.

the fluvially influenced area with the greatest bog and peat thickness is not clearly discernible *(fig. 19 D2)*. As the fluvial deposits are covered by at least 1 m of reed-sedge peats, the channel probably silted up as early as the Bronze Age. The position of the riverbank, the sediments of which cannot be distinguished sedimentologically, remains unclear. The meander probably shifted successively to the west, and the point-bar silted up. The western slope of the valley *(fig. 19 D1)* shows boggy deposits towards the south of the area investigated, and can otherwise be characterised as a minerogenous area with colluvial

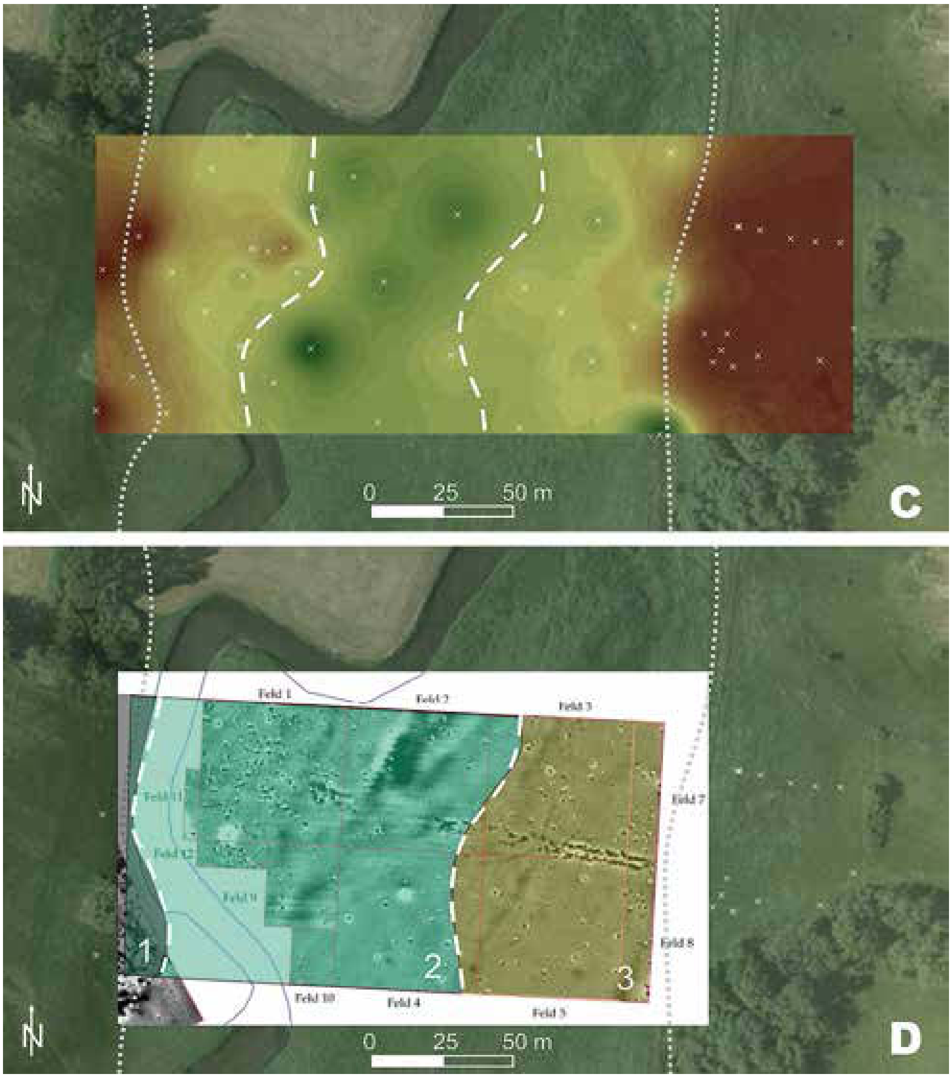

Fig. 19 (cont.) – **C** The thickest layers of peat and bog are documented within this corridor. – **D** 1) Slope area currently eroded by River Tollense; 2) fluvially influenced bog area with partly verified causeway; 3) fluvial uninfluenced floodplain with causeway (S. Lorenz).

characteristics. The sedimentology indicates that the River Tollense previously never ran as far west as it does today, as is indicated by the lack of fluvial deposits on this side of the river's course, as well as the erosive contact with the marl on the western slope of the valley. The low water depth and the accumulation of stones at the Kessin 12 site are caused by the river cutting into this marl.

Results

The interdisciplinary research at the sites Weltzin 13 and Kessin 12 uncovered conclusive evidence in the eastern floodplain for a Bronze Age crossing traversing the Tollense Valley,

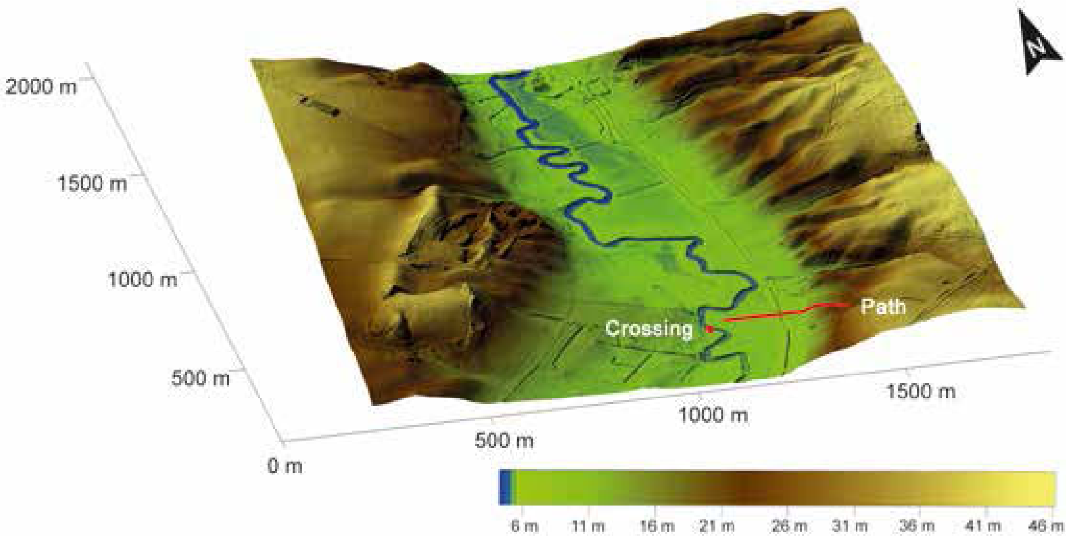

Fig. 20. Model of the Tollense Valley with the position of pathway (R. Scholz, using a digital model of the valley made by ArcTron [©]).

which is some 200 m wide here. It probably extended up the eastern valley slope in the form of simple trails *(fig. 20)*. In the geomagnetic plan it can be clearly seen as a linear pathway running east-west across the valley floor. Different modes of construction could be identified during excavation. In the eastern part of the floodplain the causeway is still visible today as a very low embankment, best visible in wet seasons. Closer to the present-day river this flat embankment disappears and the continuation of the pathway is as yet unclear. No extension on the western bank of the modern River Tollense could be clearly identified. Due to the relatively steep slope of the valley in this part, it is more likely to appear as a sunken pathway rather than as an embankment.

On the evidence of these first investigations, the eastern part of the causeway was flanked by two massive rows of boulders for approximately 35 m. The trackway, here 3.2 m wide, was constructed using horizontal timbers laid lengthways as a foundation, with timbers of which only remnants were found laid on them at right angles; sand and turf were then heaped up over the substructure.

Approximately 80 m further west towards the middle of the valley, the edges of the pathway were secured by rows of sturdy wooden posts that were not visible in the geomagnetic survey. The different construction method was probably due to the wetter, softer and boggier subsurface in this area. The causeway itself is again constructed out of sand and turf. How the trail continued in relation to the Bronze Age river bed is not yet clear.

The Tollense Valley causeway does not fit H. Hayen's classification of wooden trackways, as in places stones were used in its construction, as well as because the wooden elements observed in the areas excavated differ greatly[23].

Dating results indicate that the causeway in the Tollense Valley was constructed during the Early Nordic Bronze Age. If an old wood effect is correctly taken into account, it was

[23] Hayen 1989.

most likely built in the years after 1900 BCE. Later AMS dates may also indicate subsequent building activities (up to around 1750 BCE). However, the wooden remains from the current river (Weltzin 13) date considerably later and suggest a construction and utilisation period from 1320 BCE until the end of the 13th century BCE, as well as a possible later phase of use in the 7th century BCE. Moreover, the timber remains located in the riverbed do not match the alignment of the early Bronze Age trail. However, AMS dating of a horse tooth from trench 2/2014 confirms that the main trail was still in use in the 13th and 12th centuries BCE. Thus it is certainly possible that the rows of posts found in the river (Weltzin 13) – whether they mark the edge of the causeway or are the remains of a path, jetty, or bridge construction – belong to a later phase of the valley crossing that branched off towards the south-west, close to the Bronze Age river course. The route of the earlier pathway on the hillsides is still unclear; perhaps the rectangular structures on the eastern slope are connected to it. This question will also have to be solved by future excavations.

The spectrum of finds in the area of the river and the early Bronze Age causeway fit well with the periods of utilisation that we propose. Bronze objects from Period III have been discovered in the area surrounding the current river (Weltzin 13), matching the spectrum of absolute dates for the site. Among the finds from the causeway excavations, attention is drawn to a heavily corroded copper axe, as well as horse teeth and bones. The axe dates to the time of the pathway's construction, while the horse remains indicate that it was still in use up to the 13th/12th centuries BCE.

The results so far confirm that the valley crossing was in use over the course of more than 500 years. A direct connection to the Bronze Age battle is plausible for two reasons. The distribution of objects and human remains from Period III, or from the time around 1300/1250 BCE, that can be followed for more than 2.5 km downstream starts here, and the spectrum of objects (including a bronze palstave and a socketed arrowhead) match the dates of the wooden remains from the river, as well as of the horse bones from the causeway. It is possible that the violent events even started at the valley crossing. A hypothetical battlefield scenario postulates an attack on the western bank on a group planning to cross the river. Those attacked then tried to escape downstream along the River Tollense. During the attempt to escape or to cross the river at another place, fighting with long and short range weapons took place at different sites along the river. The fighting may have become a rout; it definitely resulted in many casualties. Finally, all this led to the deposition of the Bronze Age find layer in the river valley with its many disarticulated skeletal remains.

Early trails and pathways

Trackways, initially as a rule constructed of logs, later of split timbers, were commonplace in prehistoric Northwest Europe to access and cross wetlands and bogs from the Neolithic period[24]. These village streets, boardwalks and causeways, sometimes up to 3 m wide, and clearly accessible for wagons as is indicated by finds of wagon parts[25], probably formed parts of communication and route networks. Wheel ruts[26], representations of wagons[27], as well as trails and trackways which can sometimes be traced over several kilometres, attest to a "transport system"[28] that must have exceeded purely local requirements in the

[24] Among others: Metzler 2005a, 472f.; id. 2005b; Bang 2013; Zich 2013.

[25] Metzler 2003; Schlichtherle 2011.

[26] Zich 1999 on wheel ruts from the 4th millennium BCE in Flintbek (Rendsburg-Eckernförde region).

[27] Midgley 1993, 378–380.

[28] Fansa 2005; Both 2005; Endlich 2005.

Neolithic. The investigation of prehistoric paths and path systems is difficult, as the existing routes were often used over long periods of time, and later constructions were built over the original remnants, rendering them unrecognisable[29]. This is also the case for routes in lowland areas, where geographically favourable sites were used as crossings repeatedly over time[30].

The army or ox trail in Jutland is a classic example of a long-used route that made use of natural features (outwash plains/watersheds), and numerous barrows are documented along the trail[31]. From an early date the frequently linear arrangement of burial mounds was often explained by their being built along established paths[32]; the idea that barrows mark lines of communication is still discussed in modern research[33]. Hoards can sometimes also be significant in the context of pathways and trade routes. The Late Bronze Age hoard of bowls from Norderstapel (County of Schleswig-Flensburg), for example, was deposited on the Stapelholm geest island, apparently at a narrow point along a north-south land route which is also reflected in the linear arrangement of several burial mounds[34]. Trails can therefore be indirectly identified by monuments and structures connected to them; in rare cases, they can be documented through the physical remnants of wheel ruts or of the pathway itself.

Between 1800 and 1500 BCE, the Minoan road system already contained roads and pathways of different forms. These included "royal roads", which connected central hubs, and which in some places were provided with outposts to control them, as well as transport routes and paths linking individual villages. Fords were used to cross streams, and were sometimes reinforced with stones[35].

In Bronze Age Central Europe, trails and trackways have only been located in individual cases. Wheel ruts found at the Late Neolithic / Early Bronze Age site of Waren in the Müritz region in Mecklenburg-Western Pomerania are evidence of a transport route[36], while two Bronze Age wooden disc wheels from the Kühlungsborn site from c. 900 BCE provide an insight into wagon technology[37]. In Saxony-Anhalt the remnants of a prehistoric pathway could be documented in the area of a historically attested route (the so called "wine and copper road") near Oechlitz. Over a distance of 400 m, two humus-filled ruts in the path, similar to a modern-day dirt road, were visible in the terrain. Bronze objects from the sunken route prove that it was already in use around 1600/1500 BCE[38].

[29] See Bishop 2014 on Roman roads in Great Britain which possibly followed prehistoric pathways, covering them in the process. – See also investigations on a Roman road in Shropshire (UK), which covered its multi-phased „ancestor" of around 200 BCE, constructed of wood, stones, turf and sand; this trail could have its origins in a Bronze Age cattle drove: Malim / Hayes 2011. – See also Bang 2013.

[30] See Jørgensen 1977a; 1977 b for the repeated documentation of trails and pathways from the Neolithic to the Viking Age in the valley of Risby Å, Denmark. – Cf. http://www.fortidsmindeguide.dk/Risby-vejen.735.0.html (accessed 17.11.2015).

[31] Among others Freudenberg 2012 Abb. 1.

[32] Müller 1904.

[33] Holst 2012b, 61. See also Schierhold / Pfeffer 2014 for the documentation of a presumed „bundle" of Neolithic paths.

[34] Schmidt / Segschneider 2014.

[35] Plath / Böttcher 2011.

[36] Schanz / Wietrzichowski 2009.

[37] Heussner 1985; Schmidt 2004, 94. Wagon models, e. g. the bronze cult wagon found at Peckatel (Schmidt 2001) or small clay wheels, of which several are known from Mecklenburg-Western Pomerania (e. g. Schwanbeck, Lkr. Mecklenburgische Seenplatte; Ulrich 1998), provide an insight into Bronze Age notions of the importance of transport, as well as into connected ritual implications.

A late Bronze Age ditch intersects the feature, and the pathway will already have been in use for several centuries before the latter's construction[39]. In the area of a low moor on the bank of the River Schutter in Bavaria, a multi-phase bog crossing approximately 250 m long in the form of a plank roadway was recorded; the oldest phase of its utilisation probably dates to the late 18th century BCE[40]. As with other log or plank trackways, the amount of sand documented between the timbers is insufficient to assume it was the systematic filling of a sand or gravel path[41]. In Wustermark in Brandenburg, wheel ruts were found near an Early Bronze Age settlement, which – leading in several directions – likely indicate connections with other contemporary structures[42]. A linear feature, interpreted as a 13th century BCE "fence" in the form of a timber or plank wall flanked by a ditch, was discovered nearby. This fence, which was traced over several hundred metres, could have been a marker for a transport route in rough terrain, or to direct traffic that was crossing the Wublitz river[43]. A re-evaluation and re-dating of North-West German trackways placed most of them no earlier than the 8th century BCE; however, one example (IP XXXVI) was dated to the 14th century BCE[44].

Raised causeways can remain visible for a long time. Embanked sand fills on wooden framework foundations were also used for Roman roads[45]. The "Sandstrahl", an embanked causeway from the Roman Iron Age (1st/2nd centuries) in Frisia, reportedly was still identifiable in the terrain in the 20th century; it was likely still in use in the Middle Ages[46].

Prehistoric bridges

Prehistoric bridges have been documented even less often than pathways or roads. The construction of bridges, however, will have been necessary from the very beginning of the use of long-distance transport routes to cross wet lowlands and waterways. In the ancient Middle East, structures to traverse such obstacles are present in the written and archaeological record from as early as the late 3rd millennium BCE Among these are temporary pontoons made of wood and leather skins which were used during military campaigns[47]. A brick construction in Tello in Sumerian Girsu (Iraq) was interpreted as the substructure of a bridge over a canal, and which may have been some 7.5 m wide and 30 m long. It was dated to the end of the 3rd millennium BCE[48].

Numerous wooden posts from about 2800 BCE found in Tibirke on Sealand (Denmark) are interpreted as remains of a Neolithic trackway across wet lowland over 100 m long, which possibly also included a bridge[49].

A corbelled stone bridge near Kazarma in Greece, with a length of 10.4 m, a width of 3.3 to 5.7 m and an arch rise of 2 m, is attributed to the Mycenaean period (around 1500 BCE)[50].

38 http://www.archaeologie-online.de/magazin/nachrichten/neue-gleise-auf-alten-wegen-11385/?sword_list[]=Oechlitz&no_cache=1 (accessed 24.04.2015); Maraszek et al. 2015, 98.

39 Ibid.

40 Schussmann 2003. – Paved pathways of the Late Hallstatt / Early La Téne period were documented in the Schwarzach valley: Schussmann 2012.

41 Schmeidl 1962; Schussmann 2003, 22.

42 Beran 1999.

43 May 2007.

44 Bauerochse et al. 2014 Abb. 3.

45 Bender 1989, 113.

46 Bär 2014, 147.

47 Bagg 2011.

48 Ibid. 43.

49 Jørgensen 1977b; 1988. Siehe auch http://naturstyrelsen.dk/74001#oldtidsvejen (accessed 01.12.2015).

50 Beligianni 2011.

Several double rows of posts were documented in the shallows of Lake Zurich between the upper and lower lake. Dating to the Bronze Age (17^{th}/16^{th} century BCE), they probably represent the remains of substructures of platforms across areas of open water which connected sections of ground-level pathways[51].

In the case of the "first London Bridge" at Vauxhall, two parallel rows of oak posts, with an average diameter of 40 cm, were observed leading from the south bank of the Thames into the river. The rows are 5 m apart and set leaning slightly inwards. Originally, a platform resting on top of these posts would have formed the actual bridge. Two bronze axes discovered between the posts dated the structure to the Bronze Age, which was later confirmed by radiocarbon dating results (1750–1535 calBC and 1605–1285 calBC). The Bronze Age River Thames[52] was wider than it is today and the bridge documented at Vauxhall most likely connected the bank with an island in the stream[53].

The Thames Bridge in Dorney, which is dated to around 1400–1300 BCE, consisted of two rows of oak posts up to 50 cm thick on the opposite banks of a branch of the river that is now silted up; they most likely formed the substructures of both ends of a bridge[54].

At excavations in Flag Fan, Cambridgeshire, UK, a 1.4 ha platform dating between 1350 and 950 BCE was located. It was connected to a roughly contemporary kilometre-long sequence of wooden posts, which could have been a palisade or marked a pathway[55]. In Flag Fen ritual deposits played an important role. Metal objects found by the platform and the rows of posts had mostly been destroyed before deposition[56]. The entire Fengate area is interpreted as a Bronze Age settlement system crossed by straight paths, which in turn were flanked by ditches[57]. Axle and wheel components[58], as well as wheel ruts[59] from the surrounding area confirm a picture of a prehistoric communicational landscape such as only rarely can be documented in its entirety.

A more ritual function is also proposed for the Early and Middle Bronze Age wooden constructions from Berlin-Spandau: several weapons were recovered in the vicinity of a wooden platform or jetty over open water that was flanked by additional rows of stakes in an area that had previously been wetland[60].

Later, massively built river crossings are also known in Central Europe, for example the Bronze Age bridge from the 10^{th} century BCE documented at the Weisser Schoeps river in Saxony[61]. Furthermore, bridges not only spanned rivers – in settlements protected by moats or ditches they were necessary to provide access, as is demonstrated by a Late Bronze Age / Early Iron Age settlement near Wennungen in Saxony-Anhalt[62].

[51] Wiemann / Scherer 2011.

[52] For the significance of the Thames river valley for prehistoric research, also in connection with ritual activities and the deposition of human remains, see Schulting / Bradley 2013.

[53] British Archaeology 1999, 4–5.

[54] Allen / Welsh 1996.

[55] Pryor 1992, 527.

[56] Id. 2001, xviii.

[57] Id. 2008, 34.

[58] Ibid. 219.

[59] Ibid. 222.

[60] Schwenzer 1997.

[61] Renno 2014.

[62] Hüser 2012. The Wennungen settlement – situated in a strategically favourable position and well connected to the local transportation infrastructure on the so-called copper road – was closed off to the Unstrut river by three double ditch systems. The bridge construction, attested by substruction remains in form of posts and stones, was situated in the area around the main gate and crossed an at least temporarily water-filled ditch. Ibid. 67–69.

The significance of the Tollense Valley in Bronze Age North-East Germany

The causeway in the Tollense Valley, built of timber, stones, turf and sand, and documented over a length of more than 100 m, represents a unique finding from northern Germany. For the first time, part of a Bronze Age network of land routes could be made visible in the southern Baltic area.

Together with the other evidence, the archaeological remains suggest the construction of elaborate trackways and, in some cases, even bridges in the Bronze Age. The Tollense Valley causeway can probably be attributed to the wish or the necessity to be able to cross the Tollense Valley regardless of weather and seasonally differing water level conditions. Its location, situated at a narrow section of the Tollense Valley, offered a prime position for the construction of a permanent crossing of the floodplain on the eastern bank. It is quite possible that a bridge was also part of this.

The complex causeway construction that was likely used and maintained for centuries suggests a significance of the crossing beyond just local. In this context, finds from the valley relating to Bronze Age metal crafts are of interest: along with the scrap metal hoard mentioned above found in the immediate area of the crossing, attention is drawn to a hoard from Golchen comprising an unusual accumulation of tools[63], as well as to two tin rings found in the same archaeological layer as the Bronze Age skeletal remains[64]. These finds could indicate that metal crafts were of particular significance in the Tollense Valley and its surrounding areas. The middle section of the Tollense Valley that is the focus of attention here could have derived special significance from its role as a crossroads.

The documented pathway, which may have been the starting point of the violent conflict described above, not only contributes to the understanding of the entire findings and the reconstruction of the events in the early 13th century BCE in the Tollense Valley; its context also sheds new light on the cross-regional infrastructure of North-East Germany in the (Early) Bronze Age. Unfortunately, there currently is little further information to integrate it into the broader network of supraregional communication and traffic routes. The region around the famous barrow of Seddin in Brandenburg is a further example for the significance of river systems for regional power and the exchange of goods[65]. Similarly, the River Tollense could have played a role in the flow of commodities; the causeway at the Kessin 12 site offers a possible connection of the south-north water transportation route via the Tollense River to the Baltic Sea with an east-west land route linking the River Oder estuary region and the Mecklenburg Lake District.

The Lake District was of great importance from the Early Bronze Age; here independent bronze production was established early on[66]. Diversity analyses indicate a shift of regions of innovation during the transition from the 3rd to the 2nd millennium BCE, as the southern Baltic Sea region and the region east of the river Oder clearly also became more important[67]. Early Bronze Age imports from south-east Europe highlight the significance of the region west of the Oder estuary[68]. The Tollense Valley likely played a role in connecting these areas. Therefore, the violent events in the Tollense Valley could also be seen as a result of its strategic significance for the power structure of North-East Germany and the regions on the southern Baltic coast during the Early Bronze Age.

63 Schmidt 2014.
64 Krüger et al. 2012.
65 May / Hauptmann 2012.
66 Cf. Schubart 1972; Rassmann 1993; Terberger 2002.
67 Ducke / Rassmann 2010 Abb. 8–9 and 11.
68 Cf. Swieder 2013.

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Abstract · Zusammenfassung · Résumé

ABSTRACT Research on the Bronze Age battlefield site in the Tollense Valley (Mecklenburg-Western Pomerania, 13th cent. BCE) has to date uncovered the remains of more than 130 individuals, predominantly young adult men with perimortal as well as healed lesions, together with weapons of the same period, especially flint and socketed bronze arrowheads, and wooden clubs. The find material comes from several sites along a stretch of river more than 2.5 km long. The sites Weltzin 13 on the western bank and Kessin 12 on the eastern bank of River Tollense mark the beginning of the distribution, with finds of human skeletal remains, partly with lesions, as well as finds of weapons.

The topographical situation provides a suitable site for crossing the river and the valley, and finds from the Neolithic up to the Middle Ages testify to the importance of the crossing, which seems to have been used over several millennia. Wooden construction elements discovered in the eastern riverbank could be dated dendrochronologically to the 14th-12th centuries BCE, thus indicating structures contemporaneous with the violent event in the valley. Other wooden remains yielded dates from the 7th cent. BCE, as well as the 11th cent. CE, again indicating repeated phases of re-use. Geophysical surveys were initiated to check the adjacent meadows for structures on land. At the Kessin 12 site, in the eastern floodplain of the river, a linear structure more than 100 m long was visible in the geomagnetic plan. During excavation it turned out to be the remains of a causeway constructed of timbers, sand and turf, using for stabilisation dense rows of posts in the wetter parts of the floodplain, and stone rows on drier ground. According to dating results, this embankment was constructed during the 19th cent. BCE. The causeway seems to have been in use for centuries, as is indicated by horse remains discovered on the top of the embankment dating to Period III of the Nordic Bronze Age. This could also indicate a connection with the battlefield horizon. According to a current hypothesis, the fighting could have started at this focal point in the river valley, and would then have spread northwards.

The discovery of the causeway in the Tollense Valley represents a first glimpse into the Early Bronze Age network of land routes in the southern Baltic. The River Tollense crossing must have been of more than local significance, which could also help to explain why the river valley became the site of a major battle at around 1300 BCE.

ZUSAMMENFASSUNG Im Rahmen der Forschungen zum bronzezeitlichen Schlachtfeld im Tollensetal (Mecklenburg-Vorpommern, 13. Jh. v.u.Z.) wurden bislang Überreste von mehr als 130 jungen Männern entdeckt, die perimortale wie auch verheilte Verletzungen zeigen. Dazu kommen Waffenfunde der selben Zeitphase, hauptsächlich Pfeilspitzen aus Flint und Bronze sowie hölzerne Keulen. Das Fundmaterial stammt von diversen Fundplätzen entlang eines mehr als 2,5 km langen Flussabschnitts. Die Fundplätze Weltzin 13 und Kessin 12 markieren den Beginn dieser Ausdehnung am westlichen bzw. östlichen Flussufer mit dem Auftreten erster menschlicher Skelettreste des Schlachtfeldhorizonts, teils auch mit Verletzungen, sowie Waffenfunden.

Zugleich stellt dieser Talabschnitt aufgrund seiner topographischen Situation eine günstige Möglichkeit zur Querung des Flusstales dar. Fundmaterial vom Neolithikum bis zum Mittelalter aus diesem Bereich unterstreicht die Bedeutung dieses wohl über Jahrtausende zur Querung genutzten Flusstalabschnitts. Hölzerne Konstruktionselemente, die im Ostufer der Tollense entdeckt wurden, konnten dendrochronologisch dem 14.-12. Jh. v.u.Z. und damit auch dem Schlachtfeldhorizont zugewiesen werden. Andere Hölzer datieren ins 7. Jh. v.u.Z. bzw. ins 11. Jh. u.Z. und deuten Phasen wiederholter bzw. erneuter Nutzung an. Geophysikalische Untersuchungen wurden initiiert, um nach zugehörigen

Strukturen im Bereich der umliegenden Wiesen zu suchen. Am Fundplatz Kessin 12 in der östlichen Talaue wurde im geomagnetischen Bild eine lineare, über 100 m lange Struktur entdeckt. Während der Ausgrabungen stellte sich diese als dammartige Aufschüttung aus Sand und Rasensoden, teils über Holzlagen, heraus, die im nasseren Bereich der Wiese mit dichten Pfostenreihen, im trockneren Bereich dagegen mit Steinreihen stabilisiert worden war. Nach den Datierungsergebnissen wurde diese Wegtrasse im 19. Jh. v.u.Z. errichtet. Direkt auf der Aufschüttung entdeckte Pferdereste konnten in Periode III der Nordischen Bronzezeit datiert werden und deuten zum einen an, dass die Trasse über Jahrhunderte benutzt wurde, zum anderen, dass sie auch im Rahmen des Schlachtfeldhorizonts eine Rolle gespielt haben könnte. Nach der aktuellen Hypothese dürften die Kampfhandlungen an der Querung begonnen und sich dann nach Norden verlagert haben.

Die Entdeckung der Wegtrasse im Tollensetal ermöglicht einen ersten Einblick in das frühbronzezeitliche Netzwerk von Landrouten im südlichen Ostseeraum. Die Trasse, die von mehr als nur lokaler Bedeutung gewesen sein muss, könnte auch erklären helfen, warum das Tollensetal um 1300 v.u.Z. zum Ort einer gewalttätigen Auseinandersetzung so großen Ausmaßes wurde.

RÉSUMÉ Dans le cadre des recherches concernant le champ de bataille de la vallée de Tollense, on a identifié jusqu'ici plus de 130 jeunes hommes présentant des blessures périmortales et aussi cicatrisées. A ceci s'ajoutent encore des armes de la même phase chronologique, surtout des pointes de flèches en silex et en bronze, ainsi que des massues en bois. Le matériel archéologique provient de différents sites répartis sur un tronçon fluvial de plus de 2,5 km. Les sites de Weltzin 13 et Kessin 12 marquent le début de cette aire, avec l'apparition sur les rives ouest et est, de plusieurs armes et des premiers squelettes humains, dont certains avec des blessures.

La topographie de cette partie de la vallée offre également une bonne possibilité de traverser la rivière de Tollense. Le matériel archéologique trouvé dans cette zone et daté du Néolithique au Moyen Age souligne bien son rôle de gué durant des millénaires. Des constructions en bois découvertes sur la rive est de la Tollense, ont été datées du 14e-12e s. av. J.-C. par la dendrochronologie et s'intègrent ainsi dans l'horizon du champ de bataille. D'autres bois datent du 7e s. av. J.-C. et du 11e s. ap. J.-C., indiquant des occupations répétées ou une réoccupation. Des prospections géophysiques furent réalisées pour détecter des structures contemporaines dans les prés environnants. L'image géomagnétique a révélé sur le site Kessin 12, dans la partie orientale de la zone alluviale, une longue structure linéaire de plus de 100 m de long. Les fouilles ont peu à peu révélé une sorte de digue composée de sable et de mottes de gazon, reposant partiellement sur des couches de bois, et stabilisée par des rangées serrées de pieux dans la partie humide du pré, par des rangées de pierres dans la partie sèche. Les datations obtenues situent la construction de cette chaussée au 19e s. av. J.-C. Des restes de chevaux trouvés directement sur la levée de terre ont pu être datés de la période III du Bronze nordique et font penser que, d'une part, cet axe fut utilisé pendant des siècles et que, d'autre part, il a pu jouer un rôle à l'époque de l'horizon du champ de bataille. La thèse actuelle est que les combats ont peut-être commencé aux abords du gué et qu'ils se seraient déplacés par la suite vers le nord.

La découverte du tracé d'un chemin dans la vallée de Tollense permet de se faire une première idée du réseau routier du Sud de la région baltique au Bronze ancien. Cet axe devait jouer un rôle interrégional, ce qui expliquerait pourquoi la vallée de Tollense devint le cadre d'un conflit aussi violent et d'une si grande ampleur vers 1300 av. J.-C. (Y. G.)

Addresses of authors
Detlef Jantzen
Landesamt für Kultur und Denkmalpflege Mecklenburg-Vorpommern, Landesarchäologie
Domhof 4/5
D-19055 Schwerin
d.jantzen@kulturerbe-mv.de

Gundula Lidke
Schloßstr. 50
D-14059 Berlin
tollensetal-projekt@web.de

Jana Dräger
Geschwister-Scholl-Str. 9
D-18507 Grimmen
jana.draeger@freenet.de

Joachim Krüger
Landesverband für Unterwasserarchäologie Mecklenburg-Vorpommern
Wolgaster Str. 6
D-17509 Wusterhusen
joachim.krueger@uni-greifswald.de

Knut Rassmann
Römisch-Germanische Kommission
Palmengartenstr. 10-12
D-60325 Frankfurt a. Main
knut.rassmann@dainst.de

Sebastian Lorenz
Universität Greifswald
Institut für Geographie und Geologie
Friedrich-Ludwig-Jahn-Str. 16
D-17487 Greifswald
sebastian.lorenz@uni-greifswald.de

Thomas Terberger
Niedersächsisches Landesamt für Denkmalpflege
Scharnhorststr. 1
D-30175 Hannover
thomas.terberger@nld.niedersachsen.de

Lab.-nr.	site	Inv.-nr.	sample	AMS-date BP	AMS-date cal BC (68%-significance)
AAR-17099	Weltzin 13	ALM 2008/459, 1	tooth (human)	4339 ± 34	3011 BC–2977 BC (24,8 %) 2971 BC–2966 BC (2,9 %) 2961 BC–2949 BC (7,3 %) 2944 BC–2904 BC (33,3 %)
AAR-18739	Weltzin 13	ALM 2008/459, 35-1	tooth (animal)	4318 ± 32	3009 BC–2985 BC (15,4 %) 2935 BC–2892 BC (52,8 %)
AAR-11148	Weltzin 13	ALM 2000/1382, 2	bone (human)	2989 ± 33	1300 BC–1190 BC (59,6 %) 1180 BC–1160 BC (3,3 %) 1150 BC–1130 BC (5,3 %)
AAR-17097	Weltzin 13	ALM Wa IV/85/311, 9	bone (human)	2983 ± 29	1268 BC–1191 BC (52,6 %) 1178 BC–1160 BC (8,6 %) 1144 BC–1132 BC (7 %)
AAR-11149	Weltzin 13	ALM 2000/1382, 3	bone (human)	2982 ± 38	1300 BC–1120 BC (68,2 %)
AAR-11150	Weltzin 13	ALM Wa IV/85/311, 1	bone (human)	2952 ±40	1260 BC–1110 BC (68,2 %)
AAR-17098	Weltzin 13	ALM 2000/1382, 1	tooth (human)	2864 ± 32	1113 BC–1099 BC (6,9 %) 1090 BC–996 BC (58,8 %) 986 BC–980 BC (2,4 %)
Poz-77156	Weltzin 13	sample 121/2012 (diving survey)	horizontal timber (part of construction)	2490 ± 30	761 BC–735 BC (11.4 %) 689 BC–662 BC (10.9 %) 648 BC–546 BC (45.9 %)
Poz-77175	Weltzin 13	sample 110/2012 (diving survey)	wooden post	2485 ± 30	759 BC–731 BC (11.8 %) 691 BC–678 BC (5.3 %) 673 BC–660 BC (5.5 %) 651 BC–544 BC (45.5 %)
AAR-15057	Weltzin 13	ALM 2008/459, 16	bone (human)	1832 ± 22	135 AD–215 AD (68,2 %)
Poz-77155	Weltzin 13	sample 104/2012 (diving survey)	wooden post	985 ± 30	1016 AD–1046 AD (39.6 %) 1093 AD–1121 AD (23.7 %) 1140 AD–1147 AD (5.0 %)
AAR-18740	Weltzin 13	ALM 2008/459, 35-2	tooth (animal)	646 ± 45	1286 AD–1319 AD (30,7 %) 1351 AD–1391 AD (37,5 %)

Lab.-nr.	site	Inv.-nr.	sample	AMS-date BP	AMS-date cal BC (68%-significance)
Poz-59404	Kessin 12	HP 8/2013 = timber 13	horizontal timber (causeway)	3630 ± 40	2112 BC–2102 BC (4,1%) 2036 BC–1936 BC (64,1%)
Poz-59406	Kessin 12	HP 9/2013 = timber 20	crossbar (causeway)	3580 ± 35	2007 BC–2005 BC (1,4%) 1975 BC–1888 BC (66,8%)
AAR-21104	Kessin 12	HP 166/2014	upright timber (eastern section)	3541 ± 27	1931 BC–1877 BC (47%) 1841 BC–1821 BC (12,6%) 1796 BC–1782 BC (8,6%)
Poz-59403	Kessin 12	HP 21/2013 = stake 5	upright stake (causeway)	3540 ± 35	1936 BC– 1875 BC (42%) 1843 BC–1818 BC (15,2%) 1799 BC–1780 BC (11%)
AAR-21105	Kessin 12	HP 167/2014	horizontal timber (eastern section)	3528 ± 25	1910 BC–1872 BC (27,9%) 1845 BC–1813 BC (23,3%) 1801 BC–1778 BC (17%)
AAR-21102	Kessin 12	HP 14/2014	horizontal timber (western part)	3517 ± 26	1891 BC–1869 BC (16,1%) 1846 BC–1775 BC (52,1%)
AAR-21106	Kessin 12	HP 169/2014	horizontal timber (eastern section)	3481 ± 25	1877 BC–1841 BC (27,7%) 1821 BC–1796 BC (19,2%) 1782 BC–1753 BC (21,4%)
AAR-21103	Kessin 12	HP 19/2014	horizontal timber (western part)	3455 ± 28	1871 BC–1845 BC (18%) 1812 BC–1803 BC (5,2%) 1777 BC–1738 BC (31,8%) 1715 BC–1696 BC (13,1%)
Beta-350974	Kessin 12	HP 11/2013 = timber 7	horizontal timber (causeway)	3380 ± 30	1740 BC–1610 BC (68,2 %)
AAR-21703	Kessin 12	ALM 2014/1231, 7	tooth (horse)	2977 ± 25	1257 BC–1250 BC (5,6%) 1232 BC–1191 BC (38,5%) 1177 BC–1161 BC (11,7%) 1144 BC–1131 BC (12,5%)

Tab. 1. Sites Weltzin 13 and Kessin 12. AMS-^{14}C dates of skeletal and wooden remains, ordered chronologically (BP dates) for each site.