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Offering with textile wrapping from a Bell Beaker sanctuary in Brodek u Prostějova, Czech Republic

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(with 10 figures and 1 table)

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Abstract

A group of four rectangular pits in front of a large building (possibly a sanctuary) supported by two rows of nine massive wooden posts excavated near the town Brodek u Prostějova (Prostějov County, Moravia, Czech Republic) delivered a number of vessels, wristguards and stone arrow heads dated to the Bell Beaker Culture (*c*. 2500–2200 BC). The goods appear to have been intentionally deposited, possibly as a ritual offering, as indicated by the lack of human remains in the pits and signs of intentional breakage of some objects. One of the vessels, an amphora, differed from the others (mainly Bell Beakers) in its coarser material and lack of ornament. Textile fragments adhering to the outside of the amphora indicate that it was wrapped in cloth at time of deposition. This wrapping could possibly have served as decorative element, enhancing the appearance of the – compared to the others – rather crude vessel. An alternative explanation could be wrapping as part of ritual activities – such as inferred for the common practice of wrapping of grave goods in Bronze and Iron Age burials.

The textile remains themselves, albeit fragmentary, are astonishingly well preserved. SEM analysis of the fibres identified the material as crudely processed flax, which exhibits incompletely separated fibres. The technique used for fibre processing was splicing, which is well known from contemporary sites in the Eastern Mediterranean and Ancient Egypt. Compared with other (rare) finds of Neolithic and Early Bronze Age textiles it is relatively fine.

Keywords: Bell Beaker Culture, Europe, Moravia, tabby weave, flax, splicing.

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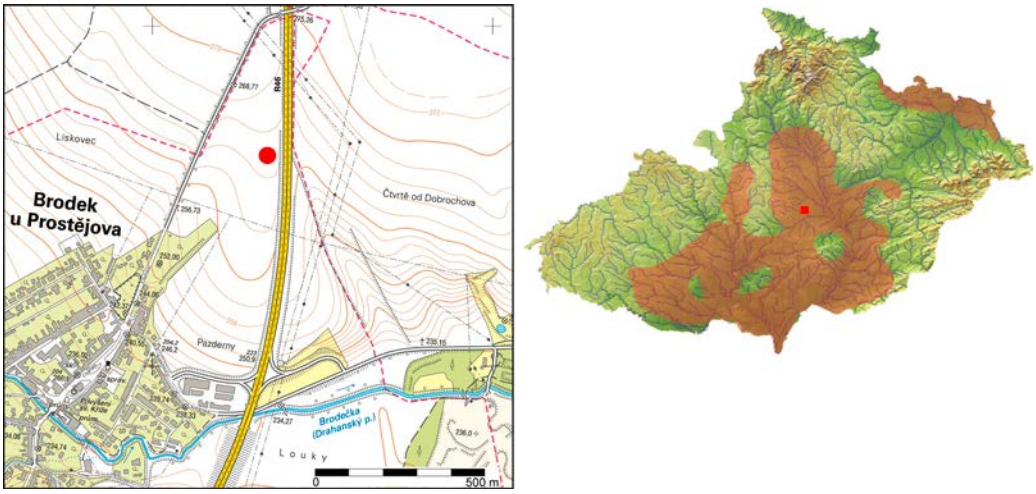


Fig. 1. **A**: location of the site Brodek u Prostějova, central Moravia. **B**: Brodek and distribution of Bell Beaker Culture in Moravia (brown). (A: base map of the Czech Republic 1:10 000, sheet 24-24-22. B: after Peška 2013: 164, map 15)

Archaeological background

Between 15 April and 21 May 2015 the Prostějov bureau of the Institute for Archaeological Heritage carried out a rescue survey project as a result of the construction of a motorway interchange on the R46 motorway with an exit near the township of Brodek u Prostějova, Prostějov county, central Moravia (Fig. 1). Within the excavation, an archaeological structure was detected which was evidently very different from the currently known layouts of prehistoric settlements or burial grounds (Fojtík 2015b).

Nevertheless, the typo-chronology of the artefacts found within the structures enable us to attribute them to the Bell Beaker Culture. The Bell Beaker Culture in Moravia, based on ^{14}C dating, ranges from 2500 to 2200 BC (Peška 2013: 211–215, tab. 8), similar to Bohemia, where it is dated as 2500 to 2300 BC (see Turek 2008: 149–150).

Bell beaker structures at Brodek

The structures found (Fig. 2) comprised two parallel rows of round pits (Fig. 2: pits 501 to 520) used for the anchoring of huge wooden posts. Using geochemical analysis, remains of wood were documented from the pits, using the so-called Brongers method (*cf. e. g.*, Hlavica *et al.* 2011). The pits are aligned in east-west direction and show equal spacing. The structure is interpreted as remains of a building here, but differs from other settlement structures known from the region. The inner area, sized approximately 20 by 4 metres, was bordered on the eastern edge by two similar "post holes". On the western side, there were four large rectangular pits (Fig. 2: pits 522–525) arranged in a precise, symmetrical pattern. No specific domestic waste was found which is associated to the building.

The rectangular pits contained large collections of typical pottery vessels (especially bell beakers with their characteristic decoration), stone wristguards used by archers, jade and bone bead, silver and gold jewellery, and a set of stones identified as tools of a craftsman (metalworking tools for copper or gold). The finds that are of special interest here are the remains of a cloth, one of the vessels was wrapped in. The nature of these finds is reminiscent of the opulent graves of members of the "elite class" of the early phase of the Bell Beaker Culture (*cf. e.g.*, Peška 2013: 207–209). However, skeletal remains were completely lacking, a fact which was verified via laboratory tests using the analysis of phosphate content level in the soil (for more on this method see *e.g.*, Prokeš *et al.* 2013). Therefore, the rectangular pits can be identified as "symbolical graves", or as pits used for cultic purposes. The direct correlation among the aforementioned structures was eventually confirmed by the discovery of stone wristguards that had been placed, evidently intentionally, in three out of the twenty post holes; probably as a "building sacrifice".

Two rows of smaller post holes (Fig. 2: pits 500/1–9) were discovered in the eastern part of the site, which may have belonged to a smaller above-ground shed. There also was a larger pit (Fig. 2: pit 521) which contained a sole torso of a vessel dated to the later phase of the Bell Beaker Culture. This suggests that the site had been used for an extended period of time. Furthermore, towards the western edge of the site a linear feature was discovered in the form of a shallow ditch which may suggest the existence of an enclosure around the "central area".

No similar structures have been recorded from continental Europe in the second half of the 3rd millennium BC, also the hints for some ritual activities on the site (hoards of wristguards at the bottom of some postholes, cenotaphs or sacrificial pits in front of the building) keep our attention. Therefore, we might interpret this unusual structure as a building for a specific task, such as a ritual building (a "sanctuary"). We can, however, identify socio-cultic architectures, a thought pattern to erect ritual buildings and monuments. The most impressive among them are the Central European Neolithic "rondels" (*Kreisgrabenanlagen*), as well as elements of "henge" type features known in Western Europe, especially in the British Isles (*e.g.*, Podborský 1992: 91–106, 114–123; Podborský 2006: 139–145, 190–200; with extensive bibliography on the subject). The latter structures are much more different in plan than the rectangular structures descibed. Nevertheless, it is evident that in Brodek we find a very carefully planned structure, reflecting the then-current knowledge of geometry and possibly even astronomy – thereby combining several possible functions: from a social and cult site to the watching of heavenly bodies and, therefore, the comprehension of something that we now take for granted – the physical quantity of time (for more information on the possible use of the site as a "calendar" see Fojtík 2015a).

The analysis and interpretation of the structures as well as ceramic, stone and metal finds is part of ongoing research. Here we focus on a certain detail, a vessel (amphora) with attached textile remains from pit 522.

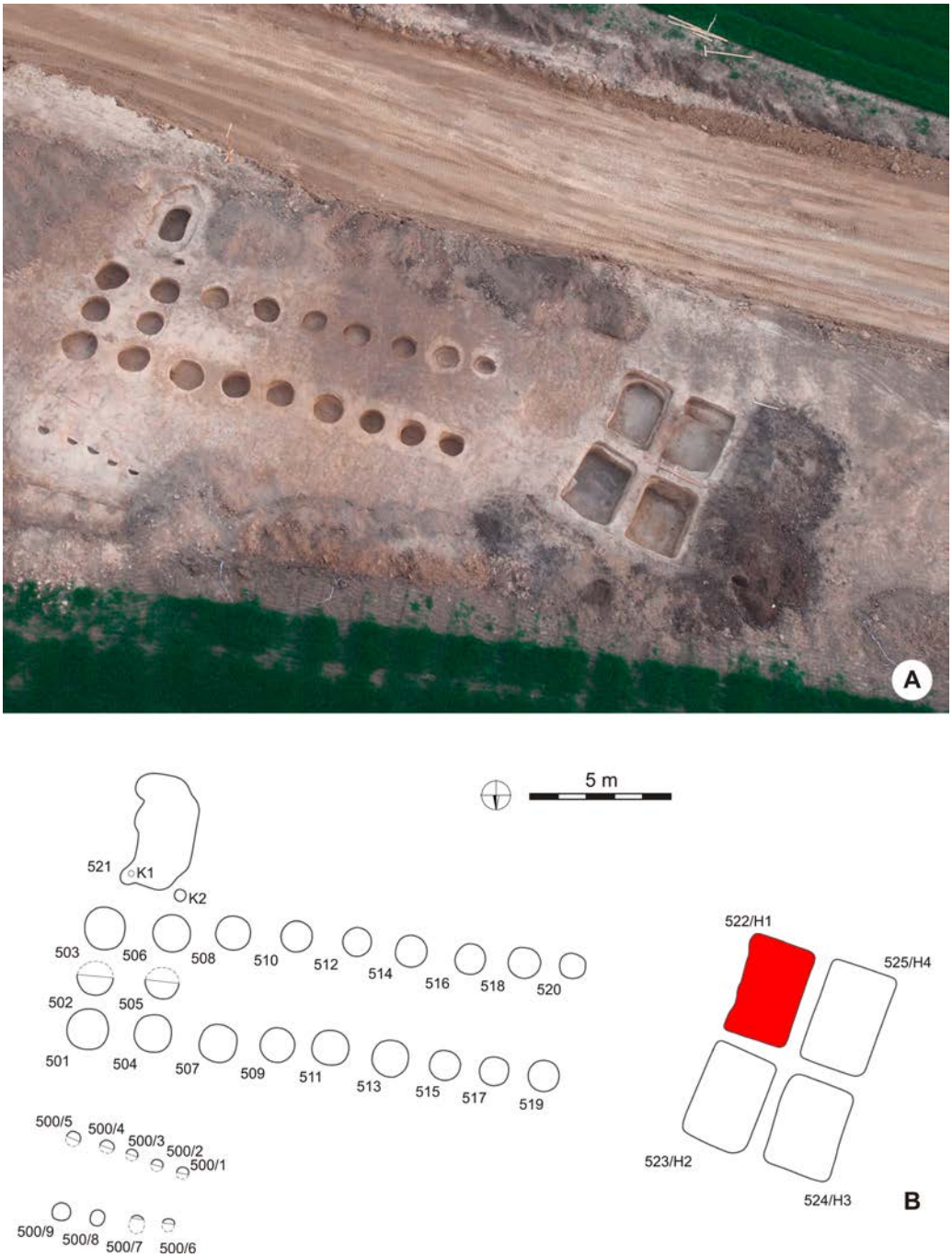


Fig. 2. **A**: air photo of the site, view from north. **B**: plan of site, pit number 522 filled in red color (A: photo by J. Šedivý; B: measuring and digitalizing by D. Vitulová).

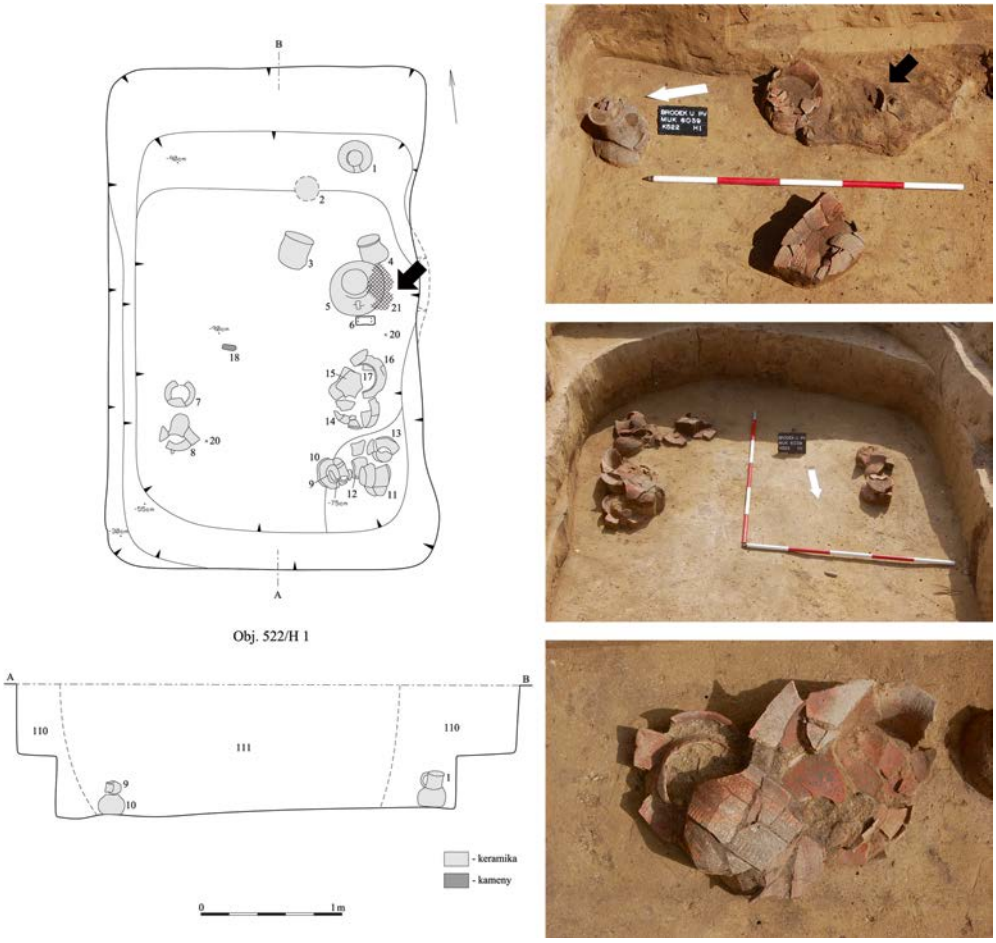


Fig. 3. Brodek u Prostějova, pit 522 (field-drawing: M. ŠMÍD, digital-drawing: M. HOLEMÁ, photo: P. FOJTÍK).

Rectangular Pit number 522 (Fig. 3)

Pit number 522 is together with the other similar pits located at the west side of the large building. It was a rectangular ditch with rounded corners and the longer axis pointing roughly in the north-south direction. Its dimensions in the loess layer were approximately 3.58 × 2.20 to 2.40 m and the step-shaped walls of 50 cm each led to an inner pit measuring 2.85 × 1.80 to 2 m. Its flat bottom, which was evidently compacted at certain places, was located at the depth of 0.87 to 0.93 m, if measured from the loess layer, on top of which a 30-centimetre layer of black soil and a 40-centimetre subsoil layer were found during the survey.

At the bottom of the pit there were 16 ceramic vessels (13 of which were typical bell beakers with numerous decorative elements and remains of white incrustation on the

outside) arranged mostly along the eastern edge of the pit. A stone wristguard (typical for archers) and two chert arrowheads were found close to vessel number 5 – an amphora with four small handles which was wrapped in a piece of cloth. A second wristguard had been intentionally broken to small fragments and these fragments were scattered around the backfill of the pit as well as in the space between vessel number 5 and the cluster of beakers number 14–16 or beaker number 8. Two chert flakes were found near the vessel clusters, as were remains of a sheet silver (or possibly electrum) jewel, a disc bead and a few fragments of animal (?) bones.

The decorated bell beakers are the dominant type at this site, as the discoveries of jugs or bowls are rare. This trend has been confirmed in the case of pit number 522 where, aside from 13 beakers, there were only two jugs and one amphora. The finds from pit number 522 are typical for classical Bell Beaker Culture (I/II or II Finding Group, *cf.* for example Dvořák 1993: 224). ^{14}C data from the site is not yet available.

Interpretation of the wrapped amphora in a sacrificial pit

The sacrificial pit containing the wrapped amphora

The analysed piece of cloth was found in pit number 522 that is interpreted as one of four "cenotaphs" or sacrificial pits, containing vessels as well as stone implements (arrowheads, wristguard) and silver pieces. All of those items required a considerable effort for production and were valuable goods within Bell Beaker societies.

The amphora from pit 522 represents a rare find within the context of the sets of finds from Brodek. It is the only vessel that can be associated with the storage of powdery or liquid contents. The other vessels found in the pits were more suitable for the serving and direct consumption of meals. Such beakers were used for drinking or possibly even "ritual drinking" (Neustupný 1997: 310; Oliva 2010: 320).

Another exceptional feature of the wrapped amphora (find no. 287094 = vessel number 5 from pit number 522) is the fact that it had been intentionally covered with a layer of loess. On one hand, this caused damage but, at the same time, it has evidently contributed to the preservation of the aforementioned piece of cloth. Therefore, we can assume that the vessel was used for transportation of a liquid substance that was eventually partly consumed during ritual acts and then intentionally disposed off. In addition to protective functions, the piece of cloth may have had aesthetic purposes – the other vessels in the pit feature many decorative elements or their surface has visible decorative details. The aesthetic qualities of the amphora (being made from sandy material of rough surface) are inferior to those of the remaining vessels and the wrapping in the cloth may have eliminated these deficiencies.

The practice of wrapping in prehistory

The textile was a wrapping of a vessel which was put down into the pit. At the bottom of the amphora is one layer, but in some parts two to three layers survived, indicating

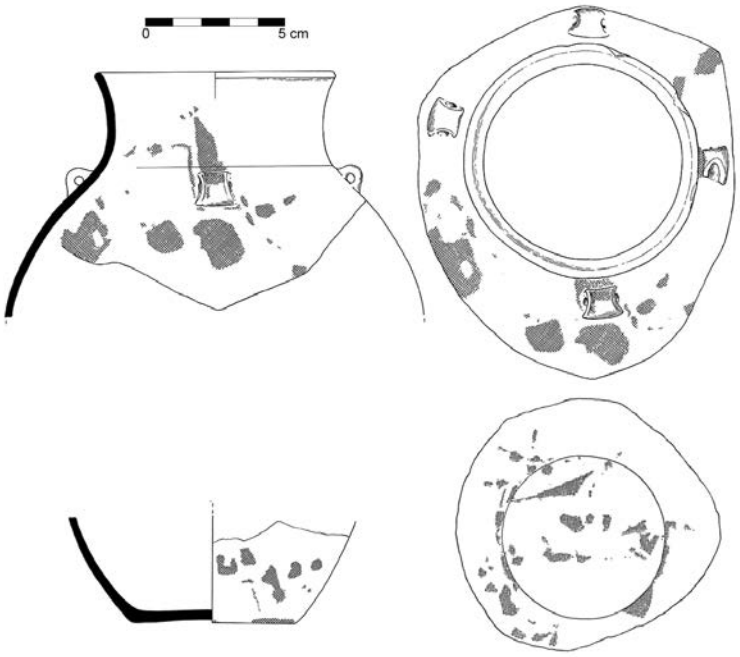


Fig. 4. Amphora (find no. 287094) with attached textiles (drawing: A. KRECHLEROVÁ).

that the fabric was folded or gathered to pack the vessel. The textile from Brodek raises a number of questions regarding the role of textiles both within settlements as well as in ritual contexts.

Usually we have little chance to find textiles in settlement contexts (except lakeside settlements). Was it common to use textiles as wrappings or coverings of vessels for storage within households? From other parts of the ancient world, *e.g.*, from Mesopotamia *c*. 2100 to 2000 BC, we know that textiles have been used as containers and wrappings of different kinds (see GARCIA-VENTURA & LÓPEZ-BERTRAN 2014: 193). Also cuneiform tablets and figurines were wrapped and stored in the houses. Ethnographic as well as folkloristic evidence tells us that textile wrappings, coverings and packing played a role for food storage, even until recent times (see SEYMOUR 1987: chapter "Kitchen").

In the case of the Brodek sanctuary, beside possible decorative function of the textile, the cultural meaning of the textile wrapping is of additional interest (DOUNY & HARRIS 2014: 15–35). So far, there is no information on the content of the vessel at the time of deposition. Possibly, the textile cover served as a protection for the content of the vessel. In that specific ritual context we also have to think about whether the textile also means to hide the content of the vessel – that other people attending the ritual were not able (or allowed) to see what was offered. Such traditions are widespread within ritual contexts worldwide – it might suffice to mention the textile covering of the chalice containing *Corpus Christi* in the Catholic Church. Within an ancient context, the example from

Mesopotamia shall be mentioned again (Garcia-Ventura & López-Bertran 2014: 201–205). Cuneiform tablets and figurines were wrapped in textiles, before they were put under the foundation of temples and other public buildings. Such the figurines were used in rituals (building sacrifices) and the textiles served as packaging, protection and concealment. It is of interest here, that Old Babylonian texts also comment that the act of wrapping (*e.g.*, of statues of gods) even had been a ritual in its own right.

There is some evidence for wrapping of objects in ritual contexts in Central European prehistory – most of them were connected with burial rites. The textile attached on a copper axe from a Funnel Beaker cremation grave at Džbán Mound I in Moravia, Czech Republic (Baldia *et al.* 2008a: fig. 2) can be interpreted as a textile wrapping. The wrapping of grave goods is also a common habit in Early Iron Age burial rites in Central Europe (see Banck-Burgess 2014; Gleba 2014). Various objects, such as swords, knives, but also vessels and even chariots (including their wheels) were wrapped with textile bands and larger fabrics. It is unknown which kinds of beliefs have led to a concealment of the dead and their grave goods. Perhaps there was a taboo forbidding the placement of bare metal in the grave. Maybe the burial goods were covered to render them invisible at the entrance into the otherworld. Practical reasons could also have led to this custom, for instance textiles soaked with grease and oil could have been wrapped around iron objects to prevent corrosion.

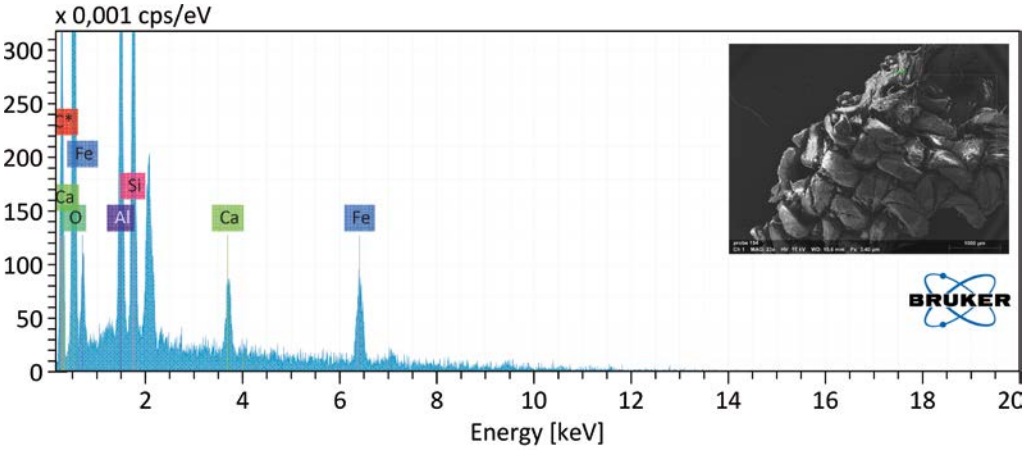
Very few textile finds from sanctuaries in prehistoric Central Europe are known so far. As an example the Býčí skála cave in Czechoslovakia (Parzinger *et al.* 1995) can be named. In that religious and sacrificial place a lot of offerings have been found, dating to the Hallstatt Period. Beyond them are 40 skeletons, a ceremonial wagon, weapons, bronze sheet vessels, jewellery, felt packages, balls of yarn spindles and the like. On some of the bronze objects remains of textiles are attached, *e.g.*, on bronze vessels, bracelets and even on the wheels of the wagons (unpublished, NHM). So it is likely that the bronze objects had been wrapped before deposition.

The textile

Material and methods

Textiles are organic materials and disintegrate easily, especially if buried in the ground. The great majority of archaeological textiles are tiny fragments, preserved in connection with metal artefacts such as bronze, iron or silver. Although often mineralised, and better designated as pseudomorphs than textiles, it is nonetheless possible to extract information from them on weave and yarn qualities, as well as identify if they had been made of plant fibre or wool.

In the case of the Brodek textile it is interesting, why it survived until today, as no metal artefact was found directly next to it. To date, the textile has some rust-reddish hue that points to iron. Spectral analysis were carried out to support that suggestion and to identify metal elements attached to the textile. Spectral analysis were made using a Electron



Element	At. No.	Line s.	Netto	Mass [%]	Mass Norm. [%]	Atom [%]	Comp.	Sto. [%]	Sto. Norm. [%]	abs. error [%] (1 sigma)	abs. erro (2 sign
Silicon	14	K-Serie	3495	6,10	17,33	14,51	SiO2	13,06	37,07	0,32	
Aluminium	13	K-Serie	3144	5,06	14,37	12,52	Al2O3	9,56	27,15	0,29	
Iron	26	K-Serie	1136	7,22	20,51	8,64	FeO	9,29	26,38	0,35	
Calcium	20	K-Serie	835	2,36	6,71	3,94	CaO	3,31	9,39	0,14	
Carbon	6	K-Serie	2201	0,00	0,00	0,00		0,00	0,00	0,00	
Oxygen	8	K-Serie	5937	14,47	41,08	60,39		0,00	0,00	2,22	
			Sum	35,22	100,00	100,00		35,22	100,00		

Fig. 5. Spectral analysis of the textile on amphora (find no. 287094) (D. TOPA, NHM).

Microprobe (Jeol JXA 8530-F) at the Central Research Laboratories, located at the Natural History Museum Vienna. The content of iron documented by spectral analysis is compatible with a geological origin. There is no evidence for intentional deposition of an iron-based pigment (*e. g.*, hematite). A combination of wet conditions (high ground water level) and a content of iron in the soil (Fig. 5) were probably responsible for the preservation of the textile.

Technical analysis of archaeological textiles describes weave type and technical details such as thread count, yarn diameter, use of plied or single yarn, twist direction (s or z), weaving errors, and seams can be studied. Fine structures of the weave, details of patterns and seams as well as thread diameter were documented with a DinoLite Digital Microscope and light microscope (Zeiss SteREO Discovery V20), together with measurements of technical details of the textile.

Fibre analysis was carried out using Scanning Electron Microscope (JEOL, JSM-6610LV). Electron microscopy is applied to study objects down to micro- and even nanometre scale (0.000001 mm) in a structural or analytical way. The following instrumental settings were used: 15–20 kV accelerating voltage and working distance of 25 mm. SEM analysis not only allows fibre identification, but also some information

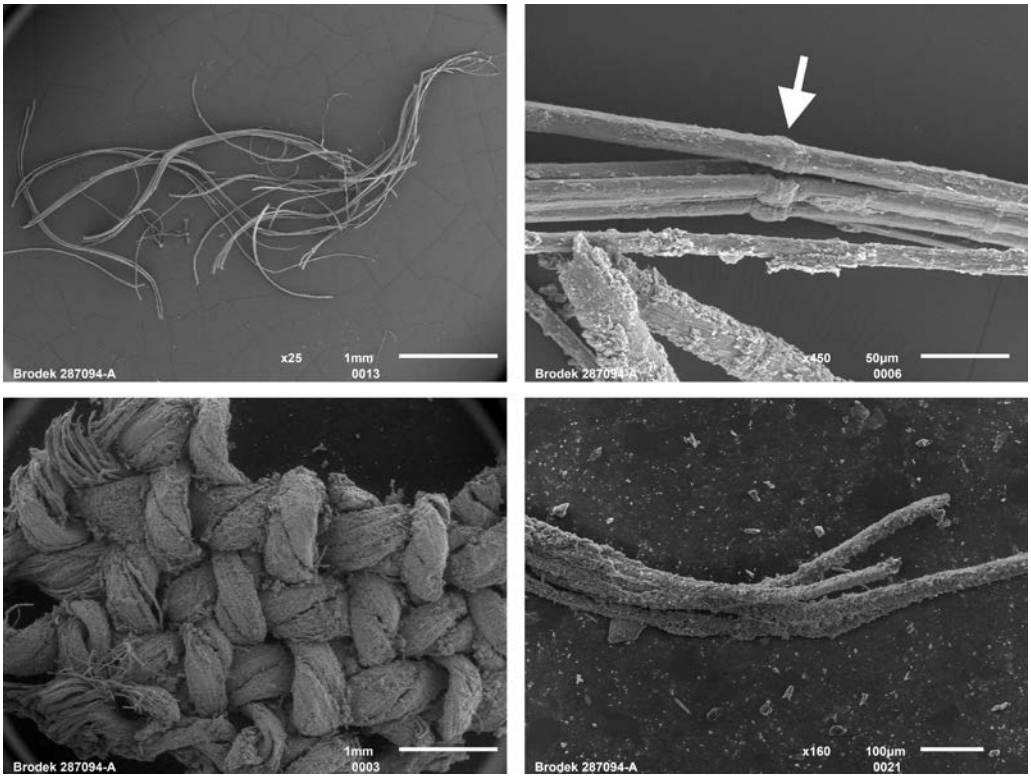


Fig. 6. Textile on amphora (find no. 287094): SEM images of the cleaned (above) and uncleaned (below) samples (SEM-photos: A. Rudelics).

about fibre processing and thread production can be achieved. That point was of specific interest here. The Brodek textile was examined less than one year after excavation before any conservation treatment. Materials used in conservation often cover the surface of the fibres and the fabric, usually leading to a loss of details and precluding fibre identification. Although this was not the case for the Brodek textile, incrustation by sediment particles and minerals obscured most details. Since the preservation of the fibres, however, appeared good (no signs of complete mineralisation or carbonisation) cleaning of the fibres was attempted. For this a short thread was detached from the margin of a textile fragment where fibre preservation appeared to be best (as judged by fibre surface corrosion and color under an optical microscope). This thread was immersed in a glass tube filled with distilled water and treated placed in an ultrasonic bath for two cycles of one second each. Cleaning result was checked under the microscope in between. Loose sediment particles were suspended by slight shaking of the tube and removed with the supernate. Two cycles of washing with distilled water followed, after which the fibres were removed from the water and attached to a SEM stub and air-dried. Before SEM imaging they were coated with platinium. For comparison another textile fragment was analysed in the SEM without cleaning (Fig. 6).

Fig. 7. Textile on amphora (find no. 287094): details of the fragment on the loess lump (Micropictures: A. KROH, NHM).

Technical description of the textile find

After lifting the amphora (find no. 287094) from pit 522, there were still textile fragments attached, also incrustations of the textile can be seen on large parts of the vessel. In minute excavation work, the fragments of the textile no longer attached were collected, also a clump of loess with in-situ position of textile from the bottom. The biggest fragment on the loess clump measures 2.3 × 1.3 cm (Fig. 7).

The textile can be described as a fine tabby, made of S-plied yarn (Tab. 1). On the fragments, no selvedges survived and warp and weft can, therefore, not be determined. However, the fabric is balanced and even: the weave density measures 12 to 14 threads per cm in warp and weft; also the thread diameters in both thread systems are more or less alike (about 0.4–0.6 mm).

There are some details on the threads that point to the fact that spliced yarn was used. The threads of the textile are a bit irregular and on tiny parts over-twisted due to the thread making method. The fibres used for the production of the textile were flax (*Linum usitatissimum* L.). The individual polygonal flax fibres and the nodes could be identified.

Table 1. Technical details of the textile (K. GRÖMER).

	Thread system 1	Thread system 2
Thread construction	plied yarn (spliced)	plied yarn (spliced)
Twist direction	S	S
Twist angle	40–50 °	40–50 °
Thread thickness	0.4–0.5 mm	0.5–0.6 mm
Thread count (threads per cm)	12–14	12–14

On the SEM images it is clearly visible that the fibres were not completely separated (Fig. 6, arrow, and Fig. 9; strips of linen fibres which were still stuck together with parallel nodes). Also, epidermic cells are visible sometimes (Fig. 9, arrow), which still "glue" the fibres together. This is another indication for the use of splicing, because for that technique strips of fibres rather than completely separated flax fibres are used.

The surviving textile fragments are beige with a reddish hue, which might be reasoned by the preservation conditions. The iron content of the surrounding soil had an influence on the colour. No traces of dyes were detected on the fibres by microscopic examination. Given the excellent preservation of the fibres, it thus seems likely that the textile originally had the "natural whitish" appearance of linen.

Textile technology of the 4th and 3rd millennium BC in Central Europe

The term "textile techniques" in a broad ethnographic and historic sense comprises different aspects: from the manufacture or production of raw materials to the production of fabrics from smaller units. That means not only weaving, but also other techniques like matting, basketry techniques, twining, netting, coiling and the like. Textile techniques also include the processing of finished fabrics (cutting, sewing) as well as their decoration, *e. g.*, embroidery and appliqué (Seiler-Baldinger 1994; Emery 1966). Nevertheless, here in the discussion of the Brodek textile, we concentrate on woven fabrics and the technologies used to make them.

Sources

Different contexts offer information about textile technology at the Late Neolithic / Copper Age in Central Europe (see *e. g.*, Grömer 2016: 20–32, and chapter B). Archaeological sites of settlements usually preserve textile tools, especially the ones which are made of clay or bone – such as spindle whorls and loom weights. The pile dwelling settlements built around the Alps in Austria, Switzerland, South Germany and Northern Italy furthermore provide information about organic materials. There textiles survive under waterlogged conditions. Intensive research on Late Neolithic material was carried out for the lakeside settlements in South Germany (*e. g.*, Feldtkellner & Schlichtherle 1987), but especially in Switzerland (*e. g.*, Rast-Eicher 2005; Médard 2010, 2012).

Perishable material such as wood, flax or wool, usually does not survive in settlements built in Loess areas like Moravia and adjacent areas. Only from one Bell Beaker settlement at Hulín-Pravčice 2 (Kroměříž County) remains of flax are known (Kočár & Kočárová 2010). Woven textiles from this area are sometimes preserved as imprints on pottery. Some of these were created accidentally like the imprint of a fine tabby weave on the bottom of a vessel from Bilcze Złote in Poland (Bender Jørgensen 1992: 244 and fig. 110). Others, like the imprints of ropes from the Corded Ware Culture, were created deliberately to gain a distinctive pattern on the neck and shoulder region of ceramic vessels (Grömer & Kern 2010). Textiles also can survive in connection with

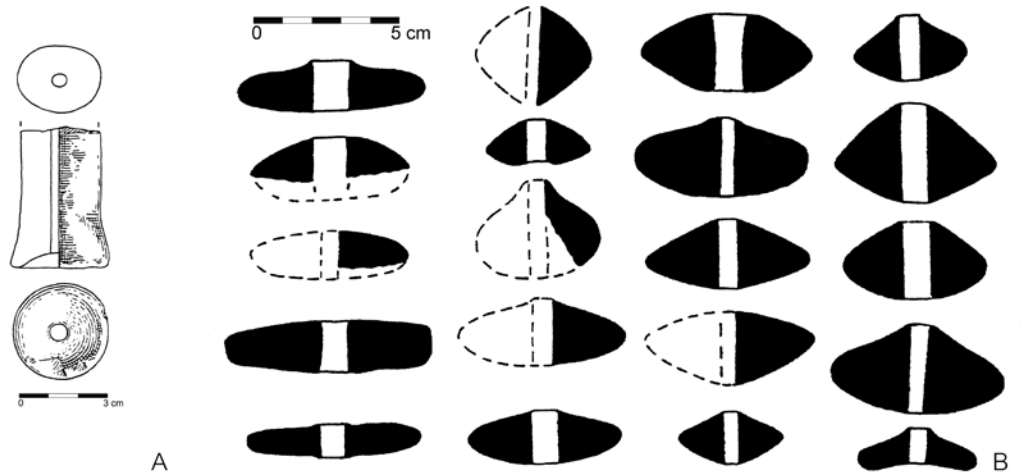


Fig. 8. Textile tools from settlements in Moravia: **A**: spool from "Pravčice 1", Kroměříž County. B: Spindle whorls from different sites (A: unpublished. B: selected from ONDRÁČEK *et al.* 2005).

metal artefacts. In settlements, but also in Late Neolithic graves sometimes textile pseudomorphs are preserved by copper salts (*e. g.*, BALDIA *et al.* 2008). Charred textiles also appear in the archaeological record from Late Neolithic. After carbonisation, the charred and usually shrunken textiles sometimes preserve (see WILD 1988: 11). A very specific case for the preservation of organic materials, including elements of textile techniques (netting, basketry and twining techniques) is the Iceman from an Alpine glacier at the nowadays Austrian/Italian border (FLECKINGER 2011), dated to *c.* 3300 BC.

Textile tools

It is possible to study textile tools from the 4th and the beginning of the 3rd millennium BC. From the settlements of the Cham/Jevišovice/Horgen horizon (3500 to 2700 BC), a rich body of tools related to textile production is known (for Austria *e. g.*, GRÖMER 2006: fig. 5; Switzerland: LEUZINGER 2002; Moravia, Bohemia and Silesia: JANÁK 2011). There are spindle whorls, spools and loom weights made of clay, bone tools such as awls, needles and two-pronged bone tools for flax hackling.

Also the Funnel Beaker (*Trichterbecherkultur* – TRB) settlements yielded textile tools. From Rmíz in Moravia, dated to 3600 to 3200 BC, spindle whorls and loom weights were recorded (BALDIA 2004: 68). Moreover, at Middle Eneolithic hillforts (TRB and "Boleraz") in central Moravia, *e. g.*, Hrad u Bílovic, Ohrozim-Čubernice, Prostějov-Čechovice hundreds of ceramic spindles were found (see ŠMÍD 2010; ŠMÍD & PŘICHYSTAL 2015). M. ŠMÍD wrote (ŠMÍD & PŘICHYSTAL 2015: 157–158) *"about a potential connection between these sites and agriculture activities (production of flax) and finally about workers activities (stone industry production and production of textile)"*.

There is a big difference between Middle Eneolithic and Late/Final Eneolithic. Corded Ware settlements in the Czech Republic provide us similar types of spindle whorls, but just few of them (*e. g.*, Buchvaldek 1992: fig. 3). From Moravian Bell Beaker settlements also a few textile tools are recorded: One ceramic spool was excavated from site "Pravčice 1", Kroměříž County (unpublished; pit no. 70, Archeologické centrum Olomouc, A. Tajer and M. Daňhel; Archive of Archaeological Institute Brno, Report No. 4019/15). Also at various other settlement's sites spindle whorls were found (see Ondráček *et al.* 2005) (Fig. 8). So far, no spindle whorls or loom weights were discovered in Corded Ware and Bell Beaker graves. It seems as if textile tools were no task to serve as a burial good (*e. g.*, in Moravian graveyards: Dvořák *et al.* 1996).

Comparison finds – woven fabrics between 4000 to 2000 BC

To set the Brodek textile into a wider context, woven fabrics have to be discussed. As finds of the Bell Beaker horizon (2500–2200 BC) are more or less scarce, we extend the discussion to the timespan to between 4000 and 2000 BC, which is more or less the beginning of the Late Neolithic/Copper Age till the beginning of Early Bronze Age in Central Europe.

From the territory of modern Czech Republic (especially from Moravia), we only know a few Late Neolithic textile finds. In earthen long barrows of the Funnel Beaker Culture (TRB IIA), with a date between 3600 and 3200 BC, in the area of the TRB fortified hilltop site of Rmíz, some textile fragments could be identified. The Křemela I mound cluster (Baldia *et al.* 2008b: 32 and fig. 12) is some 600 m far from Rmíz. Flotation of the soil matrix of the cremation burial grave 1 from mound 2, resulted in the discovery of two tiny charred textile fragments. The find has exhibited several textile layers – obviously it had been folded. It was initially thought to be made from wool. However, microscopic analysis showed it to be woven from finely spun linen threads with a thread count of 13 threads per cm (Baldia 2004). Additionally from a burial mound at Džbán Mound I, located *c.* 2 km northeast from Rmíz (Baldia *et al.* 2008a: fig. 2) a copper axe was found, to which a textile pseudomorph was still attached. According to the excavation report it was not possible to scientifically sample the piece to determine whether the textile was wool or flax. However, the imprint shows a tabby fabric.

From the neighbouring countries also just a few textiles are known – all of them tabby fabrics: from Poland, Neolithic textiles on pottery found at Bilcze Złote were reported, which are associated with the *Kultura Tripolska* (Bender Jørgensen 1992: 244). The imprint of the balanced tabby fabric has a thread count of 7 threads per cm. Recently some more finds have been discussed by Tomasz Chmielewski (2009: 277–278), among else a coarser tabby fabric from the funnel beaker site Niedźwiedź. The textile with 1 mm thick S-plied yarn shows only 5–6 threads in one thread system and 8–9 in the other.

From Germany, textiles associated with the Funnel Beaker Culture are known from Gollwitz, Kreienkropp and Spitzes Hoch near Latdorf. There S-plied linen yarn of 0.5 mm

thickness was employed to create different tabby textiles with thread counts between 9 and 15 threads per cm (Bender Jørgensen 1992: 51 and 224). Closer to the Brodek find by means of chronology are the finds from Lützendorf (Bender Jørgensen 1992: 224), dated to the Corded Ware, and Wiepenkathen, belonging to the Bell Beaker Culture of north-western Europe (Bender Jørgensen & Rast-Eicher 2015: 67–68, fig. 5.1–5.2). The latter find is of specific interest because it belongs to the earliest wool textiles known in Europe.

A rich body of woven textiles from that time-span are also known from Swiss lakeside dwellings. The weave-type of the textiles is tabby, but we know of different starting borders and even some pattern types (*e.g.*, Médard 2010: 109–122; Rast-Eicher & Dietrich 2015: 82–93). The textiles thus display some interesting techniques to embellish their borders and to create visual effects. Sometimes fringes were inserted for decorative reasons as well as functional ones, also structure pattern with different thread thicknesses and additional wefts are known. Interestingly for woven textiles not only flax was used but also tree-bast such as lime. For the understanding of textile qualities the material from lake Zürich may serve as an example (Rast-Eicher & Dietrich 2015: 83–85, fig. 231). The threads are usually S-plied, with diameters between 0.5 and 1 mm, sometimes even reaching 0.3 mm. The weaves are mostly of a balanced type, with similar threads counts in warp and weft. The main body of the textiles has thread counts between 8 and 12 threads per cm. Some are very coarse with only 5 threads and some reach fineness until 20 threads per cm. At present no clear chronological trend in textile qualities can be recognized for textiles from the beginning of the 4th millennium (Pfyn Culture in Switzerland) to those from the end of the 3rd millennium (Corded Ware).

Even in the Early Bronze Age, around 2200–2000 BC textiles still were usually made from plant fibre and with S-plied yarn. Famous finds derive from lakeside dwellings in Northern Italy, namely from Molina di Ledro (Bazzanella & Mayr 2009: 75–138). From the countries adjacent to Czech Republic the grave find from Franzhausen in Austria can be named (Grömer 2016: fig. 98), a fine ribbed tabby with colour stripes.

To sum up that evidence, the Brodek textile fits in very well with the textile culture of the 4th and 3rd millennium BC in Central Europe and it is on the medium-fine scale in terms of textile quality.

Handcraft details of the Brodek textile

Technical details on the threads as well as features of the flax fibres visible in the Scanning Electron Microscope point to the fact that the threads of the Brodek textile were made by using the splicing technique. As mentioned before, the fibres are still stuck together, the parallel nodes can be clearly identified as well as parts of the epidermis (Fig. 9). The fibres thus did not undergo a final retting (incomplete decay under aerobic conditions) and hackling/combing process to separate them completely.

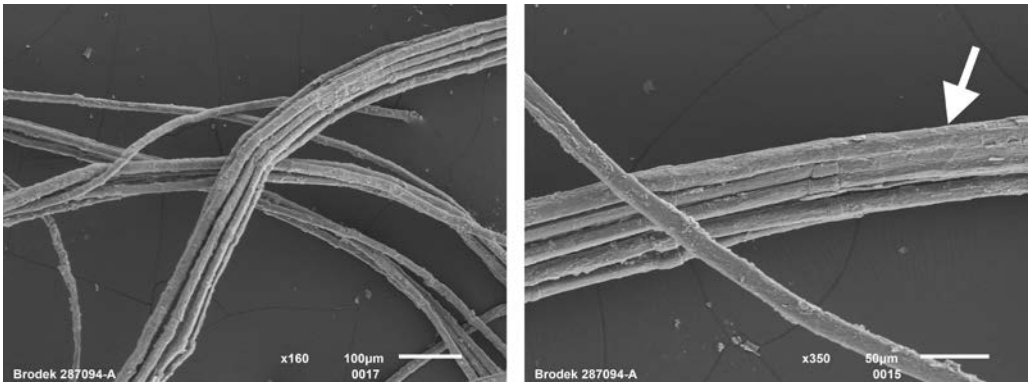


Fig. 9. Brodek-Textile: Fibres not separated (SEM image A. Rudelics).

Splicing as a technique for thread production was well examined for Egyptian linens (*e. g.*, Vogelsang-Eastwood 1992; Granger-Taylor 1998). Recently, more attention is laid on this specific technique even in discussing archaeological material from prehistoric Europe. The results from the SEM analysis carried out on linen threads from Swiss lakeside dwellings and experimental archaeology are as follows: Neolithic thread was plied using two spliced yarns, therefore the flax had to be partly (incompletely) retted, but was not combed (Leuzinger & Rast-Eicher 2011). Furthermore, the results indicate that the splicing technique for flax was adopted from the older tree-bast treatment procedures.

For splicing (Barber 1991: 44–47; Granger-Taylor 1998: 103–104) the ends of pre-formed fibre bundles (strings or strips), stripped from the flax stalks, were spliced together, so that the ends of the ultimate fibers overlapped in bunches and at considerable intervals. After that first step, two of such elements were then twisted or plied together (Fig. 10).

Tools that could have been used to prepare the flax fibres for splicing might be *e. g.*, pronged bone tools such as the ones from Attersee (Grömer 2016: fig. 30). With them the fibres could have been torn from the flax stems as several strips [including removing the phloem and xylem (*i. e.* the inner layers of the flax)] and some coarse separation could be achieved. Different tools for flax processing are also known from Late Neolithic lake dwellings, *e. g.*, from Egolzwil and Zürich in Switzerland (Rast 1990: fig. 2). The intensive hackling and combing process to get fine, separated fibres maybe was not done before Bronze Age in Central Europe (Leuzinger & Rast-Eicher 2011: 541), as proven by SEM analysis of linen threads.

For splicing also a spindle can be used to add twist to the thread, as the spliced thread required a lot of spin. The spindle whorls of the Cham and Horgen cultures sometimes reach weights of over 100 g. Maybe those heavy whorls were well suited for adding twist to spliced yarn, because their inertia offers a long, continuous turn (see time of operation: Grömer 2005: fig. 9).

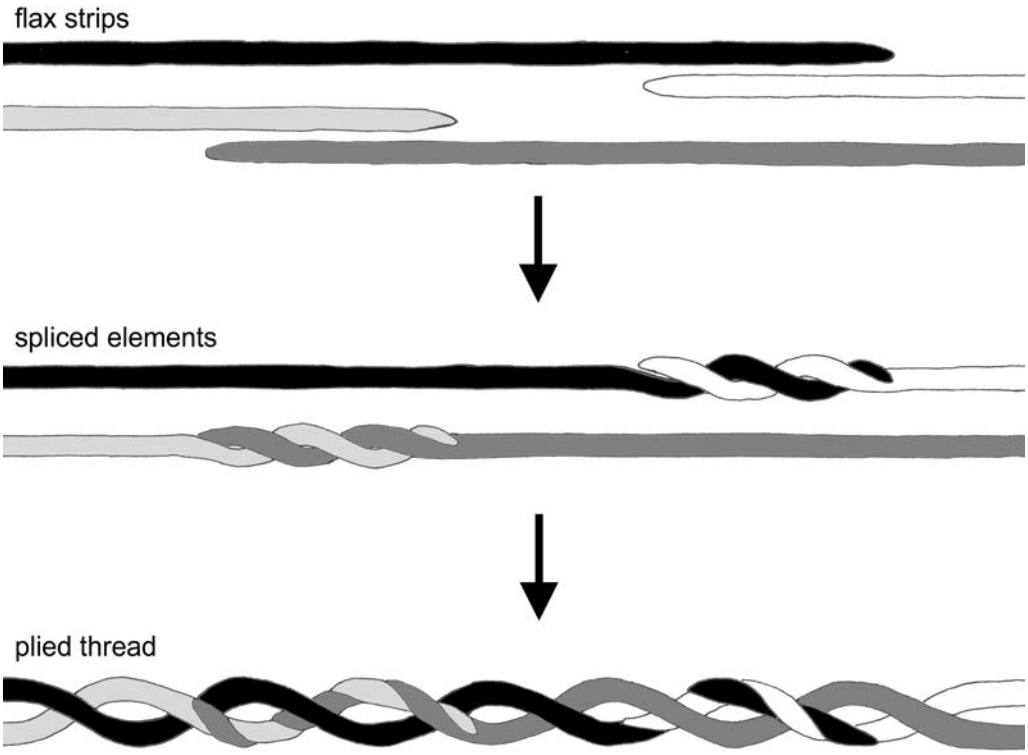


Fig. 10. Principle of splicing (drawing: C. MEYER and K. GRÖMER).

For weaving a fabric out of the threads we have evidence for the warp-weighted loom in the 4th and 3rd millennia BC in Central Europe. Impressive finds are *in situ* layers of loom weights which even give us a suggestion, how large the fabrics that were woven on them could have been. A loom from a settlement in Krems-Hundssteig, Austria (Jevišovice Culture, *c.* 3100 BC) consists of approximately 30 large, cylindrical loom weights. They were found in three rows at a length of 1.20 m parallel the wall of a pit house (GRÖMER 2016: fig. 57).

The Brodek textile itself is too small to give further technical details of the weaving process, because no borders, weaving faults or the like are visible on the tiny fragments.

Conclusion

During the construction of a motorway overpass near the township of Brodek u Prostějova (Prostějov County) in Moravia a very unusual archaeological structure was discovered, which differs from the previously known layouts of prehistoric settlements or burial grounds. The building of Brodek u Prostějova clearly was a well-planned structure reflecting the then-known information about geometry and possibly even astronomy. It

is assumed that this building was a multi-purpose building, fulfilling social and cultic needs and possibly serving as a place for observing the movement of celestial bodies – thanks to which the people were able to grasp the physical quantity of time. It was built by the peoples of the Bell Beaker Culture almost 4,500 years ago.

In one of the sacrificial pits an amphora was found, wrapped into a textile. The practice of wrapping artefacts into organic material is a custom that is not well examined due to the lack of organic finds in conventional sites in Central Europe. We know such rites from Bronze and Iron Age burials, where we sometimes find textiles attached on metal artefacts. It seems as if wrapping and such covering burial gifts was very common. Also offered objects found in the sacrificial cave of Býčí skála cave in Czech Republic have traces of textile wrappings. Therefore, we know that textiles played an integral role in ritual activities in prehistory.

Due to the rarity of Neolithic textile finds from loess areas, the textile itself is of interest as well. It is a tabby weave with 12 to 14 threads per cm and comparatively fine for Neolithic and Early Bronze Age finds. Close examination demonstrated that it was woven with threads made from flax, consisting of incompletely retted fibres. The technique used was splicing, which is well known from the Eastern Mediterranean and Ancient Egypt. The find from Brodek u Prostějova, therefore, offers interesting insights in the textile technology of the 4th and 3rd millennium BC in Central Europe.

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