FASCICULI ARCHAEOLOGIAE HISTORICAE
FASC. XXIII, PL ISSN 0860-0007

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TABLET-WOVEN AND TABBY-WOVEN BRAIDS FROM THE CZECH LATE MEDIEVAL ARCHAEOLOGICAL FINDINGS

Waste pits, fecal reservoirs and wells of High and Late Middles Ages that, having lost their original function, were often used as sink-holes, are frequently subjects to archaeological research of urban zones. The organic matter that fills up such objects comes hides a number of textile fragments offering a unique and broad source of findings about the trade of textile making of the time.

Unfortunately, until recently, experts in the Czech Republic have not paid sufficient attention to small and unsightly textile remainders, and a number of such finds, excavated from their humid surroundings of the organic layers, were not treated and stored appropriately, and quickly perished. This is one of the reasons why as part of the Czech and Moravian excavation projects only a few sets of textile from medieval wells and reservoirs in the cities of Plzen (West Bohemia), Prague (Central Bohemia), Opava (North Moravia) and Tabor (South Bohemia) including nearly three hundred different fabrics and textile products have so far been processed, analyzed and introduced in publications[1]. It is only in the past few years that the numerous sets of textiles from medieval waste layers are being traced, processed and analyzed.

Based on the medieval textile fragments from waste layers processed and published so far it can be concluded that a majority of textile fragments are made up of wool milled and non-milled fabrics in plain weave with a count of up to 20 threads per 10 mm in warp and weft, with a dominance of reversed twist (Z / S) in both thread systems that can be considered to be the usual production of local textile craftsman. The fact that textile products made of vegetable fibers are almost absent is not a proof of popularity of a specific textile material, but only reflects the reality that vegetable fibers are hard to be preserved and thus rare to be found. Therefore, it is not possible to conclude that the fabrics which are most frequently found were also the ones most frequently produced and used textile products, because we are lacking information on fabrics made of vegetable fibers that must have been also used widely but have not been preserved for our research. Besides wool fabrics in plain weave, almost every set of textiles includes also more complicated weaves – 2/1 and 2/2 twill, interesting were also the rare finds of braids made on a loom with a rigid heddle or a band loom for tablet weaving laced in plain weave with a high number of threads in warp and weft that can be taken for a proof of availability of more luxurious silk products at urban areas that have always been imported into the Czech lands[2].

The interpretation of the original function of the textile fragments found is in most cases highly problematic because a majority of these fragments preserved no detail or characteristic element (e.g. stitches, hems, seams, fringes, ornaments, etc.) that would allow for a more detailed knowledge of the original function or shape or design of the product. However, the fact that they were found in waste or fecal layers implies to their secondary use – small torn or cut textile fragments could have been used for lavatory purposes, similarly as today's toilet paper[3].

This essay focuses on two unique finds of tabby-woven and tablet-woven braids which are quite rarely discovered in the sets of textile fragments. Despite of having been highly practical and probably frequently used textile products, it should be pointed out that the key and most important characteristic of these braids (or straps or hems) was their strength, and therefore, they were often made of stronger textile materials of vegetable origin (flax, hemp) which materials are much harder preserved in soil.

Tablet-woven braid (Fig. 1-4)

Fragments of this braid were found in 1968 inside the well no. 1 on the Perlova street no. 83, on a plot of land in the center of the city of Plzen (West Bohemia), and it is dated as originating in the mid-15th century. The braid is

[1] H. Březinová, *Textilní výroba v českých zemích ve 13. – 15. století. Poznání textilní produkce na základě archeologických nálezů.* (Textile manufacture in the Czech Lands in the 13th – 15th centuries. Understanding textile production on the basis of archaeological finds), Praha – Brno 2007; J. Staňková, *Textil ze 13.–15. století v archeologických výzkumech českých zemí*, (Textile from the 13th through 15th centuries in archaeological research in the Czech Lands), „Český lid 54", Praha 1967, pp. 155–168.

[2] H. Březinová, *Textilní výroba v českých zemích...*, pp. 45-50.

[3] K. Tidow, *Herstellung und Verbreitung von Gewebebindungen bei norddeutschen Wollgeweben des Mittelalters aufgrund von Neufunden*, „Lübecker Schriften zur Archäologie und Kulturgeschichte 16", Bonn 1989, p. 335.

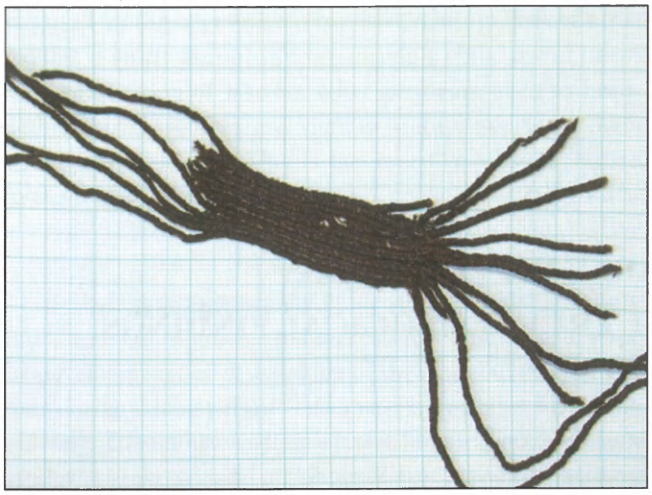

Fig. 1. Tablet-woven medieval braid from archaeological research in Plzen (Photo by: Helena Březinová).

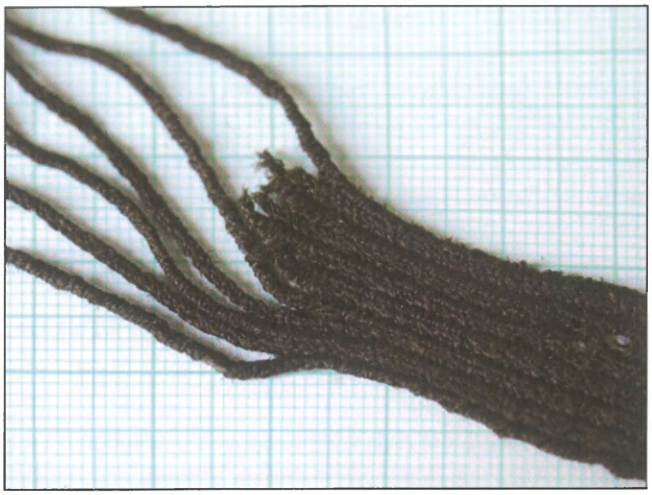

Fig. 3. A weave detail of tablet-woven braid (Photo by: Helena Brezinová).

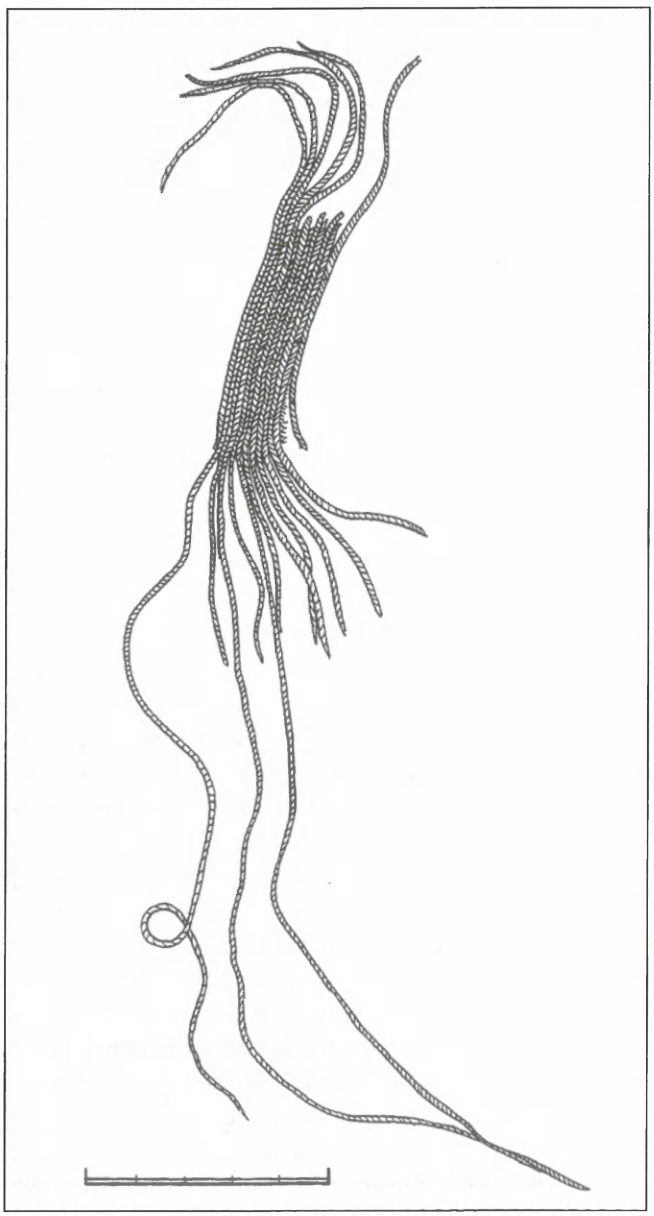

Fig. 2. Drawing documentation of tablet-woven braid (Drawing by: Helena Březinová).

Fig. 4. A weave detail of tablet-woven braid (Photo by: Helena Březinová).

deposited in the Museum of West Bohemia in Plzen under the inventory number of HA 14419. The textile and technological analyses of the braid were done at the Restoration Laboratory of the Archaeological Institute of the Academy of Sciences of the Czech Republic in Prague, being documented using the Olympus BX 40 laboratory microscope and Olympus E 520 camera[4].

The braid is well preserved as a single piece and cluster of warp threads separated from the braid, currently showing a dark brown color (it has not been attempted to restore the original color). The threads in the braid are made of sheep's wool; the material was detected through a microscope analyses of the fibers which feature visible epidermic scales typical for wool fibers. The entire braid fragment is 52 mm long and 14 mm wide. The fragment preserved only a single fixed side edge, while the other edge is missing, and thus it is

[4] H. Březinová, *Textilní výroba v českých zemích...*, p. 26.

not possible to establish the original width of the braid. The same is true about the original length of the braid, because we are missing the upper and bottom edge, so that only the length of the longest thread (separated from the braid) of 335 mm can be given. The warp threads feature an 2z/S plying twist, the weft threads are spun with a Z twist. The count of warp is 40 threads per 10 mm, and the count of weft is 11 threads per 10 mm. The width of threads in both is 0.5 mm on average, general width of 4 together twisted threads from one tablet is 1,5 mm.

The braid is woven using a band loom for tablet weaving, on at least 13 square tablets. Due to the fact that only one original fixed edge was preserved, it is not possible to establish the original number of tablets used, or the number of warp threads. As the tablets turn during weaving four warp threads fixed to a single tablet are twined together, and this twist allows for detecting the direction of tablet turning during weaving – every odd tablet was turning to the left (the four warp threads are twined together in an S-twist), and every even tablet was turning to the right (the warp threads of these tablets create a Z-twist). Such technique was certainly used on purpose, because it was a way of creating a plastic, and if threads of different colors were used, also a colorful design.

The band loom for tablet weaving was a loom used for narrow braids and straps which were very strong, and at the same time, thanks to a special tappet generated by the turning of the tablets, and featured diverse designs used primarily for decorative purposes. The use of this kind of loom in medieval Europe is well substantiated thanks to iconographic sources as well as the rare findings of braids made of various materials[5].

The most important component of this band loom were small square tablets with four round openings in the corners (or polyhedral tablets with more openings) through which the warp threads pass. The tablets can be made of various materials – wood, bone, antler, skin or tree bark. The number of tablets used on a single loom depended on the expected width of the braid being made - the higher the number of tablets, the wider the final braid[6]. The principle of table weaving is that the weft passes through a shed which is created by rotation of the tablets about an axis to the left or right by 90, 180 or 360°. This rotation, which follows a predefined system subject to the desired design of the braid, causes the warp threads running through the openings of a single tablet to twine together, thus ensuring that the final textile product is exceptionally strong. The warp threads of the band loom for tablet weaving are attached using three different ways – firstly, hanging vertically where their upper section is attached to a single fixed point and the other end they are weighted down by weights ensuring that the warp is tight; secondly, handing horizontally where one end is attached to a fixed point, while the weavers bind the other end around their waist to make sure that the warp remains tight; thirdly, attached to weaving bench with two rotating rollers secured by a cogwheel to prevent reversed rotation. One of these rollers is used for attachment of warp threads and for rolling of the finished fabric; the second roller serves to supply and to tighten the warp threads[7].

Tabby-woven braid (Fig. 5-7)

The fragments of this braid come from archaeological excavations in Chomutov (North-Western Bohemia), the Žižka square (Probe 5, Sector 4, Layer 5098) carried out in 2008. The braid was found in many tiny fragments was in a fire destruction layer in the interior of the bulwark tower, dated to 1525. During the fire, the individual floors of the tower burnt through and the furnishing of all the rooms came down to the ground floor. The finds of kitchen and table ceramics, tiles, glass containers, arms, furniture or small-size items of private use imply that these are remainders of the dwelling place of the tower or gate keeper[8]. The braid fragments are deposited in the Regional Museum in Chomutov. The textile and technological analyses of the braid were done at the Restoration Laboratory of the Archaeological Institute of the Academy of Sciences of the Czech Republic in Prague, being documented using the Meiji Techno EMZ 13TR stereo-microscope and Olympus E 520 camera.

The braid remainders were preserved in the form of over 30 small and separated fragments of the maximum size of 30x20 mm that were extracted from the charred layer containing clinkers and baked organic remainders. The textile fragments of black color are dry, very fragile, and when being manipulated they disintegrate into individual threads or dust. The textile structure is preserved in a single layer or more superimposed layers as the braid was folded, and a single fixed side edge, made of weft thread, is recognizable on three fragments.

The braid is plain woven, and the typical structure shows that it was made using a loom with a rigid heddle. However, not both fixed edges were preserved in the fragments,

[5] E. Crowfoot, F. Pritchard, K. Staniland, *Textiles and clothing (c. 1150 – c. 1450*, [in:] *Medieval finds from excavations in London*, Vol. 4, London 1992, pp. 24, 130-138; M. Michałowska, *Leksykon włókiennictwa*, Warszawa 2006, pp. 211, 399.

[6] M. van Epen, *A short history of tablet weaving from the iron age to the middle agens*, [in:] *Textiel van 4000 voor tot 1500 na*, eds. A. Boonstra, W. Zuidweg, Eindhoven 1997, pp. 6–9.

[7] H. Březinová, *Textilní výroba v českých zemích...*, pp. 85-86; H. Stolte, *Technik des Brettchenwebens*, „Experimentelle Archäologie in Deutschland. Archäologische Mitteilungen aus Nordwestdeutschland", Beiheft 4, Oldenburg 1990, pp. 434–437.

[8] For contextual site information to the finds I would like to thank Mr. M. Sykora from the Institute of Archaeological Cultural Heritage Protection for North-Western Bohemia in Most. I am also grateful to Mr. D. Kohout, student at the Technological University in Prague for his assistance with documenting and analyzing the braid fragments.

Fig. 5. A fragment of charred tabby-woven braid (Photo by: D. Kohout).

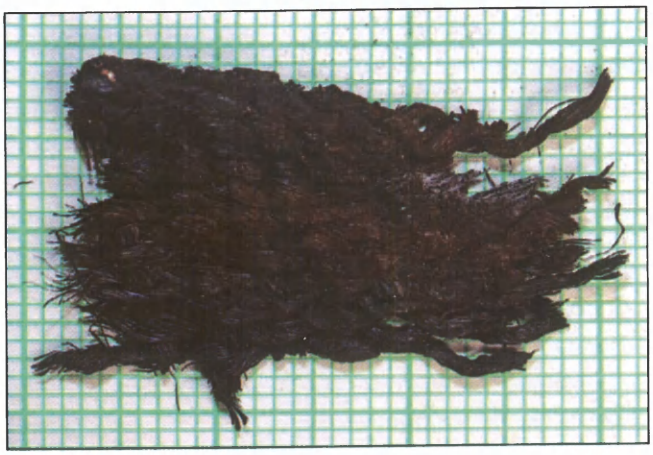

Fig. 6. A fragment of charred tabby-woven braid (Photo by: D. Kohout).

Fig. 7. A weave detail of tabby-woven braid (Photo by: D. Kohout).

and thus, it is not possible to establish the original width of the braid or the number of warp threads. The fragments and the single preserved edge imply that the braid was at least 30 mm wide.

The braid is made of twisted threads with the warp featuring threads with twists of 2z/Z and 2s/S (i.e. two simple threads with an identical twist were twisted together also with an identical twist); thus, threads with two types of final twists can be found in the fragments. The preserved, small-sized fragments cannot be used to recover the system of their alternation; some fragments show an interval of the final twisted thread of S/Z/S/Z/S, others show an irregular alternation (e.g. Z/Z/Z/S/S/S or Z/Z/S/S/S/Z/S). However, it is clear that such alteration was not accidental and it must reflected on the final look of the braid that is not perceptible on the preserved, small-size fragments. Most of the weft threads feature a 2s/S twist, however, also several threads with a 2z/Z twists were found. The warp threads are on average 1 mm wide; the width in individual fragments ranged 0.8 to 1.5 mm. The width of threads in weft ranges 1 to 1.5 mm. The count of warp is 12 to 14 threads per 10 mm, and 3 to 4 threads per 10 mm in weft.

It is very difficult to establish what material was used. The braid fragments are charred and burnt, and thus it was not possible to take such samples whose cell structure would be identifiable in microscopic analysis. However, it is reasonable to believe that it was an animal textile material (possibly sheep's wool) because the threads of most fragments were clearly caked during the fire.

The rigid heddle loom that was most probably used to make this braid is a small, hand loom used primarily for the production of narrow and strong braids and straps. The key component of a loom with a rigid heddle is a wooden, flat slide with two types of openings drilled trough it – either small and round openings, or long and elongated ones – that alternate in a regular pattern. The width of the slide and the number of openings depends on the number of warp threads and controls the final width of the braid. The number of openings is always odd, and the openings in the beginning and the end of a given line are always round. The weaving slat can be used either separately – the warp threads pass through individual openings and are attached to one fixed and another moving point, usually the weaver's waist. The slide may be also a part of a small box loom featuring two rotating rollers fastened at a specific distance from one another and secured by a cogwheel to prevent reversed rotation. One of the rollers is used to supply the warp threads, the other for rolling of the finished fabric. The slide is placed in the middle of warp threads, and the shed at the place of the weft is created by alternating lifting-up and pressing-down

of its outside the level of warp threads passing through the round openings. The warp threads in the elongated openings then get either over or under their level and the weft is brought into the resulting gap (shed)[9].

Conclusion

The presented finds of two braids made using a band loom for tablet weaving and a loom with a rigid heddle document the use of other textile products, techniques and equipment than the more common fragments of fabrics made using the typical weaving device – the horizontal loom. They are a small probe to the richness and diversity of the textile material culture that due to its fragility otherwise remains a bit mysterious to us.

Translated by Veronika Řepíková

Streszczenie

Niestety, do niedawna eksperci w Czechach nie przywiązywali należytej wagi do małych i niepozornych pozostałości tekstylnych, w wyniku czego pewna liczba takich znalezisk, odkrytych w wilgotnym otoczeniu warstw organicznych, nie zostawszy odpowiednio zabezpieczona i zmagazynowana, uległa szybkiemu zniszczeniu. Jest to jeden z powodów, dla których, jako część czeskich i morawskich projektów wykopaliskowych, tylko kilka zbiorów tekstyliów ze średniowiecznych studzien i zbiorników w miastach Pilzno (Czechy Zachodnie), Praga (Czechy Środkowe), Opawa (Czechy Północne) i Tabor (Czechy Południowe), obejmujących niemal trzysta różnych tkanin i innych produktów tekstylnych, zostało do tej pory poddane obróbce, analizie i opublikowane.

Artykuł skupia się na dwóch unikatowych znaleziskach: krajki wykonanej na tabliczkach i krajki w splocie płóciennym, rzadko odkrywanych w zbiorach fragmentów tekstylnych.

Fragmenty krajki wykonanej na krosienkach tabliczkowych, datowane na połowę XV wieku, znalezione zostały w centrum Pilzna w Czechach Zachodnich. Krajka jest dobrze zachowana w postaci fragmentu gotowego wyrobu oraz osobnego pęku nici osnowy, obecnie o ciemnobrązowym zabarwieniu. Nici wykonane są z wełny owczej, całkowita długość fragmentu wynosi 52 mm, a szerokość 14 mm. Krajka została utkana na krośnie taśmowym do tkactwa tabliczkowego przy użyciu przynajmniej 13 kwadratowych tabliczek.

Fragmenty krajki w splocie płóciennym pochodzą z wykopalisk w Chomutowie w północo-zachodnich Czechach i są datowane na początek XVI wieku. Szczątki tej krajki zachowały się w formie 30 małych, oddzielnych fragmentów, z których największy ma wymiary 30 x 20 mm. Kawałki te zostały wydobyte ze zwęglonej warstwy zawierającej klinkier i zwęglone resztki organiczne. Fragmenty czarnej tkaniny są suche i bardzo kruche, tak że pod wpływem dotyku rozpadają się na pojedyncze nici lub ulegają sproszkowaniu. Krajka jest wykonana w splocie płóciennym, a jej typowa struktura wskazuje, że została ona utkana przy użyciu krosna ze sztywną struną nicielnicy.

Zaprezentowane tutaj znaleziska dwóch krajek, wykonane przy zastosowaniu krosna taśmowego do tkactwa tabliczkowego oraz krosna ze sztywną struną nicielnicy, świadczą o istnieniu innych produktów tekstylnych, technik i wyposażenia niż częściej odnajdywane fragmenty tkanin wyprodukowanych przy użyciu typowego urządzenia tkackiego – krosna poziomego. Stanowią one skromną próbkę bogactwa i różnorodności tekstylnej kultury materialnej, która z powodu swojej kruchości na ogół pozostaje dla nas nieco tajemnicza.

[9] H. Březinová, *Textilní výroba v českých zemích...*, pp. 86-87; E. Crowfoot, F. Pritchard, K. Staniland, *Textiles and clothing...*, pp. 25, 141; M. Michałowska, *Leksykon włókiennictwa...*, pp. 27, 204.