MULTI-ASPECT ANALYSIS OF NEOLITHIC BONE TOOLS FROM KOPYDŁOWO, SITE 6, POLAND

Análisis multi-aspectual de útiles neolíticos de hueso procedentes del yacimiento 6 de Kopydłowo (Polonia)

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ABSTRACT The paper presents the results of osteological, typological, and microwear analyses of Neolithic bone tools recovered from Kopydłowo, site 6 (Greater Poland Province, Poland). The site is known for a pit with a number of bovine horn cores, a presumable refuse from Neolithic horn working. A multi-aspect analysis revealed the kinds of raw materials used for the production of bone tools and provided insights into how the specimens were worked and used. Twenty-nine out of 36 tools were identified to taxon. All artefacts were made from mammal bones, mostly cattle, sheep/goat, red deer, and pig. Awls and perforators, used to work with a soft organic material, were the most common tool types at the site. Some scrapers and polishers for hide working, as well as spatulae, a T-shaped axe, a chisel, a pendant, and pieces of raw material were also found. The presence of two tools made from wild mammals' bones may possibly contribute to the discussion on contacts between farmers and hunter-gatherers in the Neolithic.

Key words: Bone tools, Osteological Analysis, Typological Analysis, Microwear Analysis, Neolithic, Greater Poland.

RESUMEN El artículo presenta los resultados de los análisis osteológicos, tipológicos y de microdesgaste de los útiles neolíticos de hueso recuperados del yacimiento 6 de Kopydłowo (provincia de Gran Polonia, Polonia). Este yacimiento se conoce por un pozo en el que se encontraron varios cuerpos óseos de cuernos de bóvido, un presumible resultado del trabajo neolítico del cuerno. Un análisis multi-aspectual reveló los tipos de materias primas utilizadas para la producción de instrumentos de hueso y proporcionó infor-

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mación sobre cómo se trabajaron y usaron las piezas. De 29 de 36 útiles se identificó el taxón faunístico. Todos los artefactos se hicieron con huesos de mamíferos, principalmente de ganado vacuno, de caprinos, ciervos y cerdos. Punzones y perforadores, utilizados para trabajar material orgánico blando, eran los tipos de instrumentos más comunes en el yacimiento. También se encontraron algunos raspadores y pulidores para el trabajo de la piel, así como espátulas, un hacha en forma de T, un cincel, un colgante y fragmentos de materia prima. La presencia de dos instrumentos hechos de huesos de mamíferos salvajes posiblemente contribuya a la discusión sobre los contactos entre los agricultores y los cazadores-recolectores durante el Neolítico.
Palabras clave: Útiles de hueso, Análisis osteológico, Análisis tipológico, Análisis de huellas de uso, Neolítico, Gran Polonia.

INTRODUCTION

The paper presents the results of a multi-aspect analysis of 36 artefacts made from animal bones and teeth showing traces of intentional working or use, recovered from Kopydłowo, site 6, in Greater Poland Province. The analysis aimed to identify the animal species the raw material came from, assign artefacts to morphological types, and determine the technology of production and possible uses. The investigations sought to determine the relationship between the raw material, the processing method and the use of particular tools, and their cultural affiliation.

The investigations are part of a broad study on a Neolithic settlement at Kopydłowo, site 6 (Lisowski *et al*. 2015; Marciniak *et al.,* 2015a). The site is located in the southern part of the Inowrocław Plain, in the western part of the Polish Lowland. The finds were mostly related to the Neolithic settlement – the Linear Band Pottery Culture (LBK), the Late Linear Pottery Culture (LBPC) and the Funnel Beaker Culture (TRB). Some remnants of a Bronze Age burial ground and Early and Late Medieval settlement were also registered (see Marciniak *et al*., 2015a). This paper discusses only bone artefacts recovered from the Neolithic features.

The earliest relics of the Neolithic settlement at Kopydłowo are two refuse pits attributed to the LBK, which yielded numerous artefacts (Marciniak *et al.*, 2015b). Radiocarbon dates and technostylistic analyses set them in the period spanning 5200–5000 cal BC, which corresponds with the classic phase of the LBK development in Kuyavia (see Marciniak *et al.*, 2015b). The site was occupied again by people connected with the classic horizon of the LBPC. The traces of LBPC occupation constitute a complex of household pits and perhaps by a foundation trench, a storage pit, where a dismembered skeleton of a sheep was found, and a funeral feature. The remnants of the TRB settlement included a post-built house, accompanied by pits used for storage and other agricultural activity, a pit-house and a group of storage pits, and refuse pits. Another cluster of TRB features consisted of a non-residential sunken structure accompanied by pits of various functions. Six radiocarbon dates were obtained, placing the TRB settlement within the range of 3651–3360 BC (95.4% probability) or 3641–3367 BC (68.2% probability), and the stylistic analysis of pottery makes it possible to link it with phases IIIB-IIIC (3550–3200 BC) (see Marciniak *et al.,* 2015b).

Possibly, the most interesting feature on the site was a TRB pit with a set of cattle, aurochs, and goat horn cores (extensively discussed in Lisowski 2014 and Lisowski 2015). Their placement inside the pit and numerous cut marks on bones indicating horn and skin removal suggest that the pit harboured horn working waste and possibly also fresh raw material. Artefacts made of horn were not found, if ever present, since their preservation is very improbable. What is more, the pit did not yield any artefacts made of animal hard tissues.

METHODS

Bones and teeth were identified according to widely accepted procedures for zooarchaeological analysis (see Lisowski 2015). The artefacts were grouped based on their morphology (Vitezović 2011, based on Camps-Fabrer 1966, and Stordeur 1988), and their function was determined by microwear analysis.

Microwear analysis was conducted according to the scheme proposed by Isabelle Sidéra and Alexandra Legrand (2006); this was expanded to include a model developed by one of the authors (see Frankiewicz, 2013). The study was conducted in the traceological laboratory in the Institute of Archaeology at Adam Mickiewicz University in Poznań.

The analyses were carried out using a dissecting XTST ZOOM microscope, offering smoothly adjustable 21x to 135x magnification, and a metallographic microscope Nikon LV150, enabling 50x to 500x zoom. Surface dirt and greasy marks were cleaned off the analysed artefacts by gently wiping them with 97% ethanol solution. Preliminary microscopic observations were made before the artefacts surfaces were thoroughly cleaned. Artefacts were viewed under 21x, 50x, 100x, 200x and 500x magnification, which enable a detailed identification of particular traces (gloss, linear traces, and fractures), some of which were recorded photographically and digitally processed. The interpretation of the obtained microscopic image of bone implements referred to the results of experimental studies conducted by the authors and the literature mainly focusing on the Neolithic tools (e.g. d'Errico 1995 *et al.*; LeMoine, 1997; Maigrot, 2003, 2004, 2005, 2010; Beugnier and Maigrot, 2005).

RESULTS OF ANALYSES

The analysed assemblage from Kopydłowo, site 6, is comprised of 34 bone and 2 teeth fragments: tools or simply worked specimens, showing traces other than related to butchery or consumption. Based on the context of discovery and dating, the specimens are attributable to the LBK, LBPC, and TRB cultures (table 1). Detailed data on particular tools and various stages of the *chaîne opératoire*, including the raw material selection, methods of working, shaping and use, is presented below.

TABLE 1
KOPYDŁOWO 6. INVENTORY OF TOOLS MADE OF OSSEOUS MATERIAL AND THEIR CULTURAL ATTRIBUTION

Type\Chronology	*LBK*	*LBPC*	*TRB*	*Unknown*	*Total*
Awl	3		2	4	9
Point	1	1	6	1	9
Unfinished needle (?)				1	1
Awl/Point	1			1	2
Chisel			1	1	2
Axe			1		1
Polisher		2	1	1	4
Spatula/Serrated tool	1		1		2
Punch		1	1		2
Raw material		1	1		2
Pendant				1	1
Unknown	1				1
Total	7	5	14	10	36

Raw material selection

Advanced processing and fragmentation hindered the identification of species and body parts of some Neolithic artefacts; however, all were made from mammal bones. Twenty-nine specimens were identified to their taxon (81% of the total number of artefacts): 20 were made from the remains of domestic mammals (69%) and nine from the remains of wild mammals (31%). Cattle remains were the most numerous; they comprised 25% of the assemblage (n = 9). These were followed by sheep/goat and red deer – both taxa were identified in 14% of the artefacts (n = 5) – and pig (11%, n = 4). Other species are much scarcer; roe deer (n = 2), wild boar (n = 2), horse (n = 1), and dog (n = 1). A few implements were made from bones of some unidentifiable animal species: either large mammals, the size of cattle or horse (n = 3), or medium-sized mammals, such as pig or caprines (n = 4).

Most artefacts were made from long bones (n = 19). Other body parts were used much less frequently: antlers (n = 6), ribs (n = 4), mandibles (n = 3), flat bones of pelvic or shoulder girdles, or teeth (both groups n = 2).

Unfortunately, due to the paucity of finds any relations between the cultural affiliation of tools and types of the type of raw material uses remain inconspicuous.

The morphology of tools

The distribution of tool types in specific cultural contexts (table 1) reveals very little difference between particular groups. Points seem to be represented in larger number in the TRB than in LBK, however the data is very scarce.

Bone tools were classified into six functional-typological groups, based primarily on their morphology (Vitezović, 2011, based on Camps-Fabrer, 1966, and Stordeur, 1988). These groups are:

Pointed tools (figs. 1, 2, 3, 4, and 5)

Pointed tools were the most common bone implements found at Kopydłowo 6 (n = 21). The subtypes include awls, points, and needles. The site yielded nine awls, produced either from long bones of medium-sized mammals, most often caprine metapodials, with handle at the distal epiphysis (fig. 1), or pig fibulae (fig. 1). Among tools produced from the remains of wild mammals, we identified only one awl made from roe deer ulna (fig. 2). The group of points included nine tools. Their tips were more massive than the awls', and were occasionally produced *ad hoc*, more carelessly, from fragments of broken bones left from meals (cf. Vitezović, 2011). They were made from caprine and cattle metapodials (fig. 4:5), pig and wild boar canines (fig. 2:5) and cattle mandible (fig. 3); one was made from the rib of a large mammal and one from cattle tibia (fig. 4:5). Massive points produced from cattle mandibles, with handles at the incisive part (fig. 3) were a found repeatedly at the site. Two pointed tools were assigned into the awl/point category. One was produced from sheep metacarpal (fig. 2), and the other from wild boar femur (fig. 4). The site did not yield any typical needles – with a hole and worked all around. We identified only a fragment of a long bone of a medium sized-mammal which shape resembles a needle half-product (fig. 4).

Cutting and striking tools (figs. 6 and 7)

Three tools of these types were found at the site. We distinguished two symmetrical chisels – longitudinal tools with blades located on the short edge. One is a flat implement from the caudal side of the shaft of horse metapodial; the other one, in 'boatlike' shape, was made from cattle pelvis (fig. 6). One T-shaped axe made from red deer antler was also recorded (fig. 7).

Polishing tools (figs. 5, 8, and 9)

Six artefacts fit into the polishing tool category, including four identified as polishers/scrapers, with different kinds of blunt edges. They were mostly

Fig. 1.—Kopydłowo 6. Awls. Top, caprine metapodials: 1, chronology unknown; 2, LBK/TRB; 3, chronology unknown. Bottom, pig fibulae: 4, TRB; 5, TRB. A – original magnification 100x; B – original magnification 50x.

Fig. 2.—Kopydłowo 6. LBK. Awls and points: 1, awl from pig metapodial II or V; 2, awl from a long bone of a medium size animal; 3, awl from roe deer ulna; 4, awl/point from sheep metacarpal; 5, awl from upper canine of female pig. A-C – original magnification 50x; D – original magnification 21x.

Fig. 3.—Kopydłowo 6. TRB. Awls from cattle mandibles with scheme of production (1-3). A – original magnification 50x.

Fig. 4.—Kopydłowo 6. Bone tools, unknown chronology: 1, awl/point from wild boar femur; 2, unfinished needle (?) from a long bone of a medium size animal; 3, pendant from dog metatarsal II; 4, point from caprine metacarpal; 5, awl from a long bone of a medium size animal. A – original magnification 50x.

Fig. 5.—Kopydłowo 6. LBK and TRB. Tools from bone and teeth: 1, point from cattle metatarsal, TRB; 2, point from cattle tibia, TRB; 3, point from a wild boar lower canine, TRB; 4, scraper/spatula from a rib of a large size animal, LBK. A – original magnification 50x; B – original magnification 100x.

Fig. 6.—Kopydłowo 6. Bone chisels: 1, flat chisel from horse metapodial, TRB; 2, „boatlike" shaped chisel from cattle illium, unknown chronology. A-B – original magnification 50x.

Fig. 7.—Kopydłowo 6. Artefacts from antler: 1, T-shaped axe from red deer antler, TRB; 2, raw material, roe deer antler with tines chopped off, TRB; 3, raw material, red deer antler with tines sawed off and basis chopped off the cranium, LPBC.

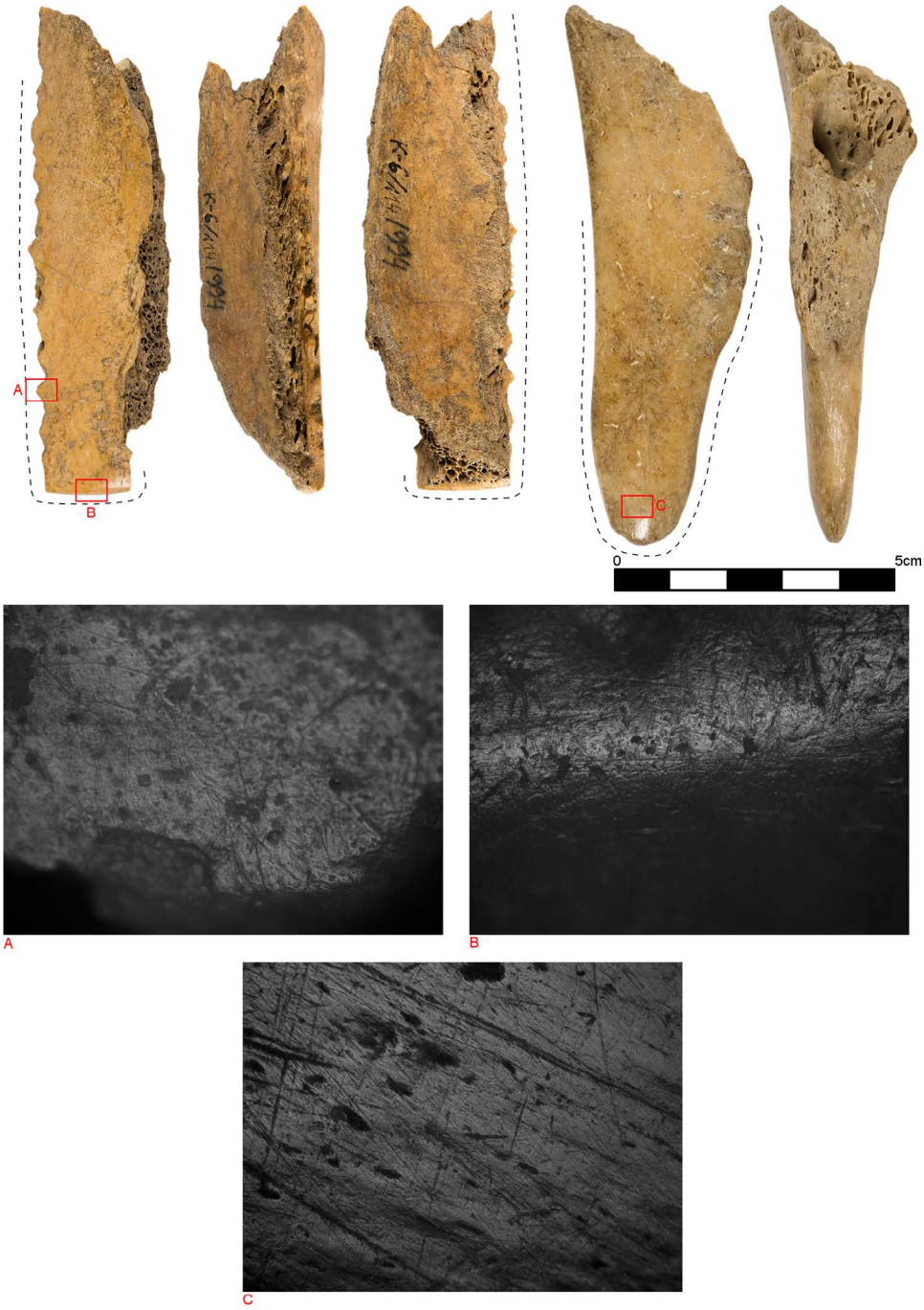

Fig. 8.—Kopydłowo 6. TRB. Polishing tools: 1, spatula/serrated tool from scapula of a large size animal; 2, polisher from cattle ulna. A – original magnification 100x; B-C – original magnification 50x.

Fig. 9.—Kopydłowo 6. Antler tools: 1, flint knapping punch, LBPC; 2, flint knapping punch, TRB; 3, Polisher, LBPC. A – original magnification 21x.

manufactured from the ribs of large and medium-sized mammals; one was made from red deer antler and one from cattle ulna (figs. 8, 9). Two specimens may be interpreted as spatulae. These were made from the rib (fig. 5) and scapula (fig. 8) of large mammals and both have a transverse fracture with rounded edges (cf. Choyke and Schibler, 2007). The scapula specimen has also a serrated side scraping edge.

Retoucheurs and punches (fig. 9)

Two artefacts belong to this category. Both are red deer antler punches.

Ornaments (fig. 4)

The site yielded one pierced pendant made from dog metatarsal.

Prepared raw material (fig. 7)

This category includes one red deer antler beam with a piece of chopped off skull and one shed roe deer antler. Both exhibit traces of cutting off tines.

Tool production and function

Microscopic analyses allowed us to get insights into the methods of production and use of a number of bone tools. A large part of the artefacts showed taphonomic traces resulting from the contact with the sediment, while antler and canines had traces of the ante-mortem use. In most cases, ante-mortem and postdepositional traces did not influence the state of surface preservation that would prevent the microwear analysis.

Thirty-two specimens showing potential traces of intentional processing and use were selected for detailed microscopic analysis. The analysis revealed how the tools were produced and used by the Neolithic communities.

Antler tools were made by cutting hard cortical bone around its circumference and breaking the remaining soft trabecular bone, a very common method in prehistory (Vitezović, 2011). Long bones were broken vertically through the epiphysis and diaphysis, in a manner similar to that described by Legrand (2005, p. 48). In the case of symmetrical and plain in shape metapodials, the technique produced two or four similar parts, suitable for making elongate pointed tools. Products were finished by shaving and grinding, as indicated by a number of linear striae located diagonally, less often perpendicularly or parallel to the axis of symmetry of the tools. Technological traces were usually mostly or completely obliterated by use-wear and postdepositional traces.

The bone tool assemblage recovered from the site consists mainly of pointed tools for working hides (e.g. piercing), wool (spinning, weaving) or plants (plaiting) (n = 12). Due to the similar nature of microscopic traces, unequivocal identification of the type of processed material is questionable.

Traces that attest to the contact with plants or wood were found on several other tools. Two chisels are characterised by intense gloss, which likely suggests that the chisels were used for woodworking or hide working (in favour for the last activity) (fig. 6). Linear traces, along the tools' edges, transverse to the working edges, indicate that they were used for scraping or planing. Another type of traces – associated with plant working, were found on a scraper/spatula, although it might have well been used for processing hides, not plants. Likewise, two forms of polishers were clearly used for processing plants or hides. Linear traces are suggestive of some transverse movement, relative to the tools' axis of symmetry. The third polisher was extensively used for hide working. Another specimen – a spatula/ a serrated tool – was most likely working animal soft tissue or its fur. Two tools that could be used for drilling/ reaming holes were also distinguished (Legrand, 2008).

We managed to identify two implements probably used for processing raw flint. This interpretation is uncertain due to the absence of preserved flint fragments in the structure of the antlers, which is believed to be the only conclusive evidence for the use of organic products to process raw flint (cf. Knarrström, 2001:38).

The only identified pendant exhibits traces of some contact with an organic material. These might have arisen as a result of wearing it for a long time (e.g. a contact with clothing).

In seven cases, the tool function was undeterminable, due to postdepositional factors or little distinctiveness of potential use-wear traces. Two specimens bore no use-wear traces.

DISCUSSION

Pointed tools, such as awls and points, make up the largest group of tools at the Kopydłowo settlement site. It is generally believed that awls were used for piercing hides (Campana, 1989; Lemoine, 1991) and in wattling (Olsen, 1979; Campana, 1989), while with more massive points people worked hard materials, such as wood, bone or antlers (Vitezović, 2011). The artefacts recovered from Kopydłowo usually exhibited features of having been used for working soft materials, such as plants and hides. It is noteworthy that the specimens are mostly small-sized.

Among common forms of pointed tools, noteworthy are sheep/goat metapodial awls, with the distal epiphysis serving as a handle (fig. 1) and a pig fibula awl with handle on the distal epiphysis (fig. 1). Both types were recovered from features attributable to the Funnel Beaker Culture. Specimens similar to the former group were found at several European sites, analogously dated (e.g. in France –Maigrot, 2003; 2005; Serbia –Vitezović, 2011; Romania –Beldiman *et al*., 2014; and Poland –Winiarska-Kabacińska and Makowiecki, 2004). These were used just like tools from Kopydłowo: to pierce soft materials, such as hides and textiles. They were also

utilised e.g. for bark or clay processing (Maigrot, 2003, 2005, 2010), yet such use is undocumented at Kopydłowo. Awls made of pig fibula are a frequent occurrence at Linear Pottery settlement sites, the Chasséen culture in France (Siderá, 2000; Maigrot, 2003) and in Polish Rzucewo (Makowiecki and Król, 1997). A few such tools found in Chalain in eastern France were used for piercing dry hides, thus similar to those from Kopydłowo (Maigrot, 2003, 2005).

People inhabiting the settlement site at Kopydłowo used also another type of pointed tools: large awls from cattle mandibles. A sunken featured building connected to Funnel Beaker culture (feature 4) produced as many as three of such artefacts. These were made from cattle mandibles, with handles in incisive part (fig. 3). The body of the mandible was broken parallel to the tooth row, and the edges of the fracture were intensely polished. Use-wear traces attest to the fact that these tools were used for working with soft organic material. The fractures of the tips in all three artefacts, including two impact fractures, indicate that the tools were used for puncturing – that is how the fractures probably occurred. In prehistoric times, mandibles were rarely utilised to produce larger tools. In the Early Bronze Age, bovine mandibles were used across the areas from Kazakhstan to Slovenia, Hungary and the Czech Republic to fashion 'thong-smothers' used in horsemanship as reins or whips (Olsen, 1999; Choyke, 2013). Their form and function were nevertheless completely different. They consisted of the body of the mandible, angle and ramus with a distinctive hole made in the bone at the site of the third molar (M3). Tools akin to awls recovered from feature 4 are not present in the literature, to the best of our knowledge.

Less frequent at the Kopydłowo settlement site, polishing tools are mainly represented by polishers. It is assumed that polishers were used for softening and polishing hides (Liesau von Lettow-Vorbeck, 1998; Maigrot, 2005) and polishing pottery (Martineau and Maigrot, 2004; Maigrot, 2010; Buc 2011). Out of few polishers excavated at the site, two were used for hide working. The third one, found in feature 36, layer VII, and attributable to the Late Linear Band Pottery Culture, was made of a split along antler fragment (fig. 9); it was likely used for processing plants, e.g. splitting fibres. Tools of this type are rare; the only known analogy from Starčevo (the Starčevo culture) is referred to as a spatula (Vitezović, 2014:fig.6). A very similar form notwithstanding, the implement showed completely different microwear, i.e. deep, overlapping linear traces that attest to its use for other purposes, e.g. polishing inorganic materials such as clay (Vitezović, 2014).

Noteworthy among excavated polishing tools are spatulae. Similar rib tools for scraping hides are frequent in Neolithic materials from different parts of Europe (Maigrot, 2005; Choyke and Schibler, 2007). One implement was made from the scapula of large mammal; one of its longitudinal edges was shaped into a serrated tool (fig. 8). Serrated tools made of blades were common at many prehistoric settlements, especially in Central Europe, e.g. in the materials of the Bernburg groups (Northe, 2001). Microscopic analyses revealed that such tools were used primarily for softening or removal of hair and bowel preparation. They were in use from the Neolithic up to the Pre-Roman Period. The shaping of the serrated edge remained unchanged in the Neolithic and some modifications are visible only in the Bronze

Age, when the serration was moved from the side to the distal part (Morgenstern, 2011). In this period, the raw material for the production of such tools did not change, and the idea to produce them survived well into the Early Middle Ages. For example, Polish Bodzia, site 6 yielded an implement with a shaped serrated edge made of deer antlers (Sobkowiak-Tabaka *et al.*, 2013:142, fig.6).

Though rare at the site, cutting and striking tools were extremely interesting. Noteworthy is a flat chisel made of horse metapodial (caudal side of the proximal part of the shaft) and a T-shaped red deer antler axe (fig. 6:7). Both were found in/or above feature 4, presumed to be related to the TRB. T-shaped axes are very common at Polish and European Mesolithic and Neolithic sites (Kabaciński *et al.*, 2014). Previous microwear analyses suggest that the shape of the cutting edge indicates that they were generally used for chopping wood (Jensen, 2001; Schibler, 2001; Maigrot, 2004; Pratsch, 2011).

Flat chisels of this type seem to be much scarcer on the Neolithic sites, but are known, e.g. from TRB features registered at Grabkowo, site 8, in Poland (Siewieryn-Mikulska, 2012), and Linear Pottery settlement sites from France (Sidéra, 2000). At the current stage of research on the function of Neolithic bone artefacts, an unequivocal determination of the purpose of this tool in general is problematic. The examined tool from Kopydłowo, based on documented traced, was presumably used for hide working (cf. Christidou and Legrand-Pineau 2005). This kind of artefacts played a supporting role during animal skinning, barking and wood-working (Winiarska-Kabacińska and Makowiecki, 2004).

The LBPC and TRB materials yielded two punches for flintworking. These tools are relatively frequent, e.g. at Balkan sites of the Starčevo culture (Vitezović, 2014) or Neolithic tools from France (Maigrot, 2005), but only few were registered in the Neolithic materials from Poland. This may be due to their low distinctiveness, which hinders proper identification. A microwear analysis of the two implements from Kopydłowo revealed how they were used based on the analogy with punches used in the experimental flint working (cf. e.g. Migal and Sałaciński, 1996; Pelegrin, 2006).

Bone artefacts from the settlement site at Kopydłowo include also two raw materials: red deer and roe deer antlers (fig. 7). They were deprived of tines in a manner characteristic of this material: the cortical bone of the outer part of the antlers was sawed around, the remaining cancellous bone was broken (Vitezović, 2011). A similar method was also used in the case of the aforementioned T-shaped axe. It is worth mentioning that the deer antler was obtained from a slaughtered individual, while the roe deer antler was shed naturally.

The settlement site at Kopydłowo yielded also one dog metatarsal pendant. It was found in a medieval feature 2, which was dug into a TRB sunken featured building (feature 4), thus the precise chronology of the artefact is uncertain. The hole was made by drilling with a sharp instrument from one side. A modified and expanded morphology of the edge of the hole attests to the fact that some cracks appeared during drilling and the hole was repaired.

Among others, two tools from Kopydłowo deserve some more attention. A rare point made from wild boar canine and an antler T-shaped axe, both found in the TRB

context, potentially may suggest some forms of connections with hunter-gatherer groups. The point it is made from the enamel of wild boar canine. One of its ends was polished or scraped to form a point with a working edge, possibly used as a scraper (fig. 5). No use-wear traces were recorded and thus the function of this tool is unknown. Similar tools were found at French Linear Pottery sites (Sidéra, 2000). Their occurrence in France is interpreted as an evidence of contacts and cultural and technological exchange between Linear Pottery communities and Mesolithic groups, among which such tools are a frequent occurrence (Sidéra, 2000). The Kopydłowo T-shaped axe (fig. 7) is one of many finds of this kind in the Polish Neolithic (cf. Kabaciński *et al.*, 2014). Research on the process of production of T-shaped axes shows a large variation among drilled holes (Grygiel, 2008; Kabaciński *et al*., 2014). There are differences between the holes in axes recovered from a Mesolithic site at Dąbki (that were oblong) and the holes pierced in axes from a Neolithic site at Bodzia, both in Poland (these were round; Kabaciński *et al*., 2014). In this context, the oblong shape of the hole in the axe from Kopydłowo is much closer to Mesolithic finds from Dąbki than to chronologically closer finds from the Neolithic Bodzia. We do know that the contacts between the Neolithic communities and post-Mesolithic hunter-gatherers occurred (e. g. Wierzbicki, 2013; Galiński, 2016; Kabaciński *et al.*, 2015; Czekaj-Zastawny and Kabaciński, 2017), and these two tools, the wild boar point and the T-shaped axe, may constitute the remains of those interactions. However, these vague and rather circumferential evidence may be too inadequate to draw inference from it about the influence of hunter-gatherers' societies on the people of TRB Kopydłowo.

CONCLUSIONS

Bone artefacts from the settlement site at Kopydłowo show a great variability in typology and function. Most common are pointed implements; other tool types are scarcer – cutting, striking, polishing tools, punches or ornaments. Their state of preservation and abrasive traces obstructed complete reconstruction of the technological process, however we were able to determine with certainty the final phases of treatment included shaving and grinding their surfaces. In many cases, it was also possible to determine the function of the specimens, which were usually used for processing hides and plants. The site yielded a relatively large variety of forms of tools, many commonly known across the Neolithic Europe, but some seem to have very few analogies on other sites. The analysis of bone tools from Kopydłowo have not revealed any relations between the cultural affiliation of artefacts and their morphological forms or types of raw material used to produce them, predominately due to the paucity of the data. Similarly, the link between artefacts made of hard animal tissues and the remnants of the presume horn working workshop recorded at the site is unknown. The site yielded raw material such as unused pieces of segmented antler, however no artefacts made of animal hard tissues were present in the pit associated with horn working.

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