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CULTURAL BIOGRAPHIES OF BRONZE AGE KNIVES AND SICKLES FROM SOUTH-WESTERN POLAND

Abstract: This article constitutes an effort to reconstruct cultural biographies of Bronze Age metal sickles and knives with the use of traceological analysis, preliminary results of experimental research and contextual data. Source base consists of artifacts from the south-western Poland. In total 99 artifacts were chosen for the traceological analysis – 80 sickles and 19 knives – dated from the early until the decline of the Bronze Age (Fig. 1). On the basis of obtained data we may formulate a conclusion that function of sickles and knives was not limited only to utilitary or only symbolic. What is more, role and the meaning of these tools evolved and changed in time.

Key words: Bronze Age, Central Europe, traceology, experimental archeology, knives, sickles.

1. ADMISSION

Traceological analyses of objects made of bronze, even though they began almost 20 years ago, are still considered a rarity. Archeologists who conduct such research focus mainly on militaria (Bridgford 1997; Kristiansen 2002; O’Flaherty 2007; Molloy 2008, 2009, 2010, 2011; Anderson 2011; Coloquhoun 2011; Gener 2011; Brandherm 2011; Horn 2011, 2013; O’ Flaherty *et al.* 2011; Mödlinger 2011), rarely on tools (Kienlin, Ottaway 1995; Roberts, Ottaway 2003), which are considered one of key sources for understanding the questions related to prehistoric economy, society and cult.

On the basis of traceological analyses and initial results of experiments, as well as contextual data, I have attempted to reconstruct cultural biographies of sickles and knives, which, in Vistula River basin and Odra River basin, constitute respectively second and third category in terms of numbers of bronze tools. Source base consists of artifacts from southwestern Poland that are the property of museums located in voivodeships: Dolnośląskie, Opolskie and Śląskie.

In total 99 artifacts (Fig. 1) were selected for traceological analysis – 80 sickles and 19 knives dated from the early until the decline of Bronze Age. Copies of the artifacts

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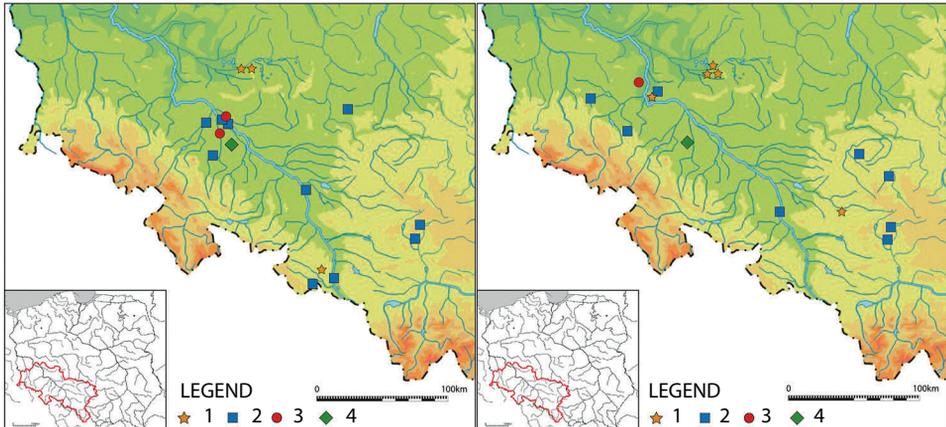


Fig. 1. Location of knives (left) and sickles (right) dated to Bronze Age chosen for traceological analysis: 1 – hoard; 2 – grave; 3 – isolated finds; 4 – settlement. Drawing by D. Sych

used for experimental research were delivered by Adam Maziarka of the casting workshop Maziar's Workshop.

2. METHODS

Based on the comparative analysis of use-wear visible on the surface of sickles and knives and the initial experimental research results I was able to differentiate between their three main categories: (1) production related, (2) use related and (3) being the result of actions performed on them after their discovery (Fig. 2–3). It is possible that processes that took place after the artifacts were lodged in the ground caused some of the damages. The lack of research over the influence of post-depositional factors on the formation of traces on bronze items makes it impossible to distinguish them. All traces were registered with the use of (1) portable digital microscope Conrad with photographic camera with matrix of 10 megapixels and zoom from 10x to 200x and (2) portable digital microscope Dino-Lite with photographic camera with matrix 1.3 megapixels and zoom from 20x to 220x. Photos were taken in zoom of 20x to 50x that, in my opinion, allows for the best visibility of traces on the surface.

On the basis of traces visible on sickles and knives I have distinguished four stages of wear – low, medium, high and destroyed. Low level of wear is characterized by visibility of traces such as scratches, minor notches and bluntings. On medium worn objects scratches, notches, bluntings and bendings are visible. High level of wear is characterized by a large number of scratches, notches, bluntings, bendings as well as cracks and fractures. I considered as destroyed those artifacts that could not be otherwise repaired and the only possibility to restore them to circulation was re-melting.

Production related traces:

- Casting seam – visible on objects produced in multipart casting molds.

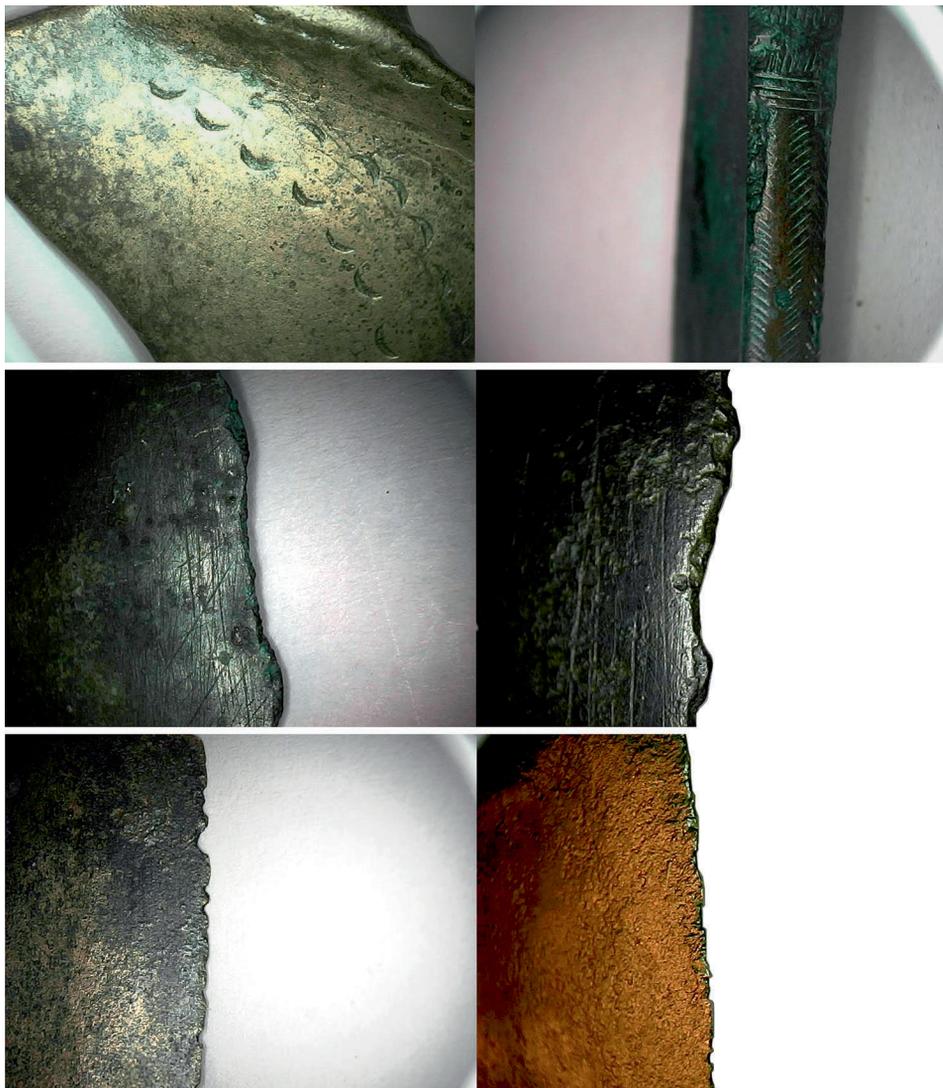


Fig. 2. Use-wear visible on knives (upper row) ornament, (middle row) scratches, (lower row) notches and bluntings. Photo by D. Sych

- Hammering – associated with treatments aimed at increasing the hardness of metal or removing casting defects.
- Ornament – concave or relief elements that have decorative function.
- Scratches – lines visible under the patina that arise in the process of grinding, sharpening.



Fig. 3. Use-wear visible on sickles: (upper row) hammering and ornament, (2nd row) casting seam and scratches, (3rd row) bluntness and fractures, (lower row) notches. Photo by D. Sych

Usewear related traces:

- Scratches – lines visible under the patina that arise in the process of grinding, sharpening or during work.
- Notches – U-shaped cavities arising probably during the usage. No loss of the material takes place, only its rupture and deformation. In the course of repairs and post-depositional factors loss of the deformed material could have taken place.
- Bluntings – blade deformation formed probably as the result of usage. They are formed along the entire length of the blade.
- Bendings – deformation of the blade formed probably as a result of usage.
- Cracks and fractures – cracks occur when too much pressure is put onto metal. This leads to a disruption, but not to loss of material. In case of fractures, we deal with the loss of material. Both types of defects may probably be caused by intensive work.

Traces related to actions performed on the artifacts after their discovery:

- Scratches intersecting the patina, which covers the object. May arise also in the course of conservation work conducted using invasive tools. Finders could also deliberately destroy some of the objects.
- Contemporary intentional damage, including the losses resulting from sampling.

3. RESULTS

From 80 sickles selected for traceological analysis 3 are dated to phases HA1-HA2 (from the hoard containing scrap-metal from Krzydłina Mała) 1 is dated to phases HA2-HB1, 4 to phases HB1-HB3, 75 to phases HB1-HB3 and 1 to phase HC; including 10 that were a part of grave equipment, 51 constituted hoards containing tools, ornaments and elements of horse harness or tools and militaria, 1 was discovered in a settlement and 9 are single finds. Small number of items dated to phases HA1-HA2 in the analyzed group of sickles does not allow for capturing possible changes in the structure of traces visible on the surface. Above mentioned hoard from Krzydłina Mała dated to phases HA1-HA2 includes 2 axes, 11 fragments of axes, a sickle, 7 fragments of sickles, fragment of an arrowhead, 3 fragments of a necklace, 3 fragments of bracelets, 20 fragments of indeterminate bronze objects. Items were hidden in a vessel (Blajer 2001, 331). Sickles and their fragments that were selected for the analysis contains usewear but their poor state of preservation does not allow for a more acute analysis.

Over a half of analyzed sickles contains production related traces such as casting seams and/or notches that are created during forging (Fig. 4). Quite frequently the casting seam and hammering traces coincide. The visibility of the latter depends often however on the artifacts' state of preservation. This makes it extremely difficult to conclude that there exists any relation between the presence of casting seams and hammering traces. Most numerous copies are characterized by a medium level of wear. Considerably less in number are sickles with low and high level of wear as well as those destroyed. What should be noted is the lack of destroyed tools in grave inventories (Fig. 5).

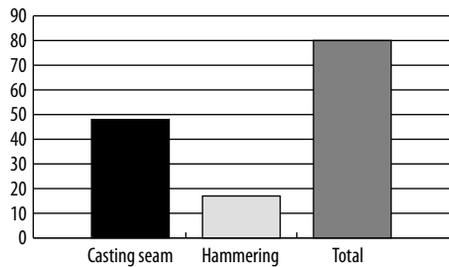


Fig. 4. Traces of production visible on sickles dated to phases HB1-HB3. Drawing by D. Sych

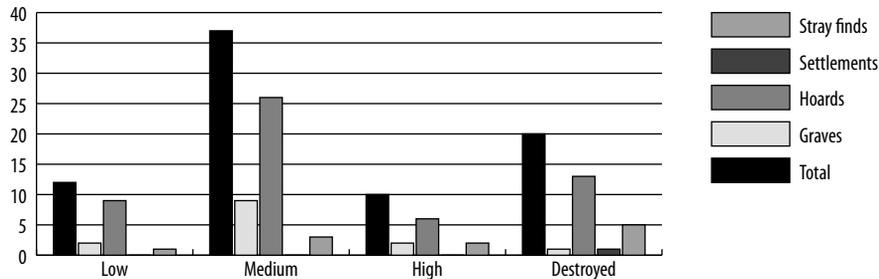


Fig. 5. Degree of wear of bronze sickles dated to phases HA1-HB3. Drawing by D. Sych

With the exception of 3 knives – 2 from settlement site from phases BA1-BA2 and 1 single find from phases HA1-HA2 – all artifacts selected for traceological analysis may be connected to phases HB1-HB3, from which 7 constituted an element of grave equipment, 3 were part of hoards of tools, ornaments and elements of horse harness or tools and ornaments or militaria and ornaments (Fig. 1).

Bronze knives are usually characterized by a high level of surface refinement, only in few cases production related traces are visible on the surface. In the group that was subjected to traceological analysis only on one item we may observe a flash and only 4 items contain notches created as a result of forging. Over a half contains ornaments in the shape of patterned engraved lines. The largest group, with 10 items, consists of destroyed artifacts. There are 6 items with moderate wear and 3 with low. The lack of clear relationship between the level of wear and the archeological context in which they were found may stem from the insufficient sample size (Fig. 6).

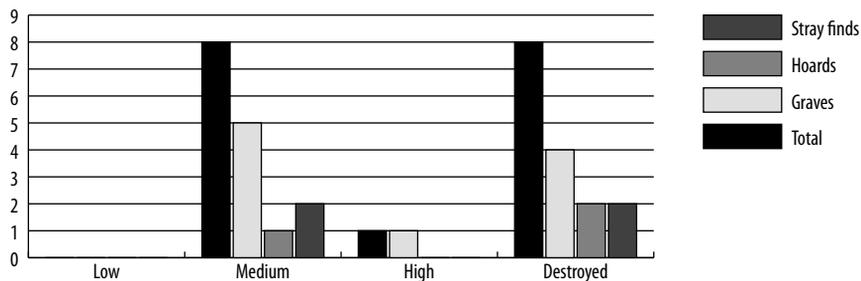


Fig. 6. Degree of wear of bronze knives dated to phases HA1-HB3. Drawing by D. Sych

3.1. Experimental research

In total, 5 replicas were created in the casting workshop Maziar's Workshop (Fig. 7): two knives were based on an item being a part of hoard from Gamowo, two sickles based on artifact found in a hoard in Pracze and razor modeled on a single find from Piotrkosice. The latter was prepared in order to verify the thesis stating that miniature sickles could perform the function of razors. Copies were made because of funds obtained in an internal competition of the Department of Historical and Pedagogical Sciences of the University of Wrocław to finance the research projects of young scientists and doctoral students from a restricted grant of Ministry of Science and Higher Education granted in 2015. Taking under account the imposed duration of the project's implementation, the presented research results are partial and they should be treated as such. The experiment shall continue.

Sickle copy no. 1 Replica was sharpened with the use of sandstone whetstone. The sickle was applied to cutting of grass and grain for about 500 minutes. In that time I was able to cut acreage of 1 are. After about 150 minutes a characteristic polished surface simultaneously covering the sharpening traces. Polished surface is visible also in the part placed in a holder, which was caused by a direct contact with a wooden handle. During the experiment no substantial damage appeared. Traces observed on the original tools suggest that they were used according to a technique that applies the full length of the blade (Fig. 8). The experiment shall continue.



Fig. 7. Experimental copies: (from the top) knife no. 1, knife no. 2, (from the left) sickle no. 1, sickle no. 2, razor. Photo by D. Sych

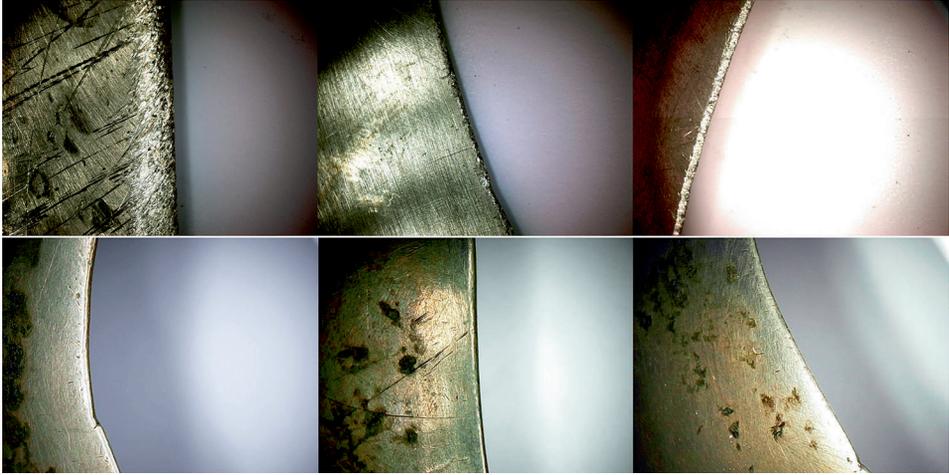


Fig. 8. Surface of sickle no. 1 after sharpening, (Lower row) surface of sickle no. 1 after 150 minutes of using. Photo by D. Sych

Sickle copy no. 2. Replica was sharpened with the use of sandstone whetstone. The sickle shall be tested during a later phase of the experiment.

Knife copy no. 1. Replica was sharpened with the use of sandstone whetstone. The knife was used for cutting different types of boneless meat for about 90 minutes. This activity did not leave any traces on the tool's blade. The experiment shall continue.

Knife copy no. 2. Replica was sharpened with the use of sandstone whetstone. The knife was used for wood treatment (larch) for about 120 minutes. This activity did not leave any traces on the tool's blade. The experiment shall continue.

Razor. Replica was sharpened with the use of sandstone whetstone. The razor shall be tested during a later phase of the experiment. Copy of the razor has been made for the purpose of comparing the usewear visible on original razors and miniature sickles, which could perform analogical function.

3.2. Contexts of finding of bronze knives and sickles

First bronze knives appeared in the basin of Vistula River and Odra River in early Bronze Age (phases BA1-BA2), however they disseminated only in middle and younger periods (phases BD-HA2), superseding daggers. Artifacts focus in the western part of the country, in Silesia, Greater Poland and Pomerania. Most of them come from graves or are single finds. In the younger (phases HA2-HB1) and later (phases HB2-HB3) Bronze Age knives began to appear also in hoards. However, grave and single finds are still dominant. Only a part of the knives constituted a part of deposits connected to the aquatic environment. Visible concentrations are present in Silesia and in the middle part of the country (Gedl 1984; Blajer 2001, 111-116; 2013, 41-42; Dąbrowski 2004, 13-14).

In the early Bronze Age (phases HC-HD) the number of bronze items drastically decreased. Most of them constitute iron knives that are a part of grave inventories, less finds may be connected to settlement sites (Gedl 1984; Blajer 2001, 111–116; 2013, 41–42; Dąbrowski 2004, 13–14).

Bronze sickles appeared in the area of today's Poland at the turn of older and middle Bronze Age (phase BB2-BD). The earliest finds should be connected most of all with hoards (including the deposits found in aquatic environment) containing tools and ornaments, tools and weapons and those with tools, ornaments and weapons. Artifacts are scattered in a line from northwest to southeast of the country. In the middle and younger Bronze Age (phases HA1-HA2) a clear concentration on the west of the country is visible. Hoards, including clear deposits containing tools and weapons, tools and ornaments or weapons, ornaments and tools are dominant. Part may be connected to the aquatic environment. A number of artifacts comes also from the graves. In younger and later Bronze Age (phases HB1-HB3) the number of sickles grew abundantly. Most of them come from hoards, including deposits containing tools, tools and ornaments, tools and weapons, as well as tools, weapons and ornaments. Only a few of the artifacts may be connected to the aquatic environment. By the end of the Bronze Age bronze sickles more often were a part of grave inventories. Artifacts are concentrated in the western part of the country (Gedl 1995; Blajer 1999, 41–47; 2001, 102; 2013, 38–41; Dąbrowski 2004, 13).

In the early Iron Age (phases HC-HD) the number of bronze items decreased in favor of iron ones. Sickles appeared in hoards much less frequently. Most of them are grave finds, a number of artifacts comes also from settlements. Concentration is visible in Silesia (phase HC) and in the central (phase HD) part of the country (Gedl 1995; Blajer 1999, 41–47, 2001, 102, 2013, 38–41; Dąbrowski 2004, 13).

4. DISCUSSION

It is without doubt, that bronze knives had economic use and probably also ritual and military. From the early until the late Bronze Age metal knives were present mostly in graves. All items contain use-wear, many are destroyed which supports the thesis that they were not made solely for the burial. Most likely they were the property of a person buried, which he or she used in the course of their lives. The personal character of knives is visible in the high level of surface refinement manifesting itself in the absence or small number of traces linked to production.

It is interesting that a significant number of the known knives are fragmentary or destroyed finds (Gedl 1984). It is important insofar as at the same time they show no signs of intentional destruction, which can be seen, for example, on swords. The item from Wąsosz, which blade was broken off, serves as a good example. There is a characteristic bending in the place where the blade was broken off, which is the effect of using force.

Special attention should be given to the deposit from Gamow that consists of a knife, 2 swords, a dagger and a clasp (Gedl 1984). All items contain usewear. If the

knife was a part of the hoard, which is not certain (Blajer 2001, 334), then it could have been one of the elements of warrior's grave equipment. One rather may not consider it to be substitute grave equipment since burials containing swords were a rarity in phases HB2-HB3 (Blajer 2001, 122–134), it is more likely that the deposit has been lodged in the ground with the intention of its retrieval or we are faced with a votive gift.

Cult application is suggested by the presence of these artifacts in hoards (with special emphasis on deposits associated with aquatic environments), which began to appear in the basin of Odra River and Vistula River in the younger and late Bronze Age. The decrease in the number of daggers at the end of the Bronze Age may have been associated with the growing popularity of knives (Blajer 2001, 122). The military function is also a matter of discussion. Daggers, halberds, spearheads, as well as swords have a number of traces interpreted as those produced during a fight. However, they are not present on bronze knives. This does not signify that they could not be used as weapons, nevertheless the military function must have been strongly limited (Kristiansen 2002; Molloy 2008, 2010, 2011; Anderson 2010; Brandherm 2011; Coloquhoun 2011; Horn 2011; Matthews 2011, Mödinger 2011; O'Flaherty 2007; O'Flaherty *et al.* 2011).

The function of metal sickles had to be even more complex, since they were used during agricultural work and thus in the process of obtaining semi-finished food, and perhaps also in the agrarian cult. In the Bronze Age sickles were present mainly in hoards, often together with axes. They dominate in the deposits from Central and Eastern Europe, and the further west, the more they give way to the axes (Bradley 1990, 119). Deposits, such as for example the hoard from Postolin (Karmin hoard I) dated to phases HB2-HB3, where axes and sickles were intentionally arranged around a clay vessel containing bronze wheels and rims as well as bronze fragments, suggest that they were used in a cult. Cult function may be prescribed also to items found in aquatic environments because of the fact that they were deposited without the intention of their retrieval (Bradley 1990, 119; Blajer 2001, 323–354).

At the turn of the middle and younger Bronze Age (phases HA1-HA2) sickles began to appear also in graves. All bear traces of use, it is therefore possible that they belonged to the buried deceased and were used by them while they were alive. It is possible, however, that because of their direct connection with the acquisition of food they were also associated with resurrection magic or the wider symbolism of death.

A significant part of bronze sickles that were undergoing traceological analysis shows traces of production in the shape of residue after casting seams or notches caused by forging. Lack of attention to the surface refinement may suggest a "mass" production in phases HB1-HB3. On the other hand, a small number of destroyed items and with a high degree of wear indicates the remelting of tools that were not suitable for repair.

The most interesting from the analyzed groups are three hoards from Karmin (today's Prace and Postolin), which contained in total 60 completely preserved sickles (Gedl 1995; Blajer 2001, 345). In the above-described hoard I 10 axes, 12 sickles, 2 arrowheads, at least 12 large rings, 700 small rings and bronze fragments were found. For

traceological analysis 6 sickles were chosen. A low level of usage characterizes all of them. So much as 4 contain production traces in the form of casting seams and traces of hammering. It does not seem to be, however a deposit of unused items, which may be supported by the traces visible on accompanying axes (6 of which were subject to traceological analysis) which are characterized by a diversified level of usage.

Hoard II (Pracze) from Karmin consists from 27 axes, 39 sickles, 4 fragments of sickles, knife fragments, double spiral disk, ornamental bronze button. Among 35 sickles chosen for the analysis, sickles with medium level of usage are dominant. Fewer in number are items highly damaged or destroyed, and there are no items with low level of usage. Axes found in the deposit (19 of which were subject to traceological analysis) are either destroyed or characterized by a medium or high level of usage. Only one of them is used on a low level but its form and size suggest that it was subjected to numerous repairs.

The composition of hoard III from Karmin (Postolin) consists of 12 axes, 9 sickles, a knife, 4 bracelets, spiral bracelet, a pin, clasps, 2 parts of horse harness, rattles made of small rings and a metal roll. The sickles (all subject to traceological analysis) are characterized by a diversified level of usage. The same applies to accompanying axes of which a half was analyzed. Every above described deposit – although all three contained similar items – is characterized by a different set of features. While hoard I most probably had a ritual character, the interpretation of the other two remains an open question.

The presence of traces of use on all analyzed sickles puts into question their role as commodity money (Sommerfeld 1994), which may be indicated, among other things, by a domination of less characteristic forms, mass scale of production, and the existence of forms unique for the Lusatian culture suggesting rather the existence of specific technological and aesthetic preferences. It is possible, however, that “raw material ingot / half-products” could be perceived quite differently in prehistory than today. In considerations regarding the functionality of sickles it is extremely important to establish (Sommerfeld 1994, 170), that diversity of forms comes not only from the prevailing fashion and natural evolution, but also from actions aimed at repairing the tools by forging, which is clearly visible in a different shape of blade’s tips. Observation suggests that few sickles from hoards of Postolin and Pracze could be subjected to similar treatment. It is difficult, however, to arrive to conclusions regarding the single items from other deposits, including the graves.

The experiment has shown that with a bronze sickle one may mow the acreage of one are within about eight hours. Other studies has shown that the more experienced reapers were able to perform the same work in just two hours. What is more, they proved that the metal sickles were not much more efficient than the ones made of flint (Dąbrowski 2009, 179).

There is no doubt that in phases HB1-HB3 bronze sickles also performed simultaneously symbolic and utilitarian roles. The increase in the amount of bronze in circulation, as well as the progressive diffusion of iron in the final stages of the Bronze Age and during Hallstatt period C and D could result in a kind of “secularization”,

which may be indicated by the decline in deposits with metal sickles in the early Iron Age and the simultaneous increase in the number of burials which contain them and settlement finds (Bukowski 1982; Blajer 2001, 102–111).

5. ACKNOWLEDGEMENTS

I would like to thank all my colleagues from Museum of Silesia in Katowice, Museum of Upper Silesia in Bytom, Museum in Gliwice, Museum of Dąbrowa Basin in Będzin, Archeological Museum in Wrocław, Museum of Opolian Silesia, Museum in Wodzisław Śląski and Museum in Racibórz and Museum of Archaeology and History in Głogów who allowed me to perform the analysis of artifacts and were most helpful during my research.

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