Materiały Zachodniopomorskie
Nowa Seria, t. XIV: 2018, s. 275–286
ISSN 0076-5236

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Bronze Age dagger from Dargocice

Sztylet z epoki brązu z Dargocic

Abstract: In the spring of 2016, an archaeology student at the University of Wrocław together with a resident of Gościno commune found a blue-green blade that fitted into the palm of his hand. It was found in a ploughed soil while walking along a forest path in Dargocice (Gościno commune, Kołobrzeg district, West Pomeranian Voivodeship). The artefact was submitted to the Institute of Archaeology at the University of Wrocław for further analysis.
Keywords: Bronze Age, weapons and tools, traceology, archaeometallurgy, ED-XRF
Abstrakt: Wiosną 2016 roku student archeologii Uniwersytetu Wrocławskiego wraz z mieszkańcem gminy Gościno znalazł niebiesko-zielone ostrze, które dobrze pasowało do dłoni. Znaleziono je w wyoranej ziemi podczas spaceru leśną ścieżką w Dargocicach (gm. Gościno, pow. kołobrzeski, woj. zachodniopomorskie). Zabytek został przekazany do analizy w laboratorium Instytutu Archeologii Uniwersytetu Wrocławskiego.
Słowa kluczowe: epoka brązu, broń i narzędzia, traseologia, archeometalurgia, ED–XRF

Place of discovery

The area of today's Dargocice was inhabited already in the Neolithic. There is one commonly known artefact from site 7 – a stone axe linked to the communities of the Linear Pottery culture. More permanent settlements in this area can be observed since the Bronze Age. On the opposite shore of Kamienica Lake, in a distance of 1.7 km, there is a fortified settlement of the Lusatian culture and near the lake – in Kamica and Trzynik – there are another two. In the village of Dargocice two fragments of a bronze sword were discovered. Three hundred meters to the north-west there is also an Early Medieval fortified settlement with an adjacent open settlement.

The place of the dagger's discovery is located in the area of AZP 18-16 map, where in total 19 archaeological sites are located which are mostly dated to the Early Middle Ages. There are also hoards and cemeteries connected with the Pomeranian culture, which were discovered accidentally in the 19th century. First systematic archaeological research in the area of Kamienica Lake was performed in the 1960s as a part of excavating expedition of Institute of Material Culture of the Polish Academy of Sciences in Poznań. Numerous fragments of bronze objects were found there that came from the graves of the Lusatian or Pomeranian culture. In 2007, a research team from Nicolaus Copernicus University in Toruń discovered a hoard of bronze objects dated to the Late Bronze Age at the foot of Trzynik fortified settlement, which is described as site 12. It included weapons, ornaments and tools (Rembisz-Lubiejewska 2011).

Morphology and chronology

Even though a well-mineralised layer of dark-green patina is visible on the surface of the dagger (Fig. 1), which constitutes a mechanical protection for the core, the state of preservation of the artefact is not good. Its bad condition is mostly visible on the fractures of the blades that are disintegrating significantly, exposing the highly oxidised cross-section, where the metallic phase is not present or only its residues are visible (Fig. 2).

The dagger from Dargocice is a continuation of weapon forms from the Unetice culture. It has semi-circular plate for the handle with two holes for rivets. The blade is 118 mm long and its maximum width is 28 mm. A rib runs through the centre of the blade. Both rivets have been preserved. On the basis of morphological characteristics the artefact may be dated to the turn of the Early and Middle Bronze Age, and more precisely to the end of BA2 phase and the beginning of BB1 phase (Dąbrowski 2004, 14). An analogical item is known from Szczecin (Zdroje), West Pomeranian Voivodeship (Gedl 1980, 47 Fig. 108).

Traceological analysis

There are three categories of traces visible on the dagger: (1) production traces, (2) use-wear and (3) post-depositional traces. All traces were registered with the use of portable digital microscope Conrad with photographic camera with a matrix of 10 megapixels and zoom of 10x to 200x.

In the first category we may include long parallel lines along the axis on the basis of the dagger hilt-plate which arose during grinding (Fig. 3). This action was most probably performed with the purpose of removing the casting defects. Diagonal and parallel lines found very near the blade's edges may be traces of sharpening and grinding (Fig. 4). Second category includes numerous dents

and bluntness on the working edge (Fig. 5, 6) as well as a clear bend of the blade. The third category contains corrosion and singular scratches extending in various directions.

Base for comparison consists of 15 daggers that were subjected to traceological analysis from Silesia and adjoining areas (Sych 2016). Two are dated to BA, three to BB, two to BB-BC, one to BC, four to BC-BD, one to BD-HA and two to HB2-HB3. Six daggers come from graves, one from a hoard of tools, weapons and ornaments, one from a settlement, one was discovered in an oxbow of Oder and remaining six are stray finds with unknown context of discovery.

Traces visible on the artefacts allowed to differentiate between three levels of usage: low, medium and high. Daggers with a low level of usage contain an insignificant number of use-wear such as scratches, small dents and bluntness. Medium level of usage is characterized by the presence of scratches, larger dents, bluntness and bends. Objects with high level of usage have numerous dents, bluntness and bends, they are also characterized by a clear asymmetry of the working edge as well as cracks and fractures. Aside from the above-mentioned categories we may differentiate a fourth one, consisting of destroyed objects. These are the objects which repair was not possible and remelting them was the only reasonable solution.

On all daggers subjected to traceological analysis we may observe use-wear traces. Those with medium (5) and low (5) level of usage are dominant, there are a few less destroyed artefacts (4) and the least numerous is the amount of objects with a low level of usage (1). Particularly noteworthy is the lack of items with a low level of usage in graves and dominance of artefacts with medium and high level of usage as well as those destroyed. The observed proportions may, however, be an effect of a small sample. Dagger from Dargocice is characterized by a medium level of usage.

A common feature of all enumerated daggers is the complete lack or small number of production traces such as surplus of metal, porosity of the surface or hammering. Considering the fact that items analysed for traces of production correspond chronologically to the whole Bronze Age, the interpretation seems to be correct that a dagger was a personal object, which creation involved more effort than, for example, in case of a tool. Thus, its surface was prepared with much more care by means of removal of production process defects.

Metal analysis

The purpose of the research was to determine the raw material from which the dagger was made, choosing non-destructive methods. Thus, the analysis of the elemental composition was done with the use of Energy-Dispersive X-ray

Fluorescence, with Spectro-Midex spectrometer. The device is equipped with an X-ray tube with molybdenum anode (voltage: 46 kV). Because of the use of a large sample chamber (54 cm × 42 cm × 16 cm) and an integrated video camera system as well as 0.7 mm measuring spot size the exact sample positioning was possible (Fig. 1). A series of repetitions was made on the dagger which provided raw material data on the blade and two preserved rivets.

Due to the low state of artefact's preservation and lack of conservation, it was necessary to carefully clean its surface from layers of earth without damaging the layers of patina. Thus prepared, the artefact was subjected to archaeometric analysis.

The dagger analysis has revealed that it was made of bronze, where the average tin content reaches 14% and copper almost 84%. Percentage of other components is less than 1% and these consists of: 0.5% of arsenic and nickel, 0.4% of antimony (table 1). Consistency of the results may be observed during the analysis of XRF spectra (Fig. 7). The strongest analytical signals are those of copper and tin, weaker signals of iron, nickel, arsenic, antimony and lead were also identified. Analysing these results, one may not forget that even in the case of such highly oxidised artefact, it was possible to identify the raw material and moreover, the results of sample positioning are characterized by a very small dispersion. However, it is necessary to include the data regarding a high level of oxidisation of the artefact and the difficulty in obtaining the adequate amounts of metallic phase, which in case of the dagger was extremely challenging.

That is why the analysis of two preserved rivets proved to be highly complexed but at the same time it revealed information confirming the substantial oxidation of the dagger's elements. However, during the preparation for analysis it was impossible to get access to the metal phase. Both rivets are covered with considerable thickness of oxidised layers that would have to be destroyed in order to expose the non-oxidised metallic core of these elements. That is why, considering the need for preservation of the oxidised layers covering the rivets, they were analysed after only gentle cleaning showing qualitative and semi-quantitative results for the raw material (however, due to the processes of corrosion the semi-quantitative analysis may not reflect the original composition of the alloy). The results of the elemental composition research show that the rivets were made of a material consisting of copper, tin, nickel, iron, arsenic, antimony and lead (Fig. 8). The main elements are tin and copper with tens of percent. Semi-quantitative analysis, revealing substantial concentration of tin (scope 20-90% Sn) should be treated as an effect of corrosion process. Tin, as a metal less noble than copper, is first to oxidise. As a result, corrosive layers have more tin than the original alloy. It is similar

with iron and nickel, whereas arsenic and antimony have similar nobility as copper. Thus, the analysis of the rivets' surface should not be treated as representative for the original alloy.

Daggers in the basins of Vistula and Oder

Daggers are one of the first weapons that the prehistoric societies made from metal. The oldest copper items from the area of today's Poland are dated to the old Chalcolithic Period and linked with younger Lengyel-Polgar cultural groups as well as the Funnelbeaker culture and the Globular Amphora culture. They appeared less often in the Corded Ware culture. Daggers had the apogee of their splendour in the Early and Middle Bronze Age; later on, with the advent of knives and swords, their significance decreased, which is clearly visible in the number of the items found (Blajer 2001, 116; Gedl 1980, 5–11).

A change in the social perception of daggers most likely took place in the Early Bronze Age, which manifested in deposing them in hoards. They were rarely put in graves, where sometimes they were found together with halberds and axes. A dagger was also found in a burial mound no. III in Łęki Małe, Grodzisko district, Greater Poland Voivodeship, which was interpreted as a grave of the representative of local elites. Use-wear and traces of repair in the form of a wire connecting the blade to the handle on the dagger from Łęki Małe suggest that it was used before it was deposited in the grave and most likely it performed a military function. It follows that, a dagger, next to axes and halberds was one of the main attributes of a man (Blajer 1999, 31–36; 2001, 118–119; Sarnowska 1969, 70–82, 107–112, tab. I). It is not, however, a rule on an European scale. Daggers appeared also in women's graves, for example in the Middle Bronze Age, in Scandinavia, in south-eastern Holstein. It is clearly visible there that the weapons are more common in the areas more prone to conflicts, while their number in women's graves decreases with increasing number of items of foreign origin, suggesting the establishment of more peaceful cultural contacts. It can be therefore assumed that the daggers were used by women for protection during periods of increased threat from foreign groups (Bergerbrant 2007, 98–102).

At the turn of the Early and Middle Bronze Age the role of a dagger as a man's attribute probably began to increase. In the area resided by the Tumulus culture artefacts began more often to appear in burial mounds and were rarely found in hoards. They were deposited together with axes and arrowheads. This allows to formulate a conclusion that they were also an attribute of a warrior (Blajer 1999, 31–36; 2001, 119–120; Dąbrowski 2004, 15–16; Gedl 1980, 5–11). Use-wear visible on blades of daggers from the Middle Bronze Age clearly shows that the items deposited in graves were not ceremonial or made purely

with the intention of burial (Pearson 2000, 85–86). Dominance of daggers characterized by a high level of usage in the set of artefacts subjected to traceological analysis points to selectiveness of the deposition.

Stray finds also contain use-wear, however, at this point it is impossible to settle which items were lost and which were deposited in the ground or water intentionally. The exception is the dagger from Wrocław, Lower Silesian Voivodeship, found in the oxbow of Oder, which was most likely intentionally thrown into the river. The asymmetry of the blade and damaged rivet holes points not only to numerous repairs but mainly to intensive use. Use-wear is visible also on the ornamented spearhead from Wrocław-Różanki, Lower Silesian Voivodeship dated to the same period found in the Oder's oxbow and on the bronze sword from Leśniki, Opole district, Opole Voivodeship, found in a swamp. All of the above clearly indicate the existence of strict rules governing the deposition of weapons in this period.

In the Middle and at the turn of the Middle and Late Bronze Age daggers were often a part of graves inventories, including burial mounds of the Kietrz type of the Lusatian culture that are connected to the representatives of the local elites. Therefore, the tradition that began in the Early Bronze Age is still clearly visible. One should note that a large percentage of stray finds was discovered in the aquatic environment, which could indicate that there was a need to remove at least a part of the daggers from the circulation. It is not clear if this should be linked to the burial ritual or to votive gifts (Fogel 1979, 13–26; Gedl 1984, 52–53, 73–75; Blajer 1999, 31–36; 2001, 119–120). Use-wear in the form of scratches, dents, bluntness and bends see to confirm the military function of the analysed items.

In the Late Bronze Age a clear decrease in the amount of daggers is visible. In the areas where before they were numerous, there are almost no finds. It is assumed that the role of daggers declined in the face of increasing popularity of swords and knives that became considered as their alternative (Fogel 1979, 13–26; Gedl 1980, 5–11; Blajer 2001, 121–122). The only item that was subjected to traceological analysis dated to the Late Bronze Age is the Cimmerian dagger, which was a part of hoard from Gamów, Gliwice district, Silesian Voivodeship, contains traces of use (in the form of nicks and a clear bend of the blade), just as two swords and a knife that were discovered together with it.

A common feature of all daggers subjected to traceological analysis is the lack of production traces. Due to the fact that the discussed artefacts date back to the whole Bronze Age, it seems appropriate to assume that these were so personal objects that much more effort was put in their creation when compared to the tools, and therefore their surface was developed with more care by the removal of any imperfections that arose during production.

Table 1. The elemental composition of the dagger (% weight)
Tabela 1. Skład pierwiastkowy sztyletu (% masy)

The analysed area	Ni		Cu		As		Sn		Sb	
	min.	max	min.	max	min.	max	min.	max	min.	max
Dagger average	0.5	0.5	82.0	85.2	0.5	0.5	13.0	16.0	0.4	0.5
	0.5		83.9		0.5		14.2		0.4	
Rivet No. 1	0.4	0.7	3.9	55.6	3.6	4.4	38.0	87.3	0.8	1.4
Rivet No. 2	0.2	0.5	0.0	78.2	1.8	4.2	18.5	91.3	0.4	1.3

Prepared by B. Miazga

Literature

Bergerbrant S. 2007. *Bronze Age Identities: Costume, Conflict and Contact in Northern Europe 1600–1300 BC*. Lindome. Stockholm Studies in Archaeology 43.

Blajer W. 1999. *Skarby ze starszej i środkowej epoki brązu na ziemiach polskich*. Kraków.

Blajer W. 2001. *Skarby przedmiotów metalowych z epoki brązu i wczesnej epoki żelaza na ziemiach polskich*. Kraków.

Dąbrowski J. 2004. *Ältere Bronzezeit in Polen. Starsza epoka brązu w Polsce*. Warszawa.

Fogel J. 1979. *Studia nad uzbrojeniem ludności kultury łużyckiej w dorzeczu Odry i Wisły. Broń zaczepna*. Poznań.

Gedl M. 1980. *Die Dolche und Stabdolche in Polen.* Münster. Prähistorische Bronzefunde V/4.

Gedl M. 1984. *Wczesnołużyckie groby z konstrukcjami drewnianymi.* Wrocław.

Pearson M.P. 2000. *The Archaeology of Death and Burial.* Teksas.

Rembisz-Lubiejewska A. 2011. Dar wotywny złożony z ozdób, narzędzi i broni odkryty w Jeziorze Kamienica, w miejscowości Trzynik, pow. Kołobrzeg (stanowisko 12) / Jewellery, tools and weapon from the Kamienica Lake, Trzynik in Kołobrzeg district (site 12). *Acta Universitatis Nicolai Copernici Archeologia* 31. *Archeologia podwodna* 6, 11–24.

Sarnowska W. 1969. *Kultura unietycka w Polsce*. Wrocław–Warszawa–Kraków.

Sych D. 2016. *Biografie kulturowe militariów oraz narzędzi miedzianych i brązowych datowanych na neolit i epokę brązu z południowo-zachodniej Polski*. PhD Dissertation. Insitute of Archeology, University of Wrocław.

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Fig. 1. Dagger from Dargocice (Kołobrzeg district). White square shows the area with the metal phase subjected to XRF analysis. Photo by B. Miazga
Ryc. 1. Sztylet z Dargocic (pow. kołobrzeski). Białym kwadratem zaznaczono miejsce z zachowaną fazą metaliczną, poddaną analizom XRF. Fot. B. Miazga

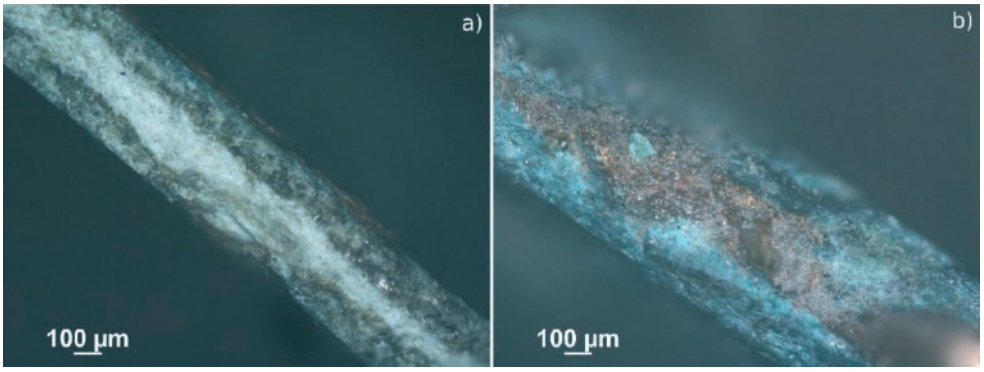

Fig. 2. Dagger from Dargocice. Microscopic image of a cross-section: a – metal phase is invisible; b – part of unoxidised metal is partially preserved in the central area of the cross-section. Photo by B. Miazga
Ryc. 2. Sztylet z Dargocic. Obraz mikroskopowy przełomu ostrza sztyletu: a – faza metaliczna jest niewidoczna, b – warstwa nieutlenionego metalu jest częściowo zachowana w centralnej części przełomu. Fot. B. Miazga

Fig. 3. Traces of grinding visible on the base of the hilt-plate of the dagger. Photo by D. Sych
Ryc. 3. Ślady szlifowania widoczne na podstawie rękojeści sztyletu. Fot. D. Sych

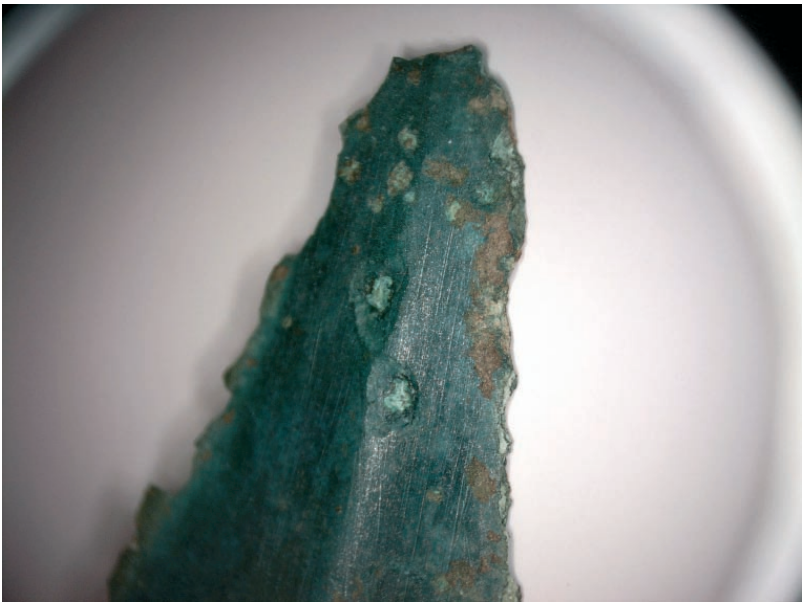

Fig. 4. Parallel lines visible on the blade of the dagger. Photo by D. Sych
Ryc. 4. Równoległe linie widoczne na ostrzu sztyletu. Fot. D. Sych

Fig. 5. Scratches and dents visible on the blade of the dagger. Photo by D. Sych
Ryc. 5. Zarysowania i wgniecenia widoczne na ostrzu sztyletu. Fot. D. Sych

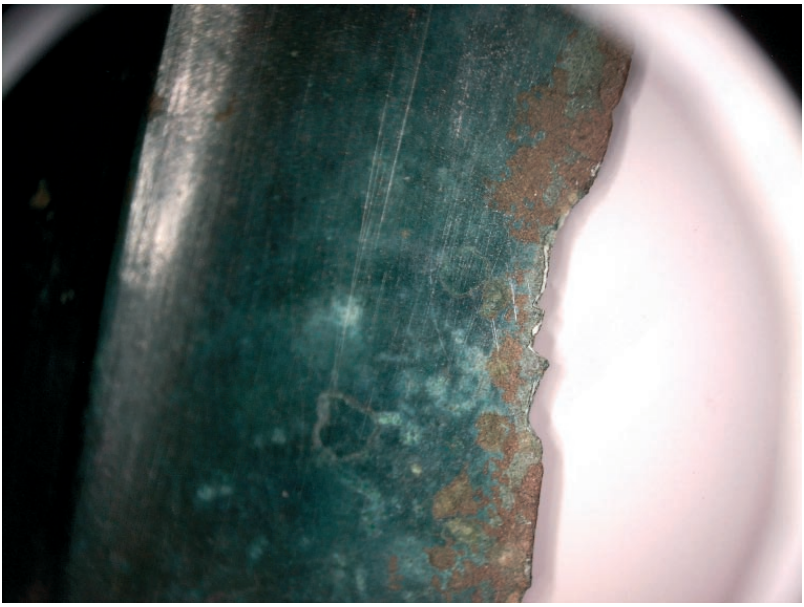

Fig. 6. Scratches and dents visible on the blade of the dagger. Photo by D. Sych
Ryc. 6. Zarysowania i wgniecenia widoczne na ostrzu sztyletu. Fot. D. Sych

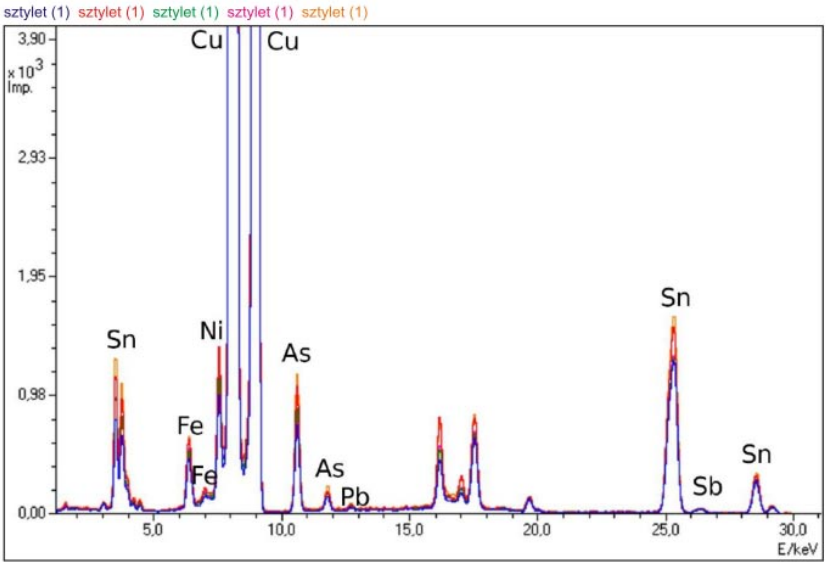

Fig. 7. The ED-XRF spectra of the dagger, line in each colour represents the spot analysis
Ryc. 7. Porównanie widm energetycznych ED-XRF dla sztyletu; analiza punktowa wybranych miejsc przedstawiona różnymi kolorami

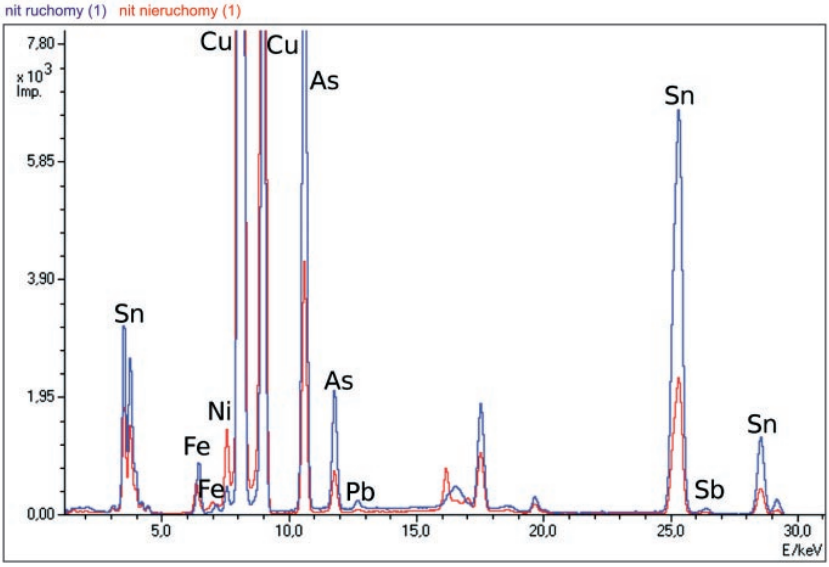

Fig. 8. The ED-XRF spectra of the moveable rivet (blue line) and motionless rivet (red line) which preserved in a dagger
Ryc. 8. Porównanie widm energetycznych ED-XRF ruchomego (niebieska linia) i nieruchomego nitu (czerwona linia) zachowanych w sztylecie