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ABSTRACT

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This paper presents a detailed documentation of 12 kaptorgas with 'horses' from the Kraków part of the Dzierznica II treasure. These artefacts are currently housed in the National Museum in Kraków. Until now, these pendants have not been fully published, thoroughly described, or subjected to any archaeometric, technological, or contextual analyses. As part of the ongoing research project, meticulous macroscopic photographs were taken of each artefact. A micrometric magnifying glass was then used to examine details and construction techniques. Finally, preliminary instrumental chemical analyses were conducted using XRF. The material proved extensive and multifaceted, making it both possible and necessary to provide an initial summary of the findings at this stage of the research. This article focuses on descriptive aspects, offering preliminary suggestions regarding the composition and type of raw materials used, as well as initial observations on their stylistic features and manufacturing techniques. Based on these results, further research stages and procedures will be presented in forthcoming publications.

Keywords: early medieval Poland, early medieval hoards, silver jewellery, silversmith work, reliquary pendants, ornamental work

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INTRODUCTION

The subject of this article is a specific type of hollow pendant known in the literature as a kaptorga. These artefacts are primarily found in hoards of hack-silver and much less frequently in burial contexts. One of the Polish hoards that undoubtedly contained an exceptionally large number of these pendants is the so-called Dzierznica II hoard (the name of the town of Dzierznica was officially changed in 2010 to Dzierżnica, poviat Środa, Greater Poland Voivodeship. Due to the existing tradition of archaeological and museum literature, it was decided to use the older name Dzierznica in this article). The current state of research on the non-monetary part of this hoard, particularly regarding its jewellery, remains highly unsatisfactory. One of the most recent studies on early medieval silver in Poland (FMP I: 36.21235-21599) indicates that the hoard contains 365 fragments of kaptorgas. However, in the portion of the hoard stored at the National Museum in Kraków (MNK, the so-called Kraków part of the hoard), the authors have inventoried eight complete kaptorgas and 74 fragments not included in the FMP I inventory.

From this substantial assemblage, this study focuses exclusively on a single type of kaptorga – those adorned with a stylised horse motif. This group consists of seven complete specimens, five kaptorgas preserved in larger fragments, and 29 small, loose fragments that include horse figures or their elements.

The Dzierznica II hoard was discovered accidentally in 1909 and was the second such deposit found in that locality (Slaski and Tabaczyński 1959, 19, pls 3 and 4; Kmietowicz 1994, 161, 162). The fate of the discovery was complex and rather unfortunate. After its discovery, the hoard was divided, ending up in private hands and later dispersed among various museum collections. Sadly, part of the material was lost or deprived of its provenance. These circumstances were thoroughly documented by Anna Kmietowicz (1994, 161-167), one of the primary researchers of the oriental coins from the hoard. She gathered valuable information from the memoirs of Prof. Zygmunt Zakrzewski, who visited the discovery site at the invitation of the estate owner, Feliks Wize. Zakrzewski estimated that the hoard originally weighed about 30 pounds (approximately 15 kg of silver). More than half of the hoard reportedly went to F. Wize, while the remainder – including whole coins and ornaments (jewellery) – was probably taken by the finders. These objects were gradually sold and dispersed into various collections. Today, the hoard's known elements are housed only in the Archaeological Museum in Poznań and MNK.

The silver jewellery from the Dzierznica II hoard discussed in this study entered the MNK collection in 1910 as a donation from Henryk Mańkowski of Winnogóra. He transferred them, along with coins, to the Emeryk Hutten-Czapski Museum – a branch of the National Museum in Kraków (Korczyńska 2003, 57, 58). Notably, in 2005-2006, M. and M. Andrałojć conducted archaeological verification excavations at the hoard's discovery site, recovering an additional 2.852 deposit elements weighing 583.24 g (Andrałojć *et al.* 2010, 98; 2011, 44-50).

Fig. 1. Map with the location of the Dzierznica II hoard find

The Dzierznica II hoard is unique – it is the largest deposit of its kind found in Polish lands. Its contents are also extraordinary, comprising coins from 20 different Muslim dynasties, as well as Western European, Roman, and Byzantine emissions (over 21,000 coins and coin fragments). All known coins from the hoard have been published in an inventory (FMP I: 36. 1-22018, under 'Dzierżnica'; see also earlier literature). Numismatic analysis suggests that the hoard was buried at the end of the 10th century (terminus *post quem*: 980/1-989/90 or 983-985).

The jewellery items within the hoard are equally significant. Preliminary analyses have identified various types of earrings, beads, lunulae, necklaces, and kaptorgas (Slaski and Tabaczyński 1959, 19, pl. III-IV; FMP I: 36. 20989-22011, Taf. 17-22; Andrałojć *et al*. 2011, 44-50). However, none of these artefacts have been subjected to in-depth studies. As a result, even basic classification of the jewellery types remains incomplete, let alone more detailed conclusions or comparative analyses.

To contribute to the discussion on non-monetary silver in Polish hoards, and in particular, the jewellery from Dzierznica, it is necessary to begin with a description and cataloguing of at least part of this collection. This study focuses on a relatively small but particularly interesting subset – the kaptorgas with horse motifs. The present article serves as a catalogue, forming the first part of a broader study. In future publications, the results of archaeometric and technological research (analytical part) as well as contextual studies (systematic part) will be presented.

In this article, we use zoomorphic terminology, clearly suggesting the species attribution of the representations. We refer to them as 'horses,' consistently identifying the parts of these figures as the muzzle (nostrils), head, ears, neck, mane, back, hindquarters, and tail. Consequently, we propose that the band usually covering the back/hindquarters of the pony be referred to as a 'saddle cloth.' However, we are aware of their conventionality and disputability. One should not forget that the prevailing trend in literature of identifying such representations with horses is not the only possible solution (Gardeła *et al.* 2019; Michalak and Gardeła 2020; 2022; 2024).

MATERIALS AND METHODS

Kaptorgas are women's ornaments characteristic of the Slavic cultural space. They take the form of small pendants, creating a type of sealed capsule. In scholarly literature, two main types of these ornaments are distinguished – rectangular kaptorgas and trapezoidal kaptorgas. These two types differ in their manufacturing techniques, construction, dimensions, and decorative styles (*e.g.*, Jakimowicz 1933, 126; 1939; Tabaczyński 1958, 19-25; Kostrzewski 1962; Stattler 1966, 233; Kóčka-Krenz 1993, 87-90; Sztyber 2010; Wrzesiński 2011, 36, 37). This article focuses exclusively on rectangular kaptorgas from the part of the Dzierznica II hoard stored in the MNK, specifically those decorated with zoomorphic figures, commonly referred to in literature as 'horses.'

The analysis includes artefacts with MNK inventory numbers IV-Z-2725/ 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 94, 96, 98. Some of these objects underwent conservation between 2012 and 2013 and are currently displayed in the permanent exhibition at the Czapski Palace in Kraków, while the remaining ones have not been conserved. Five of the kaptorgas are fully preserved, while seven survive only in fragmentary condition.

As a first step, detailed photographic documentation of each artefact was prepared. This was carried out at the MNK Photographic Laboratory using a Canon EOS 5DsR camera with a Canon Macro Lens EF 100 mm (1:2.8 L IS USM). The level of image detail enabled the planning of subsequent research stages.

Next, an inventory of each item was conducted, including stylistic, typological, and technical descriptions (using a Peak Scale Lupe 7× and a Reading Microscope M10085-1 100×). Both conserved and corroded kaptorgas were subjected to XRF analysis at the

Laboratory for Analysis and Non-Destructive Testing of Historical Objects (LANBOZ MNK). A Bruker S1 Titan HH-XRF spectrometer (Germany) was used for the quantitative analysis of thirteen metal artefacts. The S1 Titan, equipped with a Rh tube and SDD detector, features a 5 mm analysis spot, operates at 50 kV and 15 μA, and was set to an acquisition time of 30 seconds. Due to the heterogeneity of the objects, the reported percentages represent averages from six measurements.

This instrument includes several internal calibrations for metal alloys based on the Fundamental Parameters (FP) method (Thomsen 2007). The average relative uncertainty for silver (Ag) concentration was 0.5%, while those for copper (Cu) and lead (Pb) were 1.5% and 6.0%, respectively.

1. Inventory number MNK IV-Z-2725/64; Fig. 2

This is a fully preserved kaptorga in good condition (length: 38 mm, width: 22.2 mm; body plate thickness: 0.2 mm; weight: 4.49 g).

On the obverse, there are five stylised horse figures (length: approx. 15 mm, width: 5 mm, height: 6 mm), whose muzzles are attached to the tubularly rolled edge of the pendant (kaptorga loop; diameter: approx. 0.2 mm). A filigree band 1.5 mm wide, consisting of a thin

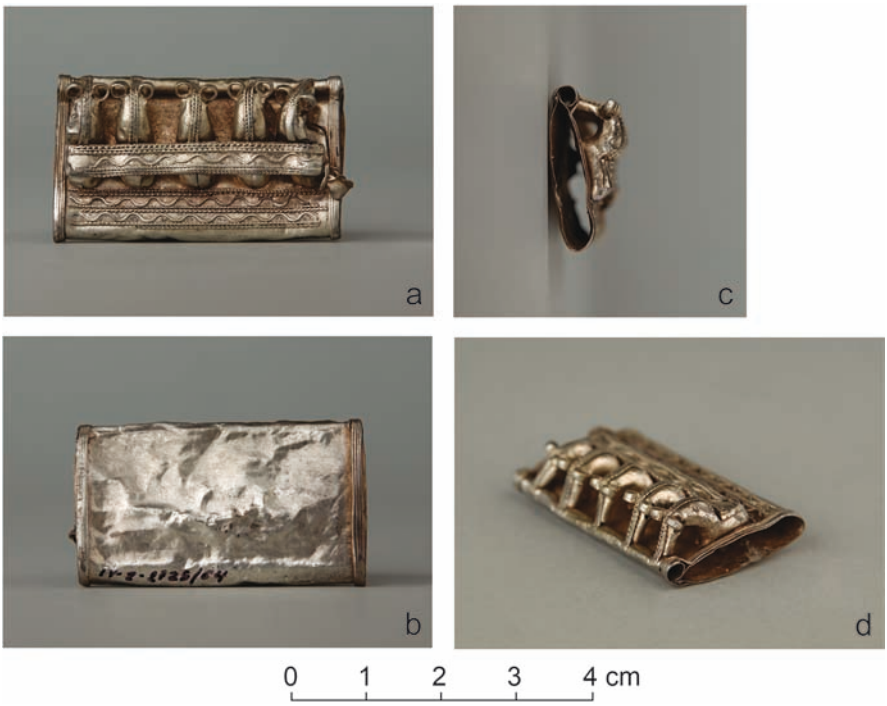

Fig. 2. Dzierznica II, inventory number MNK IV-Z-2725/64, illustrative photo: a – obverse, b – reverse, c – left side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

straight wire enclosed between two torded [profiled and twisted] wires, runs along the upper part of each horse, from the back to the tip of the muzzle, mimicking a mane. The flattened end of this filigree is soldered to the tubular loop of the kaptorga. This decoration is worn, particularly at the highest relief points of the head and the tip of the muzzle.

The ears of the horses are made from a flat, narrow strip (approx. 1 × 0.2 mm), which pierces through the plates forming the head and is coiled at both ends (approx. 1.5-2 scrolls with an internal diameter of 1.3-1.5 mm). A horizontal filigree-decorated strip (length: approx. 33.6 mm, width: 4 mm, thickness: approx. 1 mm) is soldered to the backs of the horses. Its edges feature bands of two twisted wires with a straight wire between them (width: approximately 1.15 mm), while the central section contains a single wire (diameter: approximately 0.4 mm) shaped into a wide wave pattern. Below the figures, there is a filigree decoration band (approx. 5 mm wide) with a complex composition: three interwoven torded wire bands (braid pattern) alternating with two wavy lines arranged in mirror symmetry. At the ends, some wires are detached or broken.

The reverse side of the pendant is plain, smooth, and slightly bent, with no decoration. The body's side edges are wrapped with a wire (diameter: approx. 0.3 mm), forming four coils (width: approx. 1.2 mm). The ends of these coils are visible on both the obverse and reverse. The right sidewall is partially preserved (torn and bent), bordered by a single torded wire band (two torded straight wires, width: approx. 0.8 mm). The left side of the kaptorga is open, missing a sidewall.

2. Inventory number MNK IV-Z-2725/65; Fig. 3

This is a fully preserved kaptorga, though heavily bent and flattened (length: 38 mm, width: 19.4 mm; body plate thickness: 0.2 mm; weight: 3.56 g).

On the obverse, there are five stylised horse figures, though deformed, with their muzzles attached to the tubularly rolled edge of the pendant (forming a loop of internal diameter: approx. 2 mm). A filigree band (two torded wires interwoven; individual wire diameter: approx. 0.5 mm) runs along the upper part of the horses, from the back to the tip of the muzzle, mimicking a mane. This decoration has survived on three of the figures.

The ears of the horses are made from a flat, narrow strip (approx. 1.5 × 0.2 mm), which pierces through the plates shaping the head and is coiled at both ends (approx. 1.5-2 scrolls with an internal diameter of 1.5-2 mm). A horizontal filigree-decorated strip (length: approx. 35 mm, width: 4.4 mm) is soldered to the backs of the horses. Its edges feature a 'braid' motif, made of two torded wires (width: 1 mm). Below the figures, there is a filigree decoration band (width: approx. 4.7 mm), consisting of a thin strip (0.5 × 0.15 mm, soldered upright) and two torded wires (width: approx. 0.9 mm, not forming a braid) beneath it. The strip creates a mirrored, heart-like pattern.

The reverse side of the pendant is plain, smooth, heavily bent, and cracked in places, with no decoration. The side edges are wrapped with a wire (diameter: approx. 0.3 mm), forming three coils (max. width: approx. 1.5 mm). On the right side, both ends of this wire

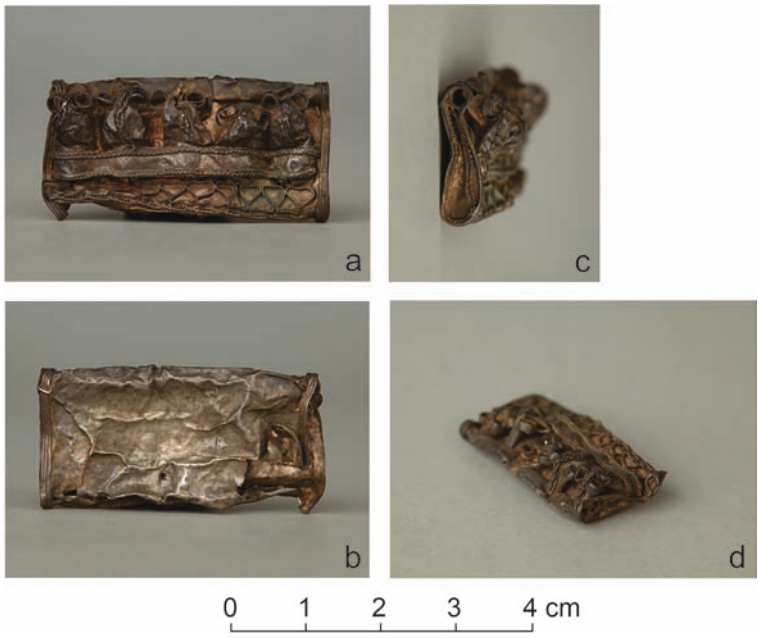

Fig. 3. Dzierznica II, inventory number MNK IV-Z-2725/65, illustrative photo: a – obverse, b – reverse, c – right side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

are visible – one soldered flat (on the obverse), the other tucked under the rest (on the reverse). One of these ends is visible on the obverse. The edges of the right sidewall are bordered by a torded wire (diameter: approx. 0.4 mm). The left side of the kaptorga is open, lacking a sidewall. The bottom of the body was probably cut open along its length.

3. Inventory number MNK IV-Z-2725/67; Fig. 4

This is a fully preserved kaptorga in good condition (length: 28.4 mm, width: 18.3 mm; body plate thickness: 0.1-0.2 mm; weight: 3.55 g).

On the obverse, there are four stylised horse figures (length: approx. 13 mm, width: 4 mm, height: 7 mm), with their muzzles attached to the tubularly rolled edge of the pendant, forming a loop (diameter: 1.8 mm). The rightmost figure is only partially preserved. A filigree band (two torded wires with a straight wire in between; width: approx. 1.3 mm) runs along the upper part of the horses, from the back to the tip of the muzzle, imitating a mane.

The ears of the horses are made from a flat, narrow strip (thickness: approx. 0.2 mm, width: 1.2 mm), which pierces through the plates shaping the head and is coiled at both ends (approx. 1.5-2 scrolls with an internal diameter of approx. 1.5 mm). Each horse has only one ear preserved. A horizontal filigree-decorated strip (length: approx. 26.1 mm,

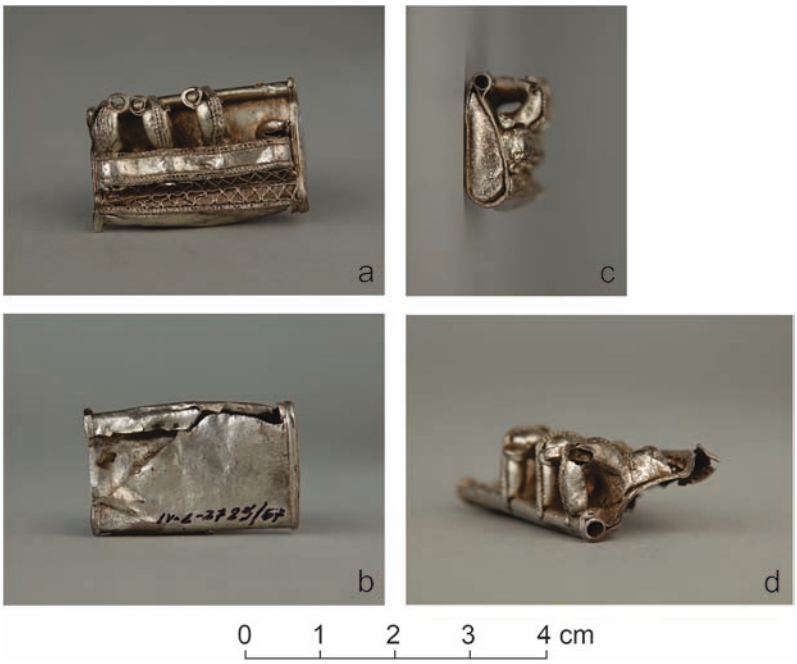

Fig. 4. Dzierznica II, inventory number MNK IV-Z-2725/67, illustrative photo: a – obverse, b – reverse, c – right side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

width: 4.7 mm) is soldered to the backs of the horses. Its edges feature a 'braid' motif, made of two torded wires (width: approx. 1 mm).

Below the figures, a decorative pattern consisting of two thin strips (0.5 × 0.2 mm) and two twisted wires (not forming a braid) is located beneath them. The first strip (approx. 2.3 mm wide) is soldered vertically, resting against the hindquarters of the horses, creating a heart-shaped openwork design. The second strip (approx. 2.6 mm wide) is soldered horizontally on edge and shaped into a heart motif. Both strips form a symmetrical mirror-image pattern.

The reverse side of the pendant is plain, smooth, with some cracks and a missing section, and is undecorated. The body's side edges are wrapped with a wire (diameter approx. 0.2 mm), forming three coils (approx. 1 mm). The right sidewall is well preserved, while the left side of the kaptorga is open, lacking a sidewall.

4. Inventory numbers MNK IV-Z-2725/68-69; Fig. 5

This is a complete kaptorga, preserved in two fragments (total length: approx. 54 mm, width: 23.3 mm, body plate thickness: 0.15 mm; weight: 6.85 g).

On the obverse, there are seven stylised horse figures (length: approx. 14.5 mm, width: 5 mm, height: 8 mm), with their muzzles attached to the tubularly rolled edge of the pendant.

Fig. 5. Dzierznica II, inventory number MNK IV-Z-2725/68-69, illustrative photo: a – obverse, b – reverse, c – right side. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

A filigree band (a thin, straight wire flanked by two torded wires; width: 1 mm) runs from the back to the tip of the muzzle on each horse, imitating a mane. This decoration is heavily worn, especially at the most protruding parts of the head and the tip of the muzzle.

The ears are made from a flat, narrow strip (approx. 1-1.5 × 0.2 mm), which pierces through the plates shaping the head and is coiled at both ends (approx. 2 scrolls with an internal diameter of approx. 1 mm). A horizontal filigree-decorated strip (length: approx. 49 mm, width: 5 mm) is soldered to the backs of the horses. Its edges feature a 'braid' motif, made of two torded wires (approx. 0.8 mm). In the central part, there is a single torded wire (diameter: approx. 0.2 mm), forming a zigzag pattern. The strip is broken and dented in one area.

Below the figures, a filigree decorative band (approx. 7.7 mm wide) runs. Its upper section consists of a band of two torded wires with a straight wire between them (width: 1 mm). Below this, antithetically arranged trapezoidal pairs form an hourglass-like pattern (height: 5 mm). Each trapezoid (bases: approx. 3 mm and 1 mm; height: 2.5 mm) is made of six torded wires, forming three braids (one braid width: approx. 0.6 mm). The lower part of the decoration repeats the band with two torded wires and a straight wire (width: 1 mm),

though this section is missing on the left fragment of the kaptorga. The tubular loop of kaptorga (diameter: 3 mm) is also decorated with a band of two wires torded in the same direction (width: 0.8 mm).

The reverse side of the pendant is plain, smooth, and cracked in some areas, without decoration. The body's side edges are wrapped with a wire (approx. 0.2 mm) to form four coils (approx. 1-1.2 mm). One end is visible on the reverse side. The right sidewall is outlined with a single torded wire (diameter: 0.2 mm), with an oval hole in its lower part (max. diameter: 2.3 mm). The left side of the kaptorga is open (lacking a sidewall).

5. Inventory number MNK IV-Z-2725/70; Fig. 6

This is a fragment (approx. ½) of a kaptorga, with the left edge preserved (remaining length: approx. 23 mm, width: 19.4 mm, body plate thickness: 0.1 mm; weight: 2.79 g). The lower part of the pendant is almost completely destroyed.

On the obverse, three stylised horse figures (length: approx. 14.6 mm, width: 5 mm, height: 6.5 mm) remain, with their muzzles attached to the tubularly rolled edge of the kaptorga (which forms a loop of diameter approx. 2.6 mm). A filigree band (a thin, straight wire flanked by two torded wires; width: 1 mm) runs from the back to the tip of the muzzle on each horse, imitating a mane.

The ears are made from a flat, narrow strip (approx. 1-1.5 × 0.2 mm), which pierces through the plates shaping the head and is coiled at both ends (approx. 1.5 scrolls with an

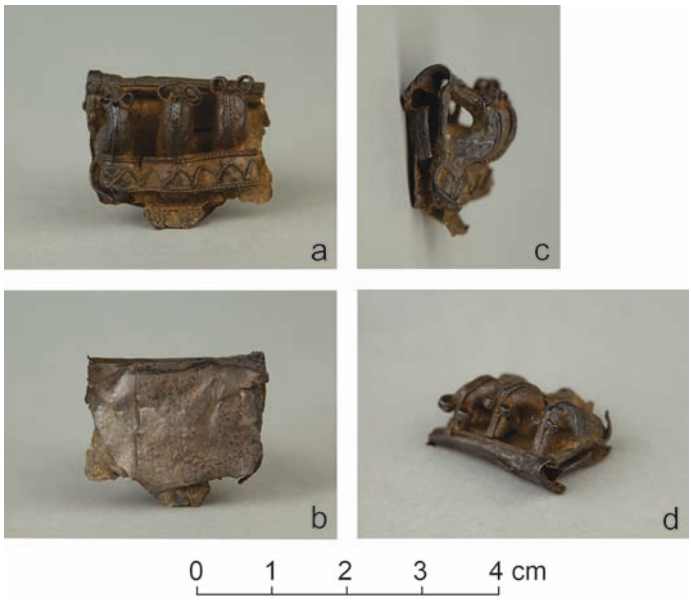

Fig. 6. Dzierznica II, inventory number MNK IV-Z-2725/70, illustrative photo: a – obverse, b – reverse, c – left side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

internal diameter of approx. 1.4 mm). Both the manes and ears are heavily worn. A horizontal filigree-decorated strip (remaining length: approx. 20.6 mm, width: 5 mm) is soldered to the backs of the horses. Its edges feature a 'braid' motif, made of two torded wires (width: approx. 0.6 mm). In the central part, there is a single torded wire (diameter: approx. 0.3 mm), forming an arcade pattern.

Below the figures, only fragments of the filigree decoration remain. The upper part consists of a band of two torded wires with a straight wire between them. Below, there are two trapezoidal shapes, made of six bands of torded wires (probably originally forming an hourglass motif; see inventory no. MNK IV-Z-2725/68-69). The tubular loop of the kaptorga is also decorated with a band of two wires torded in the same direction.

The reverse side of the pendant consists of two undecorated plates – one is smooth, while the other is granular and cracked in some areas. The side edge of the body is wrapped with a wire (approx. 0.3 mm) to form four coils (approx. 1.5 mm). The left side of the kaptorga is open (lacking a sidewall).

6. Inventory number MNK IV-Z-2725/71; Fig. 7

This is a fragment (approx. 1/3) of a kaptorga, with the left side edge preserved (remaining length: 18.4 mm, width: 25 mm, body plate thickness: approx. 0.1 mm; weight: 1.57 g).

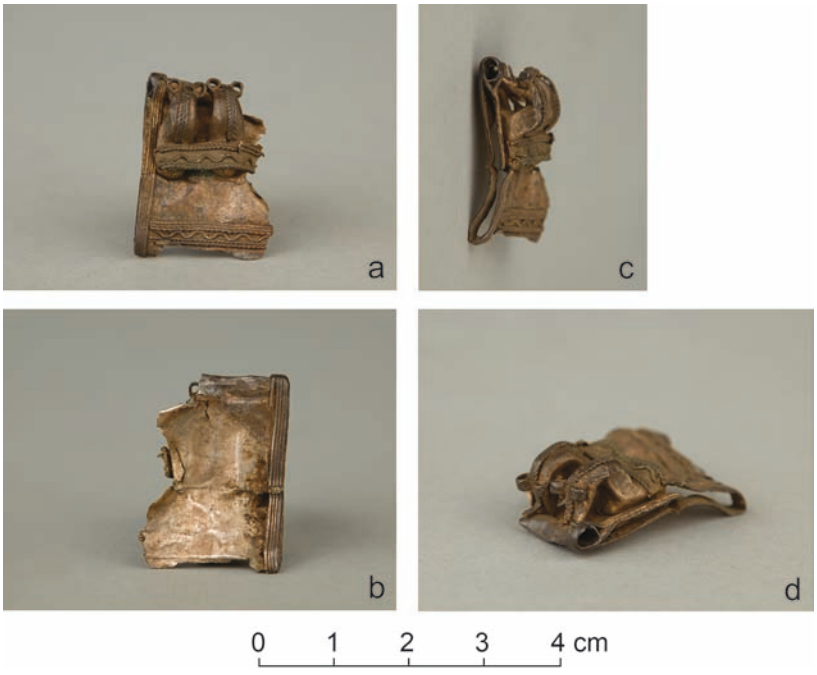

Fig. 7. Dzierznica II, inventory number MNK IV-Z-2725/71, illustrative photo: a – obverse, b – reverse, c – left side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

On the obverse, two stylised horse figures (length: approx. 13.3 mm, width: 5 mm, height: 7 mm) remain, with their muzzles attached to the tubularly rolled edge of the pendant, forming a loop (diameter: 2.5 mm). A filigree band (a thin, straight wire flanked by two torded wires; width: 1 mm) runs from the back to the tip of the muzzle on each horse, imitating a mane.

The ears are made from a flat, narrow strip (approx. 1.2 × 0.2 mm), which pierces through the plate shaping the head and is coiled on both sides (approx. two scrolls with an internal diameter of approx. 1 mm). A horizontal filigree-decorated strip (length: approx. 14.6 mm, width: 4 mm) is soldered to the backs of the horses. Its edges feature a 'braid' motif, made of two torded wires (widths: approx. 1 mm and 0.8 mm). In the central part, a single wire (diameter approx. 0.3 mm) forms a wavy line.

Below the figures, there is a blank space (6.7 mm wide), but soldering marks suggest that some decoration once existed there. The lower part of the obverse is adorned with a filigree decoration strip (width: 3 mm). Upper section: a band of two torded wires with a straight wire in between (width: 1.2 mm), below it: a wavy line made of a single straight wire (diameter: 0.2 mm), further below: two torded wires forming a braid motif (width: 0.8 mm). The bottom edge of the kaptorga's body, along with a large portion of the rear plate, is broken off. The rear part is only partially preserved, with only the upper corner remaining. The left edge of the body is wrapped with a wire (approx. 0.3 mm) to form four coils (approx. 1.8 mm). One end of these coils is visible on the reverse. The left side of the kaptorga is open (lacking a sidewall).

7. Inventory number MNK IV-Z-2725/72; Fig. 8

This is a fragment (approx. 2/3) of a kaptorga with the right side wall preserved (remaining length: 20 mm, width: 22 mm, body plate thickness: 0.1 mm; weight: 2.79 g).

On the obverse, three stylised horse figures (length: approx. 13.2 mm, width: 4 mm, height: 7 mm) remain, with their muzzles attached to the tubularly rolled edge of the pendant, forming the loop of the kaptorga (diameter: approx. 2 mm). A filigree band (a thin straight wire flanked by two torded wires; width: 1.2 mm) runs from the back to the tip of the muzzle on each horse, imitating a mane. This decoration is heavily worn, especially at the top of the head and the muzzle tip.

The ears of the horses are made from a flat, narrow strip (approx. 2 mm wide), passing through the plate shaping the head, and coiled at both ends (approx. 1.3 scrolls with an internal diameter of approx. 1 mm). A horizontal filigree-decorated strip (remaining length: approx. 15.5 mm, width: 2.6 mm) is soldered to the backs of the horses. On its edges, there is a 'braid' motif, made of two torded wires (approx. 0.8 mm), with a single wire (approx. 0.2 mm diameter) forming a wavy line in the centre.

Below the figures, there is an openwork decoration (width: approx. 6.6 mm) made from two soldered wires (thickness: approx. 0.5 mm) forming an 8-shaped braid. The upper part of the braid is soldered to the figure's haunches, so that the previously described

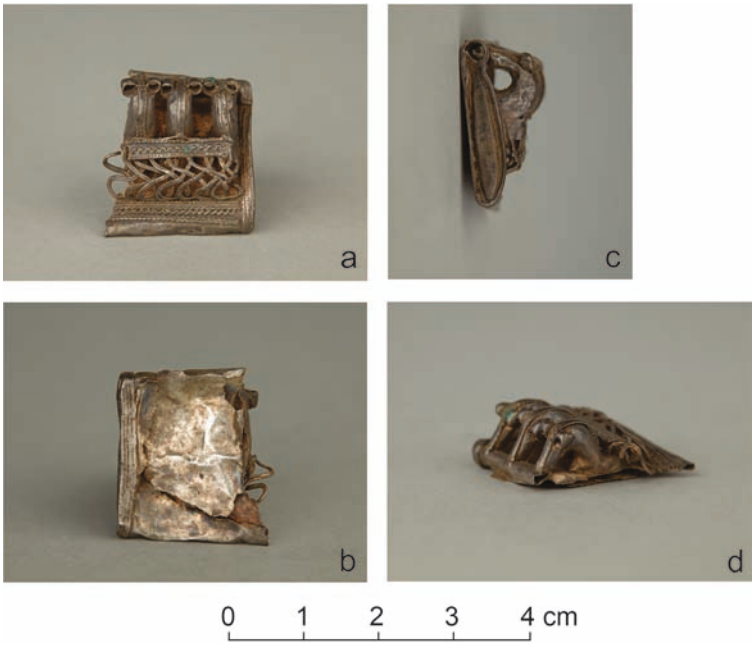

Fig. 8. Dzierznica II, inventory number MNK IV-Z-2725/72, illustrative photo: a – obverse, b – reverse, c – right side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

filigree strip covers the connection. The lower part of the braid is soldered to the body of the kaptorga, creating a convex shape. The lower part of the obverse is adorned with a filigree strip (width: 1.1 mm) that repeats the motif of the previously described band, with the difference that the upper band consists of three wires: two torded and one straight in between (width: 4 mm).

The back side of the pendant's body (reverse) is undecorated, smooth, heavily bent, and cracked in places. The right edge of the body is wrapped with a wire (approx. 0.3 mm) to form four coils (approx. 1.5 mm). Their ends are visible on both the obverse and reverse. The side wall is enclosed by a single wire (0.25 mm in diameter). On the upper surface of the kaptorga, greenish tarnishing is visible.

8. Inventory number MNK IV-Z-2725/73; Fig. 9

This is a fragment (approx. 2/3) of a kaptorga with the right side wall preserved (remaining length: 25.3 mm, width: 22.8 mm, body plate thickness: approx. 1 mm; weight: 2.47 g).

On the obverse, two stylised, secondarily deformed horse figures (length: approx. 13.6 mm, width: 5.6 mm, height: 5.5 mm) remain, with their muzzles attached to the tubularly rolled edge of the pendant, forming the loop of the kaptorga (diameter: approx. 2.2 mm).

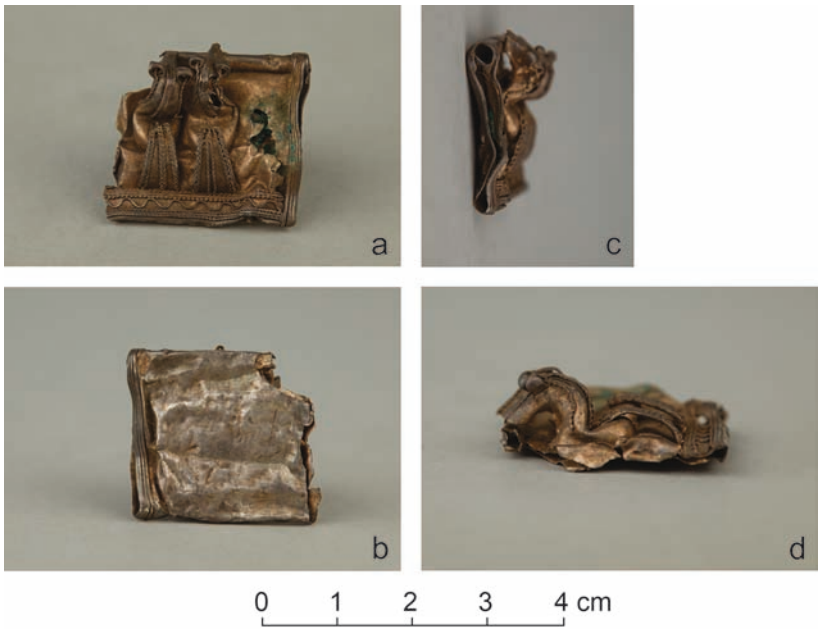

Fig. 9. Dzierznica II, inventory number MNK IV-Z-2725/73, illustrative photo: a – obverse, b – reverse, c – right side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

Fig. 10. Dzierznica II, inventory number MNK IV-Z-2725/74, illustrative photo: a – obverse, b – reverse, c – right side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

A filigree band (a thin, straight wire flanked by two torded wires; width: 1 mm) runs from the back to the tip of the muzzle on each horse, imitating a mane. This decoration is heavily worn, especially at the top of the head and the muzzle tip.

The ears of the horses are made from a flat, narrow strip (approx. 1.5 × 0.2 mm), passing through the plate shaping the head, and coiled at both ends (approx. 1.5-2 scrolls with an internal diameter of approx. 1 mm). Additionally, single torded wires (diameter: 0.3 mm) are soldered to both sides of each horse's neck, with one end inserted into the ear. At the rear of each horse, trapezoidal plates (length: approx. 8.2 mm, width: approx. 5.2 mm and 3 mm) are soldered, bent in an arc to imitate tails. Each plate is decorated with three strands of double torded wires, creating a braid motif (width: 0.8-1 mm). Soldering marks are visible at the top of the plates.

Below the tails, there is a horizontal filigree decoration (width: 5 mm) consisting of a single wire (diameter: 0.2 mm) forming a wavy line, enclosed between two filigree strands, each made of two torded wires with a single straight wire between them (approx. 1 mm and 1.2 mm wide). At the right edge of the kaptorga, a section of the body plate is missing, where a third horse figure was detached. Inside the kaptorga, green copper corrosion products are visible.

The reverse side of the pendant's body is undecorated, smooth, and heavily bent. The right side edge of the body is wrapped with a wire (approx. 0.5 mm) forming four coils (approx. 1.5 mm wide), with one end visible on the reverse side. The described example lacks the side wall.

9. Inventory number MNK IV-Z-2725/74; Fig. 10

This is a fragment (approx. ½) of a kaptorga with the right side wall (length: 19.5 mm, width: 22.5 mm, body plate thickness: 0.1 mm; weight: 2.23 g).

On the obverse, two stylised horse figures (length: approx. 16.3 mm, width: 5.4 mm, height: 6.6 mm) remain, with their muzzles attached to the tubularly rolled edge of the pendant, forming the loop of the kaptorga (diameter: 1.8 mm). A filigree band (a thin straight wire flanked by two torded wires) runs from the back to the tip of the muzzle on each horse, imitating a mane (width: 1.4 mm).

The ears of the horses are made from a flat, narrow strip (approx. 1.3 × 0.1 mm), passing through the plate shaping the head, and coiled at both ends (approx. two scrolls with an internal diameter of approx. 1.2 mm). A horizontal strip (length: approx. 12 mm, width: 5 mm) is soldered to the backs of the horses, decorated with filigree (on the edges, the braid motif is made from two torded wires, approx. 0.9 mm wide, and in the middle, a single wire, approx. 0.3 mm diameter, creating a wavy line). The lower part of the obverse of the kaptorga is decorated with a filigree band (width: 3.4 mm), consisting of – at the top, a single torded wire, at the bottom, two torded wires creating a braid motif, arranged in the same direction (width: 1 mm), and a single wavy-shaped wire (diameter: 0.3 mm) in the middle. The tops of the wavy lines overlap, partially covering the top filigree.

The reverse side of the pendant's body is partially preserved. It is undecorated and smooth. The right side edge of the body is wrapped with a wire (approx. 0.4 mm in diameter), forming four coils (approx. 2 mm wide), with one end visible on the reverse side. The side wall is enclosed by a single wire (approx. 0.4 mm diameter). In its lower part, a hole with ragged edges is punched (approx. 3.5 × 4.8 mm).

10. Inventory number MNK IV-Z-2725/94; Fig. 11

This is a fragment (approx. 1/2) of a kaptorga with the right side wall (length: approx. 18.6 mm, width: 20 mm; body plate thickness: 0.15 mm; weight: 2.07 g).

On the obverse, two stylised horse figures (length: approx. 12.5 mm, width: 5.7 mm, height: 8 mm) remain, with their muzzles attached to the tubularly rolled edge of the pendant, forming the loop of the kaptorga (diameter: approx. 2.7 mm). A filigree band (a thin straight wire flanked by two torded wires) runs from the back to the tip of the muzzle on each horse, imitating a mane (width: 1.2 mm).

The ears of the horses are made from a flat, narrow strip (approx. 1 × 0.3 mm), passing through the plate shaping the head, and coiled at both ends (approx. 1.5 scrolls with an internal diameter of 0.8-1.5 mm). A horizontal strip (length: approx. 16.5 mm, width: 4.8 mm) is soldered to the backs of the horses, decorated with filigree (on the edges, the braid motif is made from two torded wires, approx. 1 mm wide), and in the middle of the strip, a single wire (approx. 0.3 mm diameter) forms a wavy line, which was probably initially in the form of a spring. Most of the wire's distal portion is broken off.

Fig. 11. Dzierznica II, inventory number MNK IV-Z-2725/94, illustrative photo: a – obverse, b – reverse, c – right side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

Below the figures, a layered openwork decoration (approx. 5.4 mm wide) is made of wires (approx. 0.4 mm in diameter). These form at least three layers of horizontally or vertically oriented figure eights, and at the bottom is a spring-like shape. The aforementioned horizontal strip covers part of this decoration. Additionally, on the right side, the decoration is bordered by a filigree band made of two torded wires with a single straight one in between (width: 0.9 mm). Below, near the lower edge of the kaptorga's body, a horizontal band of two torded wires runs in a braid motif (width: 0.9 mm).

The reverse side of the pendant's body is undecorated, smooth, heavily bent, and partially cracked. The right side edge of the body is wrapped with a wire (approx. 0.2 mm in diameter), forming three coils (approx. 1.5 mm wide), with one end visible on the reverse side.

11. Inventory number MNK IV-Z-2725/96; Fig. 12

This is a complete kaptorga, although it is heavily bent and partially damaged (length: 49 mm, width: 21.43 mm; body plate thickness: 0.1 mm; weight: 5.41 g).

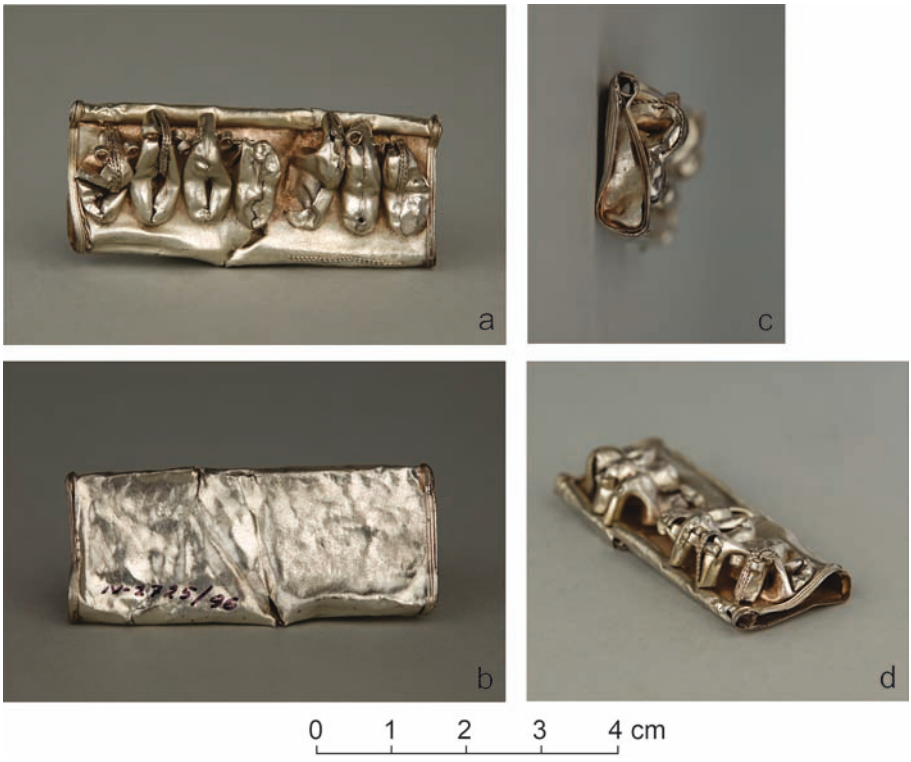

Fig. 12. Dzierznica II, inventory number MNK IV-Z-2725/96, illustrative photo: a – obverse, b – reverse, c – right side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

On the obverse, there are seven stylised horse figures (length: approx. 15.6 mm, width: 5.6 mm, height: 6.5 mm), whose muzzles touch the tubularly rolled edge of the pendant (diameter: approx. 2 mm), but they are not soldered to it now. However, solder traces are visible in several places on the tube. A filigree band (a thin straight wire flanked by two torded wires), imitating a mane (width: 1.3 mm), runs across the top of three horses, from the back to the tip of the muzzle. The remaining horses do not have this decoration.

The ears of the horses are made from a flat, narrow strip (approx. 1.4 × 0.3 mm), passing through the plates shaping the head, and coiled at both ends (approx. 1.5-2 scrolls with an internal diameter of approx. 1.2 mm). Ears remain only on four figures. In the lower part of the obverse of the kaptorga, a fragment of filigree decoration remains, composed of two torded wires forming a braid motif (width: 0.6 mm).

The reverse side of the pendant's body is undecorated, smooth, slightly dented, and cracked in places. The side edges of the body are wrapped with a wire (approx. 0.2 mm diameter) forming three coils (approx. 1.3 mm wide), one of which is visible on the reverse. The right side wall is preserved, with its edges outlined by a simple wire. On the left side of the kaptorga, it is open (without the side wall).

12. Inventory number MNK IV-Z-2725/98; Fig. 13

This is a complete kaptorga, but it is cracked approximately halfway, heavily crushed, and worn (length: approx. 46.4 mm, width: 22.6 mm; body plate thickness: 0.1 mm; weight: 4.42 g).

On the obverse, four heavily deformed stylised horse figures remain, whose muzzles touch the tubularly rolled edge of the pendant, forming the loop of the kaptorga (approx. 2.7×1.4 mm). The rightmost horse is missing, and fragments of a plate are soldered to the body of the pendant in its place. A filigree band (a thin, straight wire between two torded wires), imitating a mane, runs across the upper part of the horses, from the back to the tip of the muzzle. This decoration is partially preserved on three of the figures.

The ears of the horses are made from a flat, narrow strip (approx. 1.5 × 0.2 mm), passing through the plates shaping the head, and coiled at both ends (approx. two scrolls with an internal diameter of approx. 1 mm). A horizontal strip of wire (approx. 30 mm long, 4 mm wide), soldered to the backs of the horses, is decorated along its edges with a filigree band composed of two torded wires arranged oppositely and one straight wire in between (width: 1 mm). This strip is preserved only partially.

Below the figures, there is a filigree decoration made of three braid-like bands formed from double-twisted wires (width: approx. 0.9 mm). Some of the wires are broken and detached from the plate of the kaptorga. A similar filigree decoration, made of two torded wires and one straight wire between them, also appears on the tubular loop of the pendant (width: approx. 1 mm). On the left side, the decoration is detached and bent.

The reverse side of the pendant's body is undecorated, smooth, heavily bent, cracked, and has a large loss. The side edges of the body are wrapped with a wire (approx. 0.2 mm

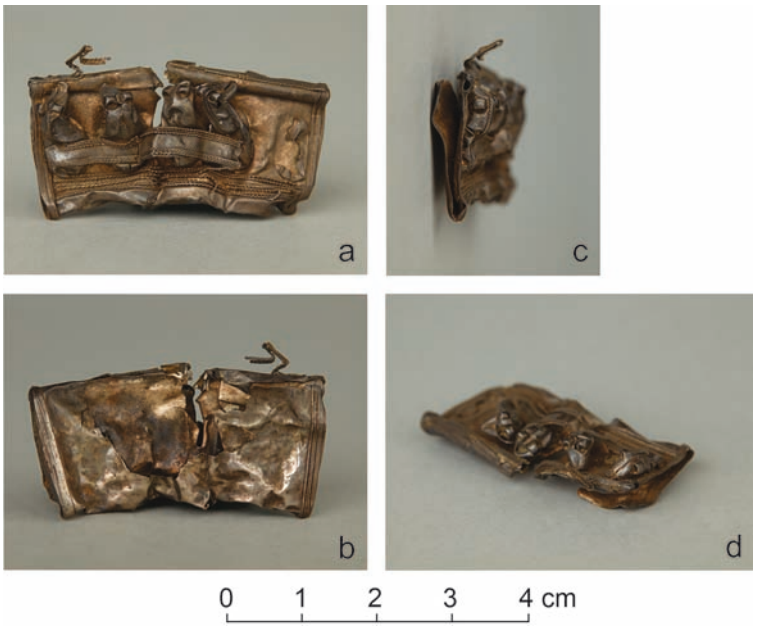

Fig. 13. Dzierznica II, inventory number MNK IV-Z-2725/98, illustrative photo: a – obverse, b – reverse, c – left side, d – oblique view. Photo A. Olchawska, MNK; graphic editing K. Niziołek, JUIA

diameter) forming five coils (approx. 1.4 mm wide), with the end of the coil visible on the left side of the reverse. The right side wall is preserved, with its edges outlined by a simple wire. The left side of the kaptorga is open (without the side wall).

CONCLUSIONS

The material presented in this text is only a small selection from the non-monetary part of the Dzierznica II hoard. It forms a stylistically homogeneous group. Given the incomplete publication of these artefacts, despite the very preliminary phase of analysis, we believe that introducing them into scholarly circulation is both justified and necessary.

The catalogue-like nature of this text is undoubtedly crucial for the following stages of publication, and through its deliberately detailed descriptions, it forms a substantial and cohesive whole. At this point, it becomes possible to begin discussions on a range of identified, specific research questions. Resolving them will ultimately lead to a more comprehensive synthesis.

During the research, descriptions, and preliminary archaeometric analyses conducted to date, several issues have arisen that require further study. Above all, there is a suggestion regarding the jewellery workshop where the kaptorgas might have been made. Was it

a single workshop? – It is difficult to confirm this at the current stage of research, definitively. However, there are already indications that this conclusion is worth considering.

It would be a truism to state that certain characteristic construction elements appear in the discussed artefacts. However, it is no longer a truism that there is significant similarity in the individual components of essentially every described kaptorga. This includes both metric features of the plates, wires, filigree, and other elements, such as the so-called 'embossed shapes,' as well as the manner in which they are joined and finished. One can observe a high degree of repetition in the tording method, joining individual elements into larger whole pieces (*e.g.*, the so-called braids or triple strands), their soldering, or assembly. It should be emphasised that these similarities are observed at the level of tenths of a millimetre (±0.1 mm), which, as can be assumed, was not (and could not have been) a subject of standardisation in early medieval workshops. At the same time, it can be assumed that this is neither a coincidence nor the result of the technological properties of the material. Hence, there is an emerging suspicion that the analysed products might have come from a single workshop. Kaptorgas decorated with a horse motif are known from

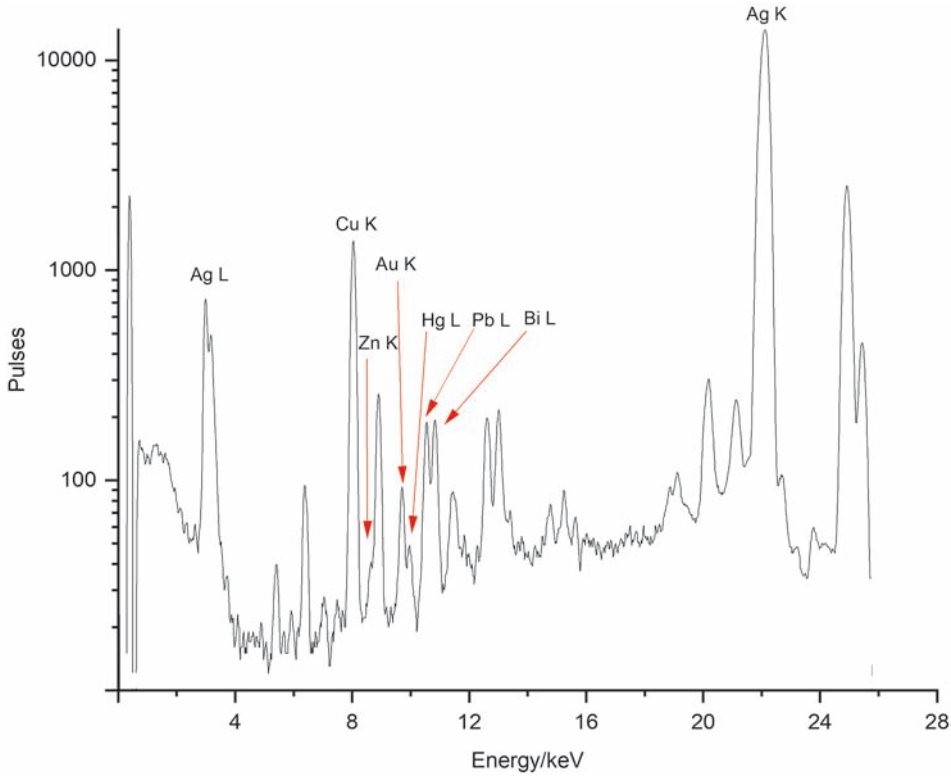

Fig. 14. An example of X-ray fluorescence (XRF) spectra obtained for kaptorga inventory number MNK IV-Z-2725/67

many sites in Poland (*e.g.*, Sztyber 2006, 2010; Kowalski and Kozłowska-Skoczka 2012; Poliński 2020), the Czech Republic (*e.g.*, Frolík and Smetánka 2014; Profantová 2022) or Scandinavia (*e.g.*, Kastholm *et al.* 2017; Miśta-Jakubowska *et al.* 2024). Therefore, the answer to the above question and the suggestion will be quite important in general, given the discussion of their origin and production.

Besides the aforementioned similarities, the shaped parts from the moulds used to make, for example, the bodies of the horses or other elements used to create the pendants, such as the strips, are almost identical. An interesting observation is also the lack of granulation decoration, which was very popular at that time (*e.g.*, Děd *et al.* 2016; Profantová 2022).

Many elements that make up the kaptorga serve a dual function: both decorative and structural. The best example of this is the mane – a filigree band securing each figure to the tubular loop of the pendant. Another such element is the transverse strip passing through the backs of the figures – the 'saddle', which simultaneously decorates the kaptorga and stabilizes the row of horses.

An interesting (though still preliminary) observation concerns the chemical (elemental) composition of the kaptorgas. The surveyed metal objects are primarily composed of silver (Ag) and copper (Cu), along with trace levels of lead (Pb), bismuth (Bi), gold (Au), mercury (Hg), and zinc (Zn) (Fig. 14). Quantitative analyses have revealed Ag contents in the range of 93.3% – 95.4%, and Cu contents in the range of 2.8% – 4.5%.

The trace element ranges are 0.3% – 0.8% for Pb and 0.3% – 0.5% for Bi, respectively (Merkel 2016). Gold was identified in all measured kaptorgas; however, the LOQ (Limit of Quantification) in the table indicates that the percentage of the identified element is below the quantification limit for the method used. Similarly, Hg was identified in most objects, except for two: MNK IV-Z-2725/68 and MNK IV-Z-2725/96, which were marked as LOD (Limit of Detection) in the table (Table 1). Zn was also detected in all items, with concentrations not exceeding 600 ppm.

Currently, the compositions of solders are also being analysed, and we have also found traces of the original content of the kaptorgs in one of the specimens (inventory no. MNK IV-Z-2725/73), which we considered interesting.

The craftsmanship of the analysed objects is also noteworthy. One kaptorga consists of about 180-200 components. A large part of them are semi-finished products, with dimensions not exceeding 1 mm (often even 0.1-0.5 mm). At the same time, the repeatability of the techniques used to make these semi-finished products stands out. As noted earlier, they are not only metrically (formally) similar but also stylistically.

Most of the analysed artefacts are damaged or crushed, which is typical for jewellery found in 'cut or chop silver' early medieval hoards. Nevertheless, they also bear traces of use. The areas with the most wear on the decoration elements and the pendants themselves indicate how they were suspended and worn, and, primarily, that they were worn for a long time. One of the pendants had been repaired (inventory no. MNK IV-Z-2725/70).

Table 1. The results of the XRF chemical analyses conducted on the examined group of kaptorgas

No.	Inventory number	Ag[%]	Cu[%]	Pb[%]	Bi[%]	Au[%]	Hg[%]	Zn[ppm]
1	MNK IV-Z-2725/64	94.5	3.6	0.3	0.4	LOQ	LOQ	300
2	MNK IV-Z-2725/65	93.9	4.1	0.5	0.4	LOQ	LOQ	300
3	MNK IV-Z-2725/67	94.8	3.6	0.4	0.3	LOQ	LOQ	300
4	MNK IV-Z-2725/68	94.1	4.3	0.7	0.4	LOQ	LOD	300
5	MNK IV-Z-2725/69	93.6	4.5	0.7	0.5	LOQ	LOQ	LOQ
6	MNK IV-Z-2725/70	93.7	4.1	0.7	0.5	LOQ	LOQ	600
7	MNK IV-Z-2725/71	93.3	4.5	0.6	0.3	LOQ	LOQ	500
8	MNK IV-Z-2725/72	95.0	3.4	0.4	0.3	LOQ	LOQ	300
9	MNK IV-Z-2725/73	95.2	3.3	0.4	0.3	LOQ	LOQ	200
10	MNK IV-Z-2725/74	94.7	3.1	0.5	0.4	LOQ	LOQ	200
11	MNK IV-Z-2725/94	94.4	3.7	0.3	0.3	LOQ	LOQ	300
12	MNK IV-Z-2725/96	93.7	4.2	0.8	0.4	LOQ	LOD	400
13	MNK IV-Z-2725/98	95.4	2.8	0.4	0.4	LOQ	LOQ	200

Another issue is the stylistic and symbolic significance of the analysed artefacts. As mentioned in the introduction, identifying the figurines as horses is not the only interpretation found in the scholarly literature (Gardeła *et al.* 2019; Michalak and Gardeła 2020; 2022; 2024). As a result of this line of thought, the question arises about the symbolic significance of the horse for the users of these pendants. Additionally, one could consider the number of figures. Does the fact that their number is repetitive have any significance, and could it possibly be used to estimate the degree of preservation of the artefact?

Finally, the observed constructional patterns are certainly not without significance. Of particular interest is the absence of the left lateral wall of the kaptorga. This could be a consequence of the prevalence of right-handedness among craftsmen or users, or it may also have a symbolic meaning.

Specialised archaeometric analyses, on the one hand, and the detailed stylistic and comparative studies the authors are currently conducting, may provide answers to these and many other questions. The conclusions will be presented in subsequent articles.

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