A child burial with a necklace from the Triangle cemetery in Prague-Střešovice

Dětský pohřeb s náhrdelníkem z pohřebiště Triangl v Praze-Střešovicích

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The Triangle cemetery in Prague-Střešovice was the only preserved part of the great burial site from the 9th–10th century AD; this site was partially destroyed beginning in the 18th century by the extraction of clay for the Strahov brick factory. A total of 49 graves, all dated to the 10th century, were uncovered in the preserved part of the cemetery in 2012. Children's grave no. 16 was the richest of the children's graves and the second richest of all graves in the cemetery. A total of 19 silver jewels were found in the grave: kaptorga – amulet container, beads, hollow spherical pendants – gombiks. A technical study was performed to describe the construction of the different types of jewels and identify the material used to manufacture them. The artefacts were examined with a stereomicroscope, subjected to X-ray radiography and observed and analysed with scanning electron microscopy coupled with energy-dispersive X-ray spectrometry (SEM/EDS). A replica provided practical information about the time of realisation of each type of jewel. Analogies from the technical and thematic points of view were further searched. The set of jewellery comes from the production of the Prague workshop which enriched the tradition of Great Moravian jewellery with new elements inspired by cultural influences from the west, east and south.

Bohemia – cemetery – 10th century – kaptorga – gombiks – beads – SEM/EDS analysis

Pohřebiště Triangl bylo jedinou zachovanou částí velkého středohradištního pohřebiště ničeného od 18. století těžbou hlíny pro strahovskou cihelnu. V poloze Triangl bylo v roce 2012 prozkoumáno 49 číslovaných hrobů s výbavou datující je do 10. století. Dětský hrob 16 byl nejbohatší z dětských pohřbů a druhý nejbohatší celkově, bylo v něm nalezeno 19 kusů stříbrných šperků – kaptorga, korálky a gombíky. Technologický rozbor šperků má za cíl poznat způsob výroby jednotlivých typů a určit suroviny použité při jejich výrobě. Předměty byly zkoumány pomocí optické stereomikroskopie, rentgenografie a elektronové rastrovací mikroskopie ve spojení s energiově disperzní spektroskopií (SEM/EDS). Byly vyhledány analogie, co se týče technologie výroby i použitých výzdobných motivů. Replika poskytuje představu o čase potřebném k výrobě každého jednotlivého typu šperku. Soubor šperků pochází z produkce pražské dílny, která tradici velkomoravského šperkařství obohatila o nové prvky inspirované kulturními vlivy ze západu, východu i jihu.

Čechy – pohřebiště – 10. století – kaptorga – gombíky – korálky – SEM/EDS analýzy

1. Introduction

The early medieval Triangle cemetery in Prague-Střešovice is situated on the southern slope above the valley of the Brusnice Stream separating it from the promontory, on which stands Prague castle (*fig. 1*). It therefore belongs to the cemeteries in which residents of the economic hinterland of Prague Castle were buried (*Tomková – Frolík 2005*, fig. 3). The cemetery at the Strahov brick factory has been known as an archaeological site since the 19th century, when finds from 9th century inhumations graves were recorded (summary *Tomková 2006*, 106–110). The actual Triangle cemetery was uncovered for the first time

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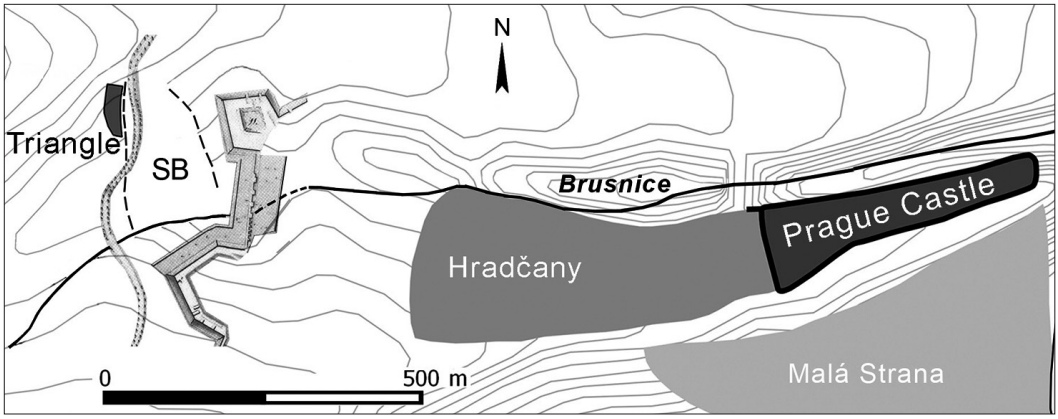


Fig. 1. Prague-Střešovice, location of the cemetery Triangle. SB – Strahov brick factory. From the map of R. Brejcha adjusted by D. Frolíková.
Obr. 1. Praha-Střešovice, poloha pohřebiště Triangl vzhledem k Pražskému hradu. SB – cihelna.

by I. Borkovský in 1924 (*Borkovský 1969*, 37; *1972*, 41), but fully excavated in 2012 (*Frolíková-Kaliszová 2014*). Anthropological analysis has shown that men and women buried in the cemetery had not been engaged in heavy physical work and that they had a high-quality diet (*Stránská 2014*, 331–345). The discovery of two rich graves and two graves with spurs suggests that members of the local elite were buried in this cemetery. This article presents the grave goods of one of the richest child burials – grave no. 16, in which a necklace composed of silver open filigree beads and *kaptorga*-amulet container was discovered along with eight small *gombiks* (hollow spherical pendants or buttons).

2. Grave no. 16

Grave no. 16 was found in the middle of the preserved part of the cemetery (*fig. 2*). The grave pit on the surface was a rectangle with rounded corners measuring about 130 × 80 cm (*fig. 3: b*). According to its west-east orientation, it belongs to an early horizon of graves from the first half of the 10th century. The sides of the pit were sloped and the western side of the grave was obliquely intersected by the trench of I. Borkovský, which fortunately did not disturb the burial. The bottom of the grave measured 106 × 56 cm, and the relative depth of the grave was 25 cm.

Ten blue-lilac coloured beads, eigth small gombiks and one kaptorga-amulet container (*fig. 3: a*) began to appear between the bones of the chest at a depth of 20 cm. The child was buried in a wooden coffin which was preserved only in the form of a few fibres next to the metal jewels. A fragment of a bronze needle from a destroyed Únětice culture grave was also found in the backfill. The poorly preserved skeleton lay in an oriented position on its back; only fragments of the skull and some small remains of bones were present (*fig. 3: a, b*). Anthropologically, the skeletal remains were identified as belonging to a child 3–4 years of age (on account of the full eruption of the primary teeth and the initial stage of root mineralisation of the secondary teeth).

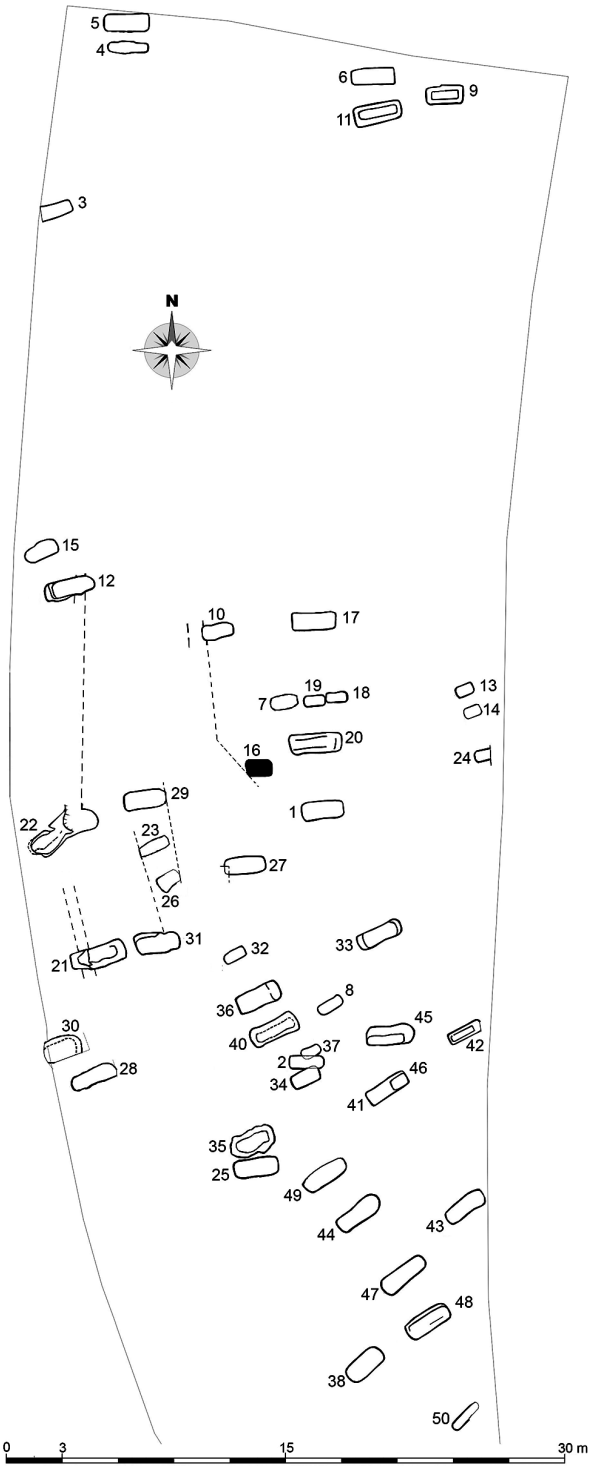


Fig. 2. Location of the grave 16 (black) in the cemetery Triangle. Drawing D. Frolíková.
Obr. 2. Poloha hrobu 16 (černě) na pohřebišti Triangl.

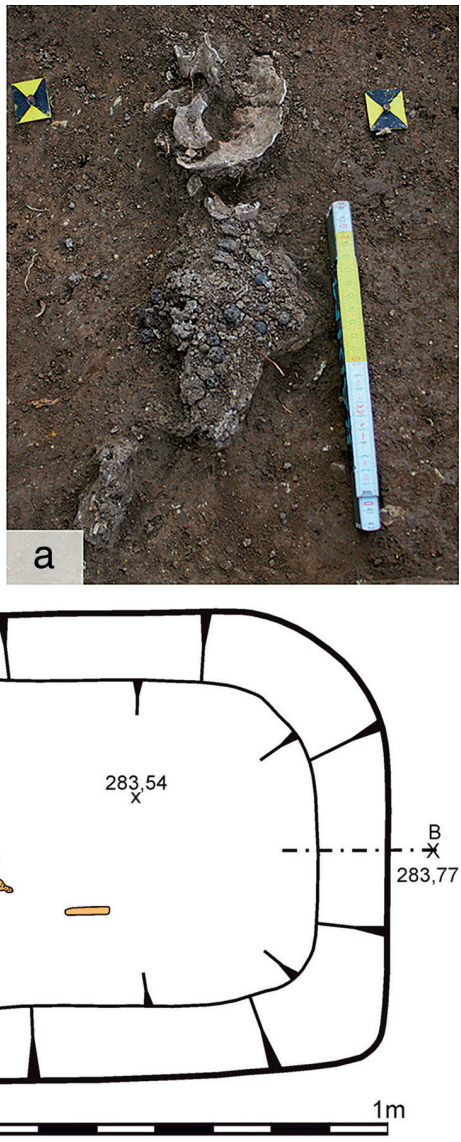


Fig. 3. Grave 16: a – field documentation; b – drawing of the grave with localisation of the jewels: green – gombiks, red – beads, violet – kaptorga. Conception D. Dvořáček.
Obr. 3. Nálezová situace hrobu 16: a – terénní foto, b – kresebná dokumentace: zeleně gombíky, červeně korálky, fialově kaptorga.

Description of the finds (*fig. 4*)

Gombik D 329 – spherical shape with filigree ring decoration. Diameter 8.45–8.7 mm, height with loop 12.8 mm.
Gombik CH 326 – silver, spherical shape, open filigree ring. Diameter 8.6–9.3 mm, height with loop 13 mm.
Gombik C 328 – silver, spherical shape with filigree ring decoration. Diameter 8.8 mm, height with loop 13 mm.
Gombik J 332 – silver, spherical shape, with filigree ring decoration. Diameter 8.9–9.2 mm, height with loop 12.45 mm.
Gombik B 330 – silver, plain, spherical shape. Diameter 10.8 mm, height with loop 15.4 mm.
Gombik L 327 – silver, plain. Diameter 13.3 mm, height with loop 14.9 mm.

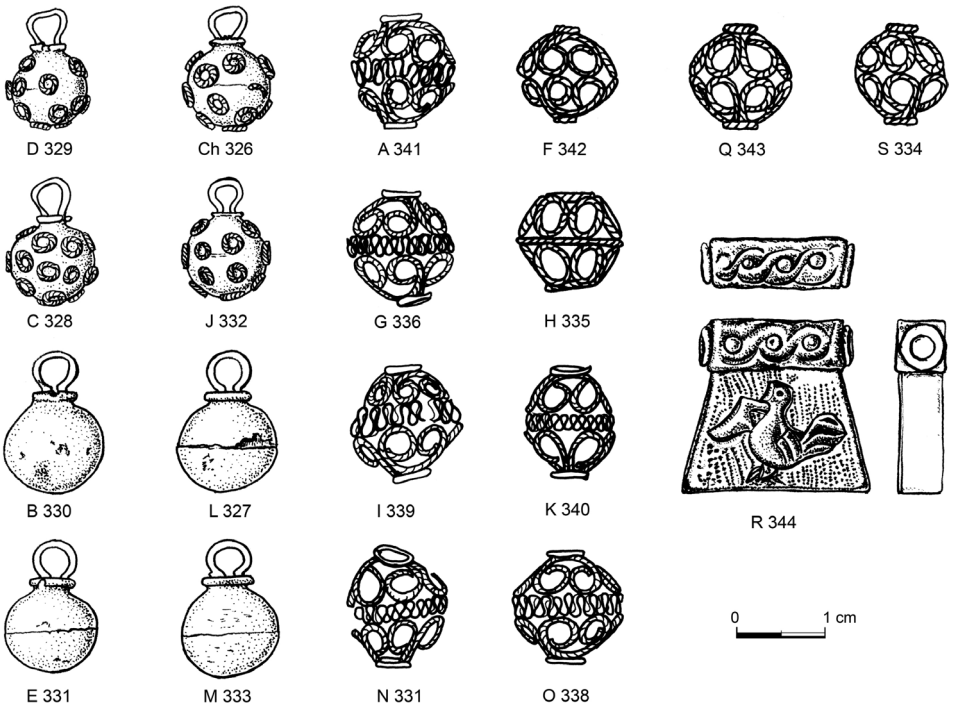


Fig. 4. Prague-Střešovice, cemetery Triangle. Jewellery from the grave 16. Drawing M. Housková.
Obr. 4. Praha-Střešovice, pohřebiště Triangl, kolekce šperků z hrobu 16.

Gombik E 331 – silver, plain, spherical shape. Diameter 10.3 mm, height with loop 14.45 mm.
Gombik M 333 – silver, plain. Diameter 10.7 mm, height with loop 15 mm.
Bead A 341 – silver, spherical shape, open filigree work, each hemisphere made of 3 "pretzel" components. Diameter 11 mm, height 12.4 mm.
Bead G 336 – silver, spherical shape, open filigree work, each hemisphere made of 3 "pretzel" components. Diameter 12 mm, height 12.2 mm.
Bead I 339 – silver, spherical shape, open filigree work, each hemisphere made of 3 "pretzel" components (damaged). Diameter 12.2? mm, height with loop 12.2 mm.
Bead N 331 – silver, spherical shape, open filigree work, each hemisphere made of 3 "pretzel" components. Diameter 9.8 mm, height with loop 11.5 mm.
Bead F 342 – silver, spherical shape, open filigree work. Diameter 10.4 mm, height 10.75 mm.
Bead H 335 – silver, spherical shape, open filigree work. Diameter 11 mm, height 10 mm.
Bead K 340 – silver, oval shape, open filigree ring, each hemisphere made of 3 "pretzel" components. Diameter 8.0–9.75 mm, height 12 mm.
Bead O 338 – silver, spherical shape, open filigree work, each hemisphere made of 3 "pretzel" components. Diameter 11.2 mm, height 11.4 mm.
Bead Q 343 – silver. Diameter 10.5 mm, height 11.3 mm.
Bead S 334 – silver, spherical shape, open filigree work, each hemisphere made of 3 "pretzel" components. Diameter 11 mm, height 11 mm.
Kaptorga R 344 – silver, trapezoidal shape, with a cover. Both the box and cover are perforated on the side by the slip-on hole, which are lined with rings. The front plate of the box and the cover as well as the upper plate of the cover are decorated with chasing. A bird on a dotted background is depicted on the front plate, while an interlaced motif is depicted on the lid. Size: 17–20.5 × 18.7 × 5 mm.

3. Technological study
(E. Ottenwelter – L. Barčáková)

A total of 19 silver jewels were found in grave 16; one kaptorga (amulet container), ten open filigree work beads and eight gombiks (*fig. 4*). Two different types of gombiks and three different types of beads were recovered. A technological study of the finds aiming to describe the construction of each type of jewel and to identify the material and technology used in their manufacture was performed.

The metallic artefacts were first examined using an Olympus SZX7 stereomicroscope (10–40× magnification). X-ray radiography was performed to investigate the internal construction of the jewellery. Analyses were conducted by scanning electron microscopy with energy-dispersive X-ray spectrometry (SEM/EDS) (PHILIPS XL30 equipped with an EDAX system). These were performed in the Department of Structure and Phase Analyses at the Faculty of Mechanical Engineering of the Brno University of Technology by Ing. Drahomíra Janová. One specimen of each type of jewel present in the grave was analysed. Analyses were performed on each type of component composing the jewel as well as solder areas.

The dimensions of the different components of the jewellery were measured with an Olympus SZX7 stereomicroscope and Olympus QuickPHOTO camera 3.0 software. Finally, each type of jewel was weighed to evaluate the amount of precious metal used for their manufacture and a replica of each type was made by professional goldsmith Ludmila Barčáková.

Kaptorga

Kaptorga R 344 has a trapezoidal shape measuring 20.5 mm at the base and 17 mm at the cover. It is 18.7 mm high (*fig. 5*) and is composed of two elements: a box and a lid (*fig. 6*). The box is made from a folded sheet 0.2 mm thick (*fig. 6: A*) on which a trapezoidal plate was soldered (*fig. 6: B*). The sides overlap the lower sheet. The lid is formed by a rectangular folded sheet (*fig. 6: C*) mechanically joined and soldered to a rectangular plate (*fig. 6: D*). Both the box and the lid are perforated on the side (*fig. 6: C*). A ring 4.8 mm in diameter made with a wire of round-section and a diameter of 1.2 mm, slightly flattened, was soldered around the holes of the lid (*fig. 5: c*; *fig. 6:* E_1, E_2). This ring was originally surrounded by a row of small granules 0.5 mm in diameter (*fig. 6:* F_1, F_2), which have almost all disappeared (*fig. 5: c*).

Six different types of components (upper plate, side perforated and bent cover plate, ring, small granule, front box plate, back plate) first had to be manufactured to produce this ornament with about 80 components in total. The front plate of the box and the lid as well as the upper plate of the lid are decorated by chasing (*fig. 5: a, d*).

A bird (dove?) holding a leaf (?) in its beak is represented on the front plate of the box on a dotted background (*fig. 5: a*), while the front side and top plate of the lid bear interlaced decoration (*fig. 5: a, d*). The lid was chased while it was on the box. The chased decoration is partly visible on the underside of the box (*fig. 5: d*). This means that the kaptorga was closed and probably filled with an organic material (pitch, wax or tallow?) to avoid deforming the plate while chasing the decoration. The plain back plate is heavily scratched.

Silver containing from 1.3 to 6.2 wt.% of copper was used to manufacture the different components of the kaptorga. The rings (*fig. 6:* E_1, E_2) were manufactured from another material – a ternary alloy of Ag-Au-Cu with 3 wt.% of copper and about 4 wt.% of gold (*tab. 1*).

Fig. 5. Prague-Střešovice, cemetery Triangle, grave 16, Kaptorga 344; a – kaptorga's front and reverse sides; b – lateral view of the kaptorga showing unmelted metallic solder; c – detail of the ring on the lid; d – open front view of the kaptorga; e – Kaptorga's X-radiography. Photo E. Ottenwelter, X-ray radiography L. Barčáková.

Obr. 5. Praha-Střešovice, pohřebiště Triangl, hrob 16, kaptorga 344, a – přední a zadní strana, b – boční strana s neprotavenou pájkou, c – detail kruhového lemu otvoru ve víčku, d – pohled na čelní stranu otevřené kaptorgy, e – RTG kaptorgy.

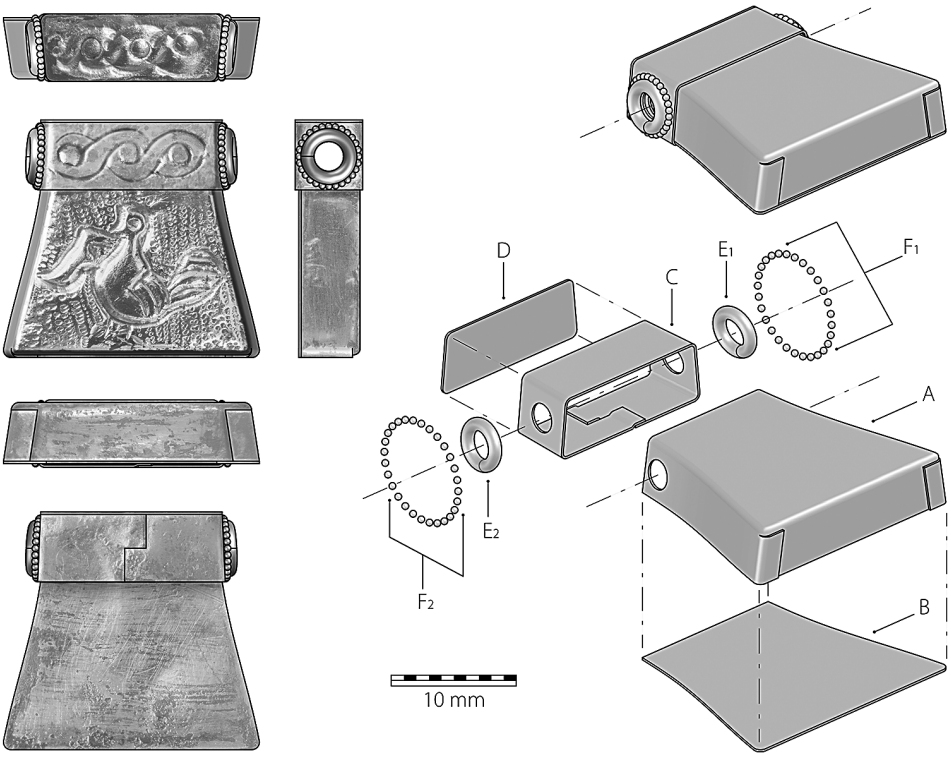


Fig. 6. Prague-Střešovice, cemetery Triangle, grave 16, kaptorga 344, exploded view. Drawing G. Plítková.
Obr. 6. Praha-Střešovice, pohřebiště Triangl, hrob 16, kaptorga 344, schematický rozkres.

The back plate of the box and upper plate of the lid were soldered, as were the rings and granules. The remaining granules are flooded (*fig. 5: c*). Pieces of un-melted solder patches are visible on one side of the kaptorga (*fig. 5: b*). Analyses have shown that it was a silver-copper hard solder containing approximatively 5wt.% of copper. This metallic solder was used to join the different components together and strengthen the mechanical joints. The composition of the solder and the bulk metal used is quite similar. The soldering must have been particularly risky, which explains why we can still observe patches of un-melted solder on the artefacts (*fig. 5: b*). The kaptorga weighs 1.9 g. The experimental manufacture of this kaptorga took approximatively 8 hours.[1]

Gombiks

A total of eight small gombiks were found in grave no. 16. Two types are present: half are decorated with filigree rings of twisted strips, while the other half is slightly larger and plain gombiks.

[1] The estimation excludes the time needed to produce sheets and wires from the silver ingot. It includes the manufacture of the different components with already available sheet and wires of silver, the soldering of the different components and the decoration.

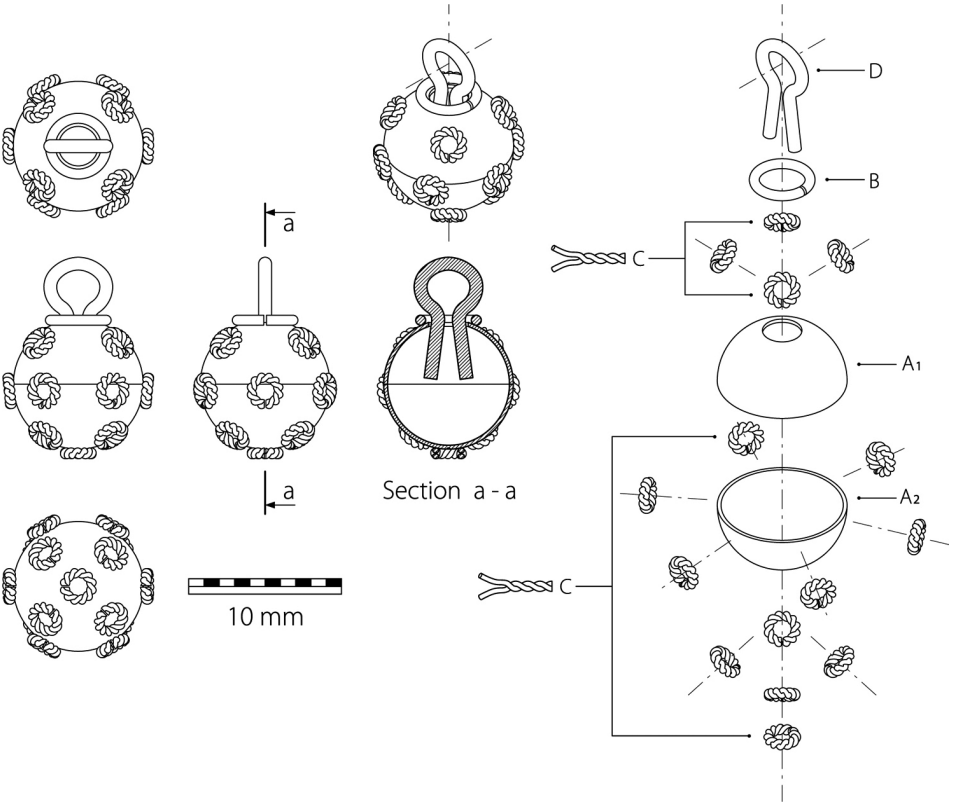


Fig. 7. Prague-Střešovice, cemetery Triangle, grave 16. Gombik 328 with filigree ring decoration, exploded view. Drawing G. Plítková.
Obr. 7. Praha-Střešovice, pohřebiště Triangl, hrob 16. Gombík 328 s filigránovými kroužky, schématický rozkres.

Gombik with filigree ring decoration, type 1 (*fig. 7*; *fig. 8*)

This type of gombik (CH 326, C 328, D 329, J 332) has a length of 13 mm on average. It is made of two embossed hemispheres (*fig. 7: A_1, A_2*) with a diameter of 9 mm joined together. The upper hemisphere is pierced on the top. The suspension system includes a split loop (*fig. 7: D*) made from a round-section wire of 0.7 mm diameter flattened on the internal side and a ring (*fig. 7: B*) of 4.2 mm diameter made from a round-section wire of 0.5 mm diameter. The split loop is inserted through the ring in the upper hemisphere. The suspension system is soldered to the hemisphere. The gombik is decorated with rings of twisted strips (*fig. 7: C*; *fig. 8: b*) with a diameter of 2.5 mm: four on the top hemisphere, five on the bottom hemisphere and five placed along the joining area of the two hemispheres. The total number of filigree rings on the gombiks varies from 15 to 19 according to the considered specimen. They appear to have been placed rather randomly on both hemispheres and on the joining area of the hemispheres. The different components of the gombik are made of almost pure silver with an average amount of 3 to 4 wt.% of copper. A silver-copper hard solder containing a slightly higher amount of copper (5–6 wt.%) was

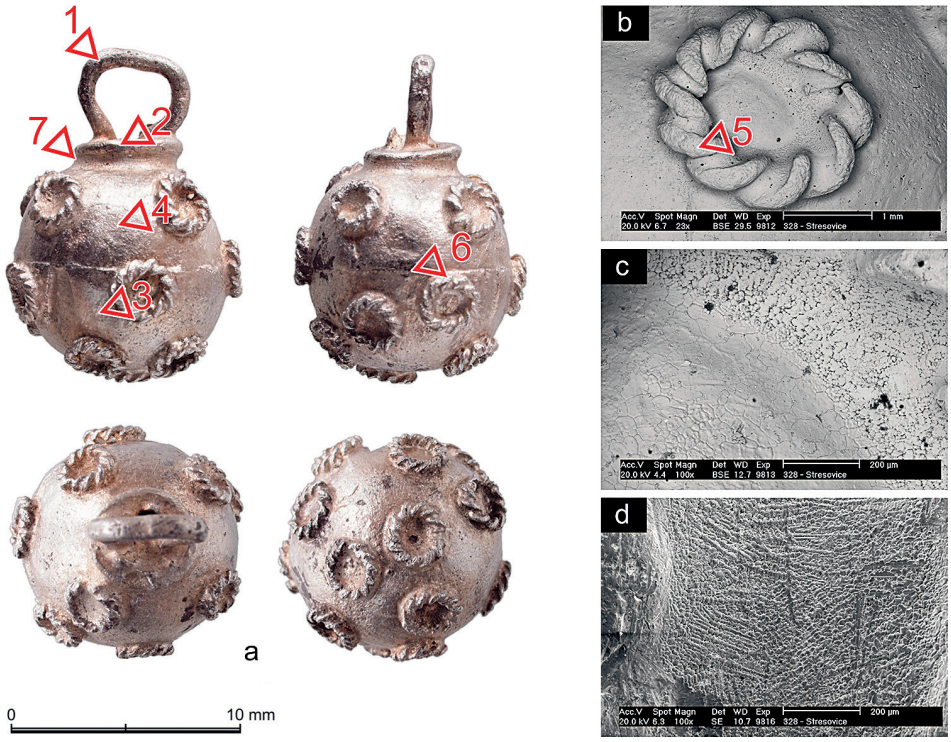


Fig. 8. Prague-Střešovice, cemetery Triangle, grave 16. Gombik 328, a – profil, top and bottom views of the gombik (photo E. Ottenwelter); b – detail of the twisted strip filigree ring, SEM micrograph (BSE image D. Janová); c – detail of the hemisphere surface and solder area, SEM micrograph (BSE image D. Janová); d – dendritic structure of the silver copper metallic solder used to solder the filigree ring, SEM micrograph (SE image D. Janová).
Obr. 8. Praha-Střešovice, pohřebiště Triangl, hrob 16. Gombík 328 s filigránovými kroužky, a – foto zepředu, z boku, shora a zdola, b detail kroužku z krouceného filigránního drátu, c – detail povrchu polokoule a pájka, d – dendritická struktura kovové pájky.

used to join the different elements together (*tab. 1*; *fig. 8: c–d*). Four different components had to be produced to manufacture this type of gombik (loop ring, hemisphere, filigree ring). A total of 19–23 components, depending on the specimen of this type of gombik, were soldered together. All the gombiks were made with the same types of components and can therefore be considered the production of the same workshop. This type of gombik weighs 1 g on average. Its experimental manufacture took an average of 5 hours.

Plain gombik, type 2 (*fig. 9*)

This type of gombik (L 327, B 330, E 331, M 333) is larger than the previous one but has the same construction. It has a length of 15.8 mm and is formed of two plain embossed hemispheres with a diameter of 10.5 mm and a thickness of 0.2 mm soldered together. The upper hemisphere is pierced. The suspension system is also composed of two elements: a split loop and a ring. Three different types of components were used to manufacture this type of gombik (suspension loop, ring, hemisphere) and four pieces in total.

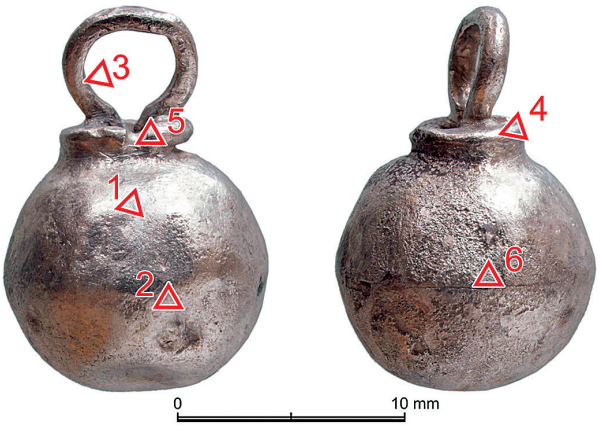


Fig. 9. Prague-Střešovice, cemetery Triangle, grave 16. Gombik 330. Photo E. Ottenwelter.
Obr. 9. Praha-Střešovice, pohřebiště Triangl, hrob 16. Gombík 330.

The gombik is plain. The hemispheres of the gombik are made of silver with 4–5 wt.% of copper. The split loop is made with silver containing 3 wt.% of copper. An identical metallic hard silver-copper solder was used to join the different components together (*tab. 1*). All the gombiks of this type are made with the same types of components and material. They were therefore produced by the same workshop. This type of gombik weighs 1.2 g on average. The experimental manufacture of this type of gombik took 2 hours.

Although both types of above presented gombiks differ in terms of the decoration and size of components, they have the same construction and were produced with the same material. They clearly come from the same workshop.

Beads

Three types of beads are present in grave no. 16. They are all open filigree work formed with twisted strips bent into pretzel-shaped components. Each hemisphere is formed with three of these components soldered together and embossed in a dapping block. Bead H 335 is an exception; its hemispheres are formed by six oval components soldered together and embossed.

Bead with "pretzel-volute" components with a corrugated strip, type 1 (*fig. 10*)

This type of bead (G 336, N 337, O 338, I 339, K 340, A 341) represents the majority of the beads. It is formed with three different types of components (ring, pretzel-shaped ornament and corrugated strip) and nine components in total. It has an oval shape with a maximum diameter of 11.5 mm and a length of 12.4 mm. It consists of two hemispheres connected together by a ring of corrugated strip with a thickness of 0.2 mm, a width of 1 mm and a height of 2.5 mm (*fig. 10: b*).

Each hemisphere consists of three pretzel-shaped components made from a bent twisted strip with a diameter of 0.8 mm (*fig. 10*). The three components are soldered together and shaped on a dapping block. Each hemisphere is topped by a ring made from a round-section wire with a diameter of 0.5 mm (*fig. 10: a*). Three different types of components were used to make this bead – ring, volute-shaped component and corrugated strip, nine components in total.

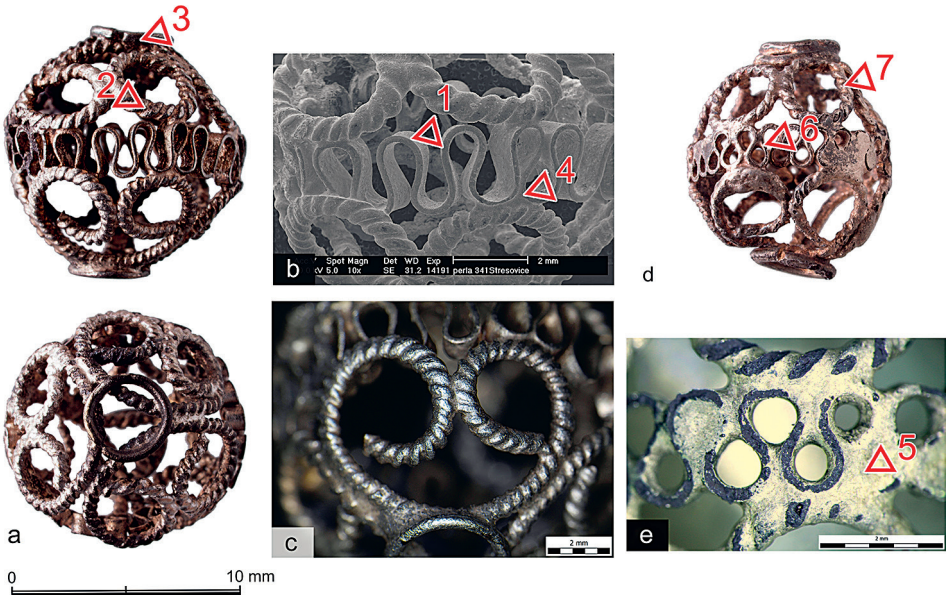


Fig. 10. Prague-Střešovice, cemetery Triangle, grave 16. Bead 341, a – profil and top views of the bead; b – detail of the corrugated strip; c – detail of the „volute" shape component; d – bead 337; e – detail of the smeared hard silver – copper solder on the corrugated strip, bead 337 (photo E. Ottenwelter).
Obr. 10. Praha-Střešovice, pohřebiště Triangl, hrob 16. Korálek 341, a – pohled z boku a shora, b – detail meandrovité pásky, c – detail preclíkovitě stočeného drátku, d – korálek 337, e – detail rozteklé pájky ze slitiny stříbra a mědi na meandrovité pásce korálku 337.

Beads N 337 (*fig. 10: d*) and K 340 are smaller, as are all the components used to manufacture them. Beads G 336, O 338, I 339, A 341 are of the same size and have identical components. Silver with an average of 3 wt.% of copper and 3 wt.% of gold was used to produce the different components of the beads (*tab. 1*). A hard silver-copper solder was used to solder the different components together. The two smaller beads (N 337, K 340) have a different chemical composition. They are made of a binary alloy Ag-Cu without gold (*tab. 1*). The components forming bead N 337 are highly flooded, especially the corrugated strip (*fig. 10: d, e*). It appears that this bead was made by an apprentice unfamiliar with the technology of soldering. These beads were produced with 1g of silver, with the exception of the two smaller ones (N 337, K 340) which weigh 0.6 g each. Their experimental manufacture took about four hours.

Bead with "pretzel" components without a corrugated strip, type 2 (*fig. 11*)

This type of bead (S 334, F 342, Q 343) has the same construction as previous type 1 but without the corrugated strip. The twisted strip is looser (*fig. 11: b*) but has the same width (0.8 mm). The top and bottom rings are not plain like the previous type but they are made with the same twisted strip used to make the pretzel-shaped component. Their diameter is smaller than type 1 beads (3.5 mm). The maximum bead diameter is 11.1 mm. They have a spherical shape and are made of two different types of components (pretzel-shaped component and ring), with a total of eight components.

No.	Object	Analyse	Analysed area	Ag	Cu	Au	Cl	S	O
R 344	*Kaptorga*	1	Lower box, front (A)	93.8	3.4	-	2.2	0.6	-
		2	Sheet lid (C)	95	4.5	-	0.5	-	-
		3	Ring lid (E)	95.2	3.1	-	1.7	-	-
		4	Sheet lid (D)	90.9	3.1	-	6	-	-
		5	Ring lid (E)	85.7	3	4.2	3.8	3.3	-
		6	Sheet back box (B)	84.1	1.3	-	10.6	-	4
		7	Granule (F)	92.7	6.2	-	1.1	-	-
		8	Solder on ring	90.6	4	-	3.5	1.9	-
		9	Solder between granules	93.1	4.6	-	0.6	1.7	-
		10	Solder unmelted patches	92.4	5.3	-	2.3	-	-
C 328	*Gombik* Type 1	1	Suspension loop fitting	96.7	3.3	-	-	-	-
		2	Ring	96	4	-	-	--	-
		3	Lower hemisphere	96	4	-	-	-	-
		4	Upper hemisphere	97	3	-	-	-	-
		5	Filigree ring	97.3	2.7	-	-	-	-
		6	Solder between hemisphere	94.8	5.2	-	-	-	-
		7	Solder area under ring	94	6	-	-	-	-
B 330	*Gombik* Type 2	1	Hemisphere	97.8	2.2	-	-	-	-
		2	Hemisphere	96.3	3.7	-	-	-	-
		3	Suspension loop fitting	95.4	4.6	-	-	-	-
		4	Ring	97.1	2.9	-	-	-	-
		5	Solder between ring and loop	93.5	6.5	-	-	-	-
		6	Solder area hemispheres	94.5	5.5	-	-	-	-
A 341	Bead Type 1	1	Corrugated strip	94.1	2.3	3.1	0.5	-	-
		2	Twisted strip	93.5	2.6	3.3	-	0.6	-
		3	Ring	91.5	2	3.7	2.8	-	-
		4	Solder area	94.6	5.4	-	-	-	-
L 337		5	Solder area	88.5	6.4	-	3.7	1.4	-
		6	Corrugated strip	94.3	5.7				
		7	Twisted strip	93.2	5.8			1	
K 340		1	Twisted strip	94.9	4.3	-	-	0.8	-
		2	Corrugated strip	93.9	5.2	-	-	0.9	-
		3	Solder area corrugated strip	94.1	4.6	-	-	1.3	-
Q 343	Bead Type 2	1	Ring	95.8	4.2	-	-	-	-
		2	Twisted strip	95.2	4.8	-	-	-	-
		3	Solder area	94.2	5.8	-		-	-
H 335	Bead Type 3	1	Top ring	89.9	6.6	3.5	-	-	-
		2	Filigree ring	93.5	5.1	1.4	-	-	-
		3	Central ring	91.4	3	2.9	2.7	-	-
		4	Solder area	92.4	5.5	2.1	-	-	-

Tab. 1. Prague-Střešovice, cemetery Triangle, grave 16. Chemical composition of the different elements composing the jewels by SEM/EDX (in wt.%).
Tab. 1. Praha-Střešovice, pohřebiště Triangl, hrob 16. Chemické složení jednotlivých komponent šperků dle SEM/EDX (v hm.%).

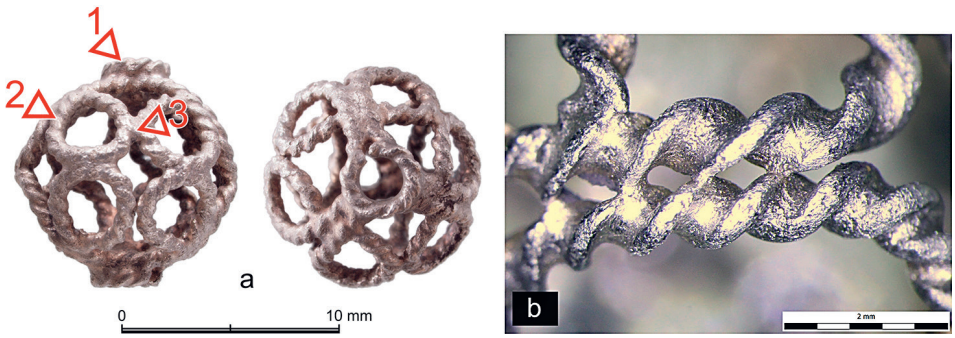


Fig. 11. Prague-Střešovice, cemetery Triangle, grave 16. Bead 343, a – profil, and top views of the bead; b – detail of the block twisted wire (photo E. Ottenwelter).
Obr. 11. Praha-Střešovice, pohřebiště Triangl, hrob 16. Korálek 343, a – pohled z boku a shora, b – detail kroucených drátků.

This type of bead weighs 1.1g. The experimental manufacture of this type of bead took 3 hours.

Bead with oval components, type 3 (*fig. 12*)

There is only one specimen (H 335) of this type of bead on the necklace. The hemispheres are not formed by pretzel-shaped ornaments but by six oval rings of twisted strip. The oval rings have an approximate diameter of 5 mm. The twisted strips have a diameter of 0.8 mm. The hemispheres have a diameter of 11 mm. The bead has a spherical shape and the two embossed hemispheres are joined together on a medial rope of twisted strip with a diameter of 11 mm made with the same twisted strip as the oval rings. The bead measures 9.5 mm and weighs 1g. The experimental manufacture of this type of bead also took 3 hours.

The different components of the bead were produced from Ag-Au-Cu ternary alloys with an average 2.5 wt.% of gold and 5 wt.% of copper (*tab. 1*).

The bead shows traces of wear in particular on the top and bottom rings (*fig. 12: c*) suggesting that it has been worn a long time and that it is possibly a re-used bead.

It is a high-quality object compared to the other beads from the grave.

All the beads except bead H 335 (Type 3), which has a different construction and signs of wear, were manufactured in the same workshop. Bead N 337 was done made by an apprentice.

Conclusion of the technological study

Two main kinds of material were used to manufacture the jewels from grave no. 16. Silver with an average of 3–5 wt.% of copper was used to manufacture the majority of the kaptorga components, as well as those belonging to the gombik and type 2 beads (after *tab. 1*). Type 1 and 3 beads were manufactured from a ternary alloy of Ag-Au-Cu containing approximatively 3–5 wt.% of copper and 3 wt.% of gold. These two materials are sometimes found in the same object (kaptorga), which suggests that recycling was probably a common practise and that components were produced according to specific needs.

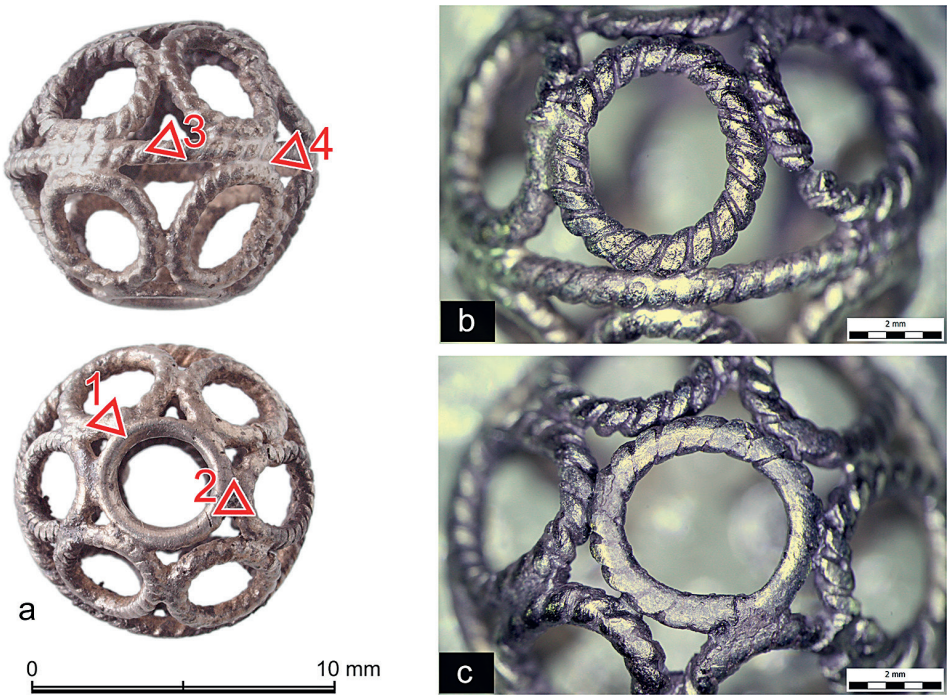


Fig. 12. Prague-Střešovice, cemetery Triangle, grave 16. Bead 335; a – profil and top views of the bead; b – detail of the block twisted oval rings; c – the weared top ring. Photo E. Ottenwelter.
Obr. 12. Praha-Střešovice, pohřebiště Triangl, hrob 16. Korálek 335, a – pohled z boku a shora, b – detail polokoule, c – otěr navlékacího otvoru.

The same type of soldering with a hard Ag-Cu solder was used on all the jewels. The same gauge of silver sheet metal (0.2 mm) was used to manufacture the kaptorga, the gombiks and the twisted strips of the beads (except bead H 335). The twisted strips from the gombiks are the same as the twisted strips used to form the majority of the beads. Thus, the technical study of this jewel assemblage shows many similarities suggesting that all the jewels except bead H 335 were produced by the same workshop.

The kaptorga's construction differs slightly from trapezoidal kaptorgas H 82-14, H 82-15, H 16-19a from Lumbe Garden (*Ottenwelter – Děd – Barčáková 2014*, 253–265). However, it is very similar to the construction of the kaptorga found in grave no. 22 from Klecany II (*Profantová a kolektiv 2010*, fototab. 90, 92, 94, 190) as well as the kaptorga from Hostivice-Palouky found in grave no. H 2103 (*Profantová – Daněček 2017*).

A close comparison with the kaptorga from Klecany documented that although the kaptorgas have different sizes, the proportions and the construction are exactly the same (*fig. 13: a–d*). Both have chased interlaced decorations on their lid. While the punched circles have the same diameter, there is no dot inside the circles in the case of the Prague-Střešovice kaptorga (*fig. 13: g*). The lids of both kaptorgas were chased while they were on the boxes, and the chased decorations are partly visible on the boxes (*fig. 13: c*). This means that the kaptorga lids were chased while they were placed on the box and that they must have been filled with an organic material (pitch, wax or tallow?) to avoid deforming

the plate while chasing the decoration. An organic material of animal origin was analysed inside the kaptorga[2] and could be associated with the use of pitch or wax, which may have been mixed with other organic or mineral material as fillers. Such remains of organic and mineral materials as well as wax and linen fibre, fur, hair, textile filaments, charred wood, kaolin clay and animal bones have been identified in several kaptorgas from Bohemia, Moravia and Poland (*Profantová – Šilhová 2010*, 296–298; *Profantová – Daněček 2017*, 97). These remains have been interpreted as intentional magical contents, but we cannot rule out that some of them may have been simply added as a filler to wax or tallow to avoid deformation of the silver plate while chasing the decoration and perhaps to avoid the mechanical deformation of the kaptorga in general considering the thinness of the sheet used to produced them (0.2 mm); they must have been particularly prone to deformation if left empty. Both kaptorgas bear horizontal scratches (*fig. 13: d, f*), which are perhaps linked to their manufacture.

The front motifs of both kaptorgas differ, but they are both surrounded by a dotted background. The tools used to chase the decorations are also different on both kaptorgas (*fig. 13: h, j*). A curved tool was used in the case of the Prague-Střešovice kaptorga and produced a rather wide channel of 0.8 mm, while a narrower straight tool was used to produce the channels (0.4 mm width) observed on the Klecany kaptorga (*fig. 13: h, i, j*).

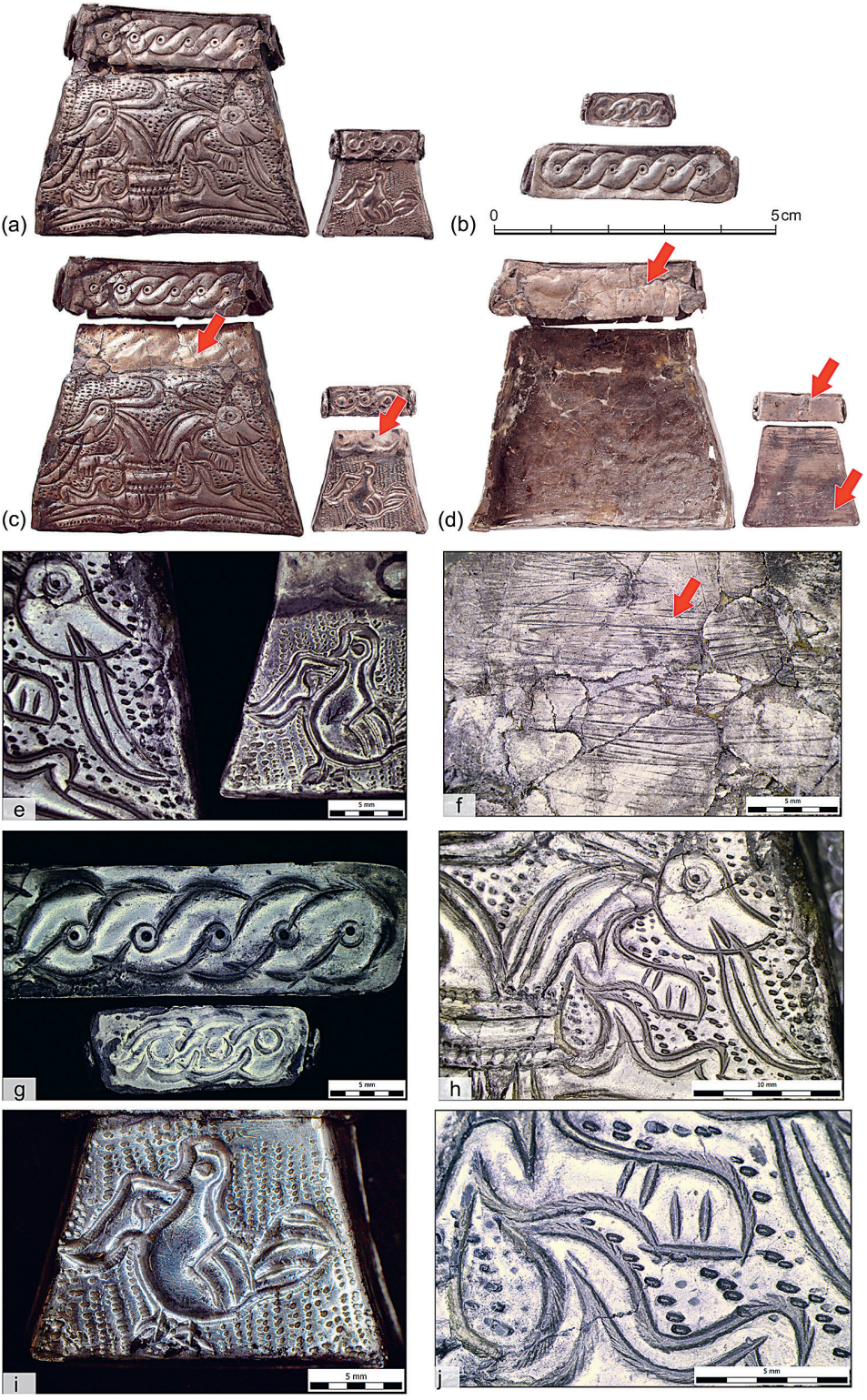
A ternary alloy of silver with gold and copper was used to manufacture the Klecany kaptorga (*Děd – Šilhová 2005*, 46), while silver with a small amount of copper was used to manufacture most of the components from the Prague-Střešovice kaptorga.

The kaptorga from grave no. 16 from Prague-Střešovice has the same size as the kaptorga found in the Za Jízdárnou (Riding Hall) cemetery in grave no. 2/82 (*Tomková 2006*, 49–50, fig. 2: 16) but its construction, in particular that of the lid, is different. The kaptorga from Za Jízdárnou was also part of a necklace, which also had metallic beads (*Tomková 2005*, 239, fig. 7) similar to type 2 beads found in grave 16 from Prague-Střešovice.

The kaptorgas from the cemetery in Prague's Lumbe Garden, Triangle cemetery and from Klecany II were manufactured in the same way, albeit with different decoration. This suggests production in a single workshop, probably in Prague (*Frolík – Smetánka 2014*, 99) as well as efforts by local jewellers to individualise each piece.

The beads with a corrugated strip (type 1, *tab. 1*; *fig. 10*) are similar to beads H 100-20 and H 100-27 from the Lumbe Garden cemetery, though in a much simpler form and were made with half the material. The ternary alloy containing a small amount of gold is similar to the material used in the manufacture of the Lumbe Garden specimens (*Ottenwelter – Děd – Barčáková 2014*, 233–236). Bead N 337 and K 340 were manufactured with another alloy (without gold) and with smaller components. Bead N 337 is very clumsy, and the solder has flooded over the components of the bead (*fig. 10: d, e*). It is obvious that the bead was manufactured by someone who did not handle the technology well, probably an apprentice. Type 3 beads (*tab. 1*; *fig. 12*) are represented by only one specimen in grave no. 16. It is distinguished from the others by its construction, its quality and signs of mechanical wear showing that the bead was worn for a long time and possibly re-used. A similar bead was also found in Klecany II in grave no. 14 (*Profantová a kolektiv 2010*, phototabs. 88, 187), but the latter did not have a medial rope.

[2] Based on the analysis performed by Radka Kozáková, it is most likely beeswax.


(a)
(b)
0
5cm
(c)
(d)
e
5 mm
f
5 mm
g
5 mm
h
10 mm
i
5 mm
j
5 mm

The gombiks and beads of type 2 (*tab. 1*; *fig. 11*) are made from silver with an average percentage of 3–4 wt.% of copper. The wire used to produce the beads and the filigree rings of the type 1 gombik (*tab. 1*; *fig. 10*) are similar twisted strips, but of a different size.

The use of metallic hard silver-copper solder was documented on all of the jewels to join the base components together and to attach the decoration (filigree rings on the type 1 gombik and granules around the kaptorga ring). This type of solder was also documented on the corrugated strip of beads H 100-20 and H 100-27 from the Lumbe Garden cemetery (*Ottenwelter – Děd – Barčáková 2014*, 233–236).

The manufacture of each type of jewels required a low amount of silver, around 1.1 g on average for the different types of beads and gombiks and almost 2 g for the kaptorga. In total, 20 grams of silver were used to manufacture all the jewels found in grave no. 16.

The manufacture of the kaptorga was the most time-consuming, followed by gombiks with filigree rings, beads with corrugated strips, beads with a volute and oval decoration and finally the plain gombiks. In general, these jewels were rather simple to make and required a low amount of material and time. However, the necklace plus the gombiks represent a total of 20 grams of silver, quite a considerable amount.

4. Definition, parallels, thematic study
(D. Frolíková)

Kaptorgas

Kaptorgas, amulet containers meant to protect their owners or possessing healing powers, were usually part of a necklace. Kaptorgas were found in burial contexts in women's and children's graves from the 9th century until the 11th century (*Profantová – Šilhová 2010*, 292) and in hoards from the 10th century mainly in Poland (*Štefan 2004*, 21–23, 39–40), but also in East Germany, Scandinavia and Russia. According to H. Kóčka-Krenz, there are two main groups of kaptorgas based on their shape: "trapezoidal" kaptorgas, which are made of two parts (a box and a lid) and "rectangular" kaptorgas, which are made of one rectangular folded sheet and which bear rich filigree or granulation decoration (*Kóčka-Krenz 1993*, 85–87). N. Profantová recognizes up to six types of kaptorgas, but they are often represented by only one specimen (*Profantová a kolektiv 2015*, 113).

Fig. 13. Comparison of kaptorgas from Prague-Střešovice, cemetery Triangle, grave 16, and Klecany II, grave 22: a – front view of the closed kaptorgas; b – the lids from the top; c – open kaptorgas, front view; d – similar mechanical joins of the lids, back view; e – detail of the chased decoration; f – scratches observed on the back of the kaptorga from Klecany; g – detail of the lids, top view; h – detail of the chased decoration, Klecany; i – detail of the chased decoration, Prague-Střešovice, grave 16; j – detail of the chasing tool marks, Klecany. Photo E. Ottenwelter.

Obr. 13. Srovnání kaptorg z pohřebiště Triangl, hrob 16, a Klecany II, hrob 22: a – pohled na zavřené kaptorgy, přední strana; b – pohled na víčka kaptorg shora; c – pohled na otevřené kaptorgy zepředu; d – mechanický spoj víček kaptorg, zadní strana; e – porovnání detailů rytého dekoru; f – škrábance na zadní části kaptorgy z Klecan; g – detail víček kaptorg, pohled shora; h – detail ryté dekorace, Klecany; i – detail ryté dekorace, Praha-Střešovice hrob 16; j – detail stop po použití rycích nástrojů, Klecany.

Trapezoidal kaptorgas bear chased decoration on their front face, usually on a dotted background. The décor can be geometric, vegetal or zoomorphic. The known chased kaptorgas with zoomorphic motifs on dotted backgrounds depict either a pair of stylised animals symmetrically arranged on a vertical axis (Prague Castle – Lumbe Garden grave no. 117, *Frolík – Smetánka 2014*, 192, 194; Budeč, *Váňa 1995*, 133–134; Klecany II, Dobroměřice, Žatec, Hostivice-Palouky, *Profantová – Daněček 2017*; *Profantová – Šilhová 2010*, fig. 11), either a stylised mythical creature with its head turned to the back (Čelákovice, *Profantová – Špaček – Novotná 2011*, 545–546; Dobrovíz, *Sláma 1977*, Abb. 10/8). These kaptorgas from Bohemia are dated to the 10th century, while kaptorgas with both types of motifs from Poland (Maszenice, Chełm Drezdenecki, Biskupin, Bodzia, Strzemieszyce Wielke, Brześc Kujawski, Gdańsk, Opole-Groszowice) are dated to the 11th century (*Slaski – Tabaczyński 1959*, tab. I; *Kóčka-Krenz 1993*, 86–87; *Sztyber 2006*, 62–95; *Duczko 2016*, 139–143).

According to N. Profantová's classification by construction, the kaptorga from the Triangle cemetery belongs to type IA – trapezoidal kaptorgas with a lid (*Profantová – Šilhová 2010*, 285–300) and according to I. Štefan's system of classification by decoration, to type II with chased decoration on the front side (*Štefan 2004*, 27). It bears unique chased decoration of a bird and its lid is decorated with an interlaced motif. The bird on the kaptorga from Triangle is depicted from the left side; it has a squat body with small legs, a small round head with a distinctly sunken eye and a curved beak. The left wing and the tail are both rendered with three bulges. The irregular elongated shape in front of the bird's beak is either a crudely rendered half-stretched wing or an object held in the bird's beak, perhaps a leaf. The squat body, short legs and small head of the bird suggest that it is a dove.

Discussion of the bird motif in early medieval jewellery

As single birds appear mainly on gombiks, especially those from Great Moravian cemeteries. They appear on gombiks from grave no. 38 (*fig. 14: 9, 10*) and no. 136 (*fig. 14: 7*) from cemetery near the church no. 1 in Pohansko (*Kalousek 1971*, 43–44 and 90–91). Single birds are also found on gombiks from Mikulčice: in grave no. 94 (*fig. 15: 2*) from the cemetery of church no. 6 (*Poulík 1963*, 153, fig. 30), in grave no. 1729 in Kostelisko (*Klanica 1991*, fig. 4: 4), in grave no. 1314 (*fig. 14: 6*) from Klášteřisko (*Klanica 1985*, 532), in grave no. 508 (*fig. 14: 5*; *Ungerman – Kavánová 2010*, Abb. 7) and 550 at the basilica (*Klanica et al. 2019*, 281), and in grave no. 714 (*fig. 15: 5*) at the acropolis of the stronghold (*Poulík 1975*, tab. 54/6). They are also present on gombiks found at the Na Valách cemetery in Staré Město near Uherské Hradiště: besides the silver plaque from grave no. 24/48 (*fig. 14: 3*), they are found in grave no. 251/49 (*fig. 14: 1*) and grave no. 129/49 (*fig. 15: 1*; *Hrubý 1955*, 437–438, 450), as well as at the Špitálky site on a gombik rescued from a riverbed dredging (*fig. 14: 2*; *Galuška 2009*, obr. 2). All of these gombiks have their surface divided into (usually three) fields, where the stylised bird is chased. Multiple birds are depicted on one gombik (*fig. 14: 11*), from settlement layer B by church no. 12 in Mikulčice (*Kavánová 2003*, fig. 59). As for the small number of Bohemian gombiks, two gombiks from graves at the former sugar mill in Zákolany (*fig. 15: 3*; *Šolle 1981*, 197, 15/1) feature stylised birds on a dotted background facing left, while a gombik from a destroyed grave in Kačice depicts a bird facing right (*fig. 15: 4*). This bird has a slightly different shape in its beak in each of the three fields: a drop, a vertically wavy leaf and a simple curved leaf (*Sláma 1977*, 47, Abb. 11/13, 12/5). The bird on the gombik from grave no. 84 (*fig. 14: 8*) in Lumbe Garden at Prague Castle is also holding a drop-leaf form in its beak (*Frolík – Smetánka 2014*, 152). A bird very similar to those of the grave 1729 from Mikulčice and from Staré Město – Špitálky is depicted on the gombík from the grave 1/2000 (*fig. 14: 7*) in Zalavár-Vársziget (*Szöke 2010b*, Abb. 8).

The appearance of the bird depicted on gombiks is always different: strongly stylised birds (*fig. 14: 6, 11*; *15: 1–4*), a bird with its head turned towards the back (*fig. 14: 5, 7*; *15: 5*), a recognisable pheasant (*fig. 15: 5*),

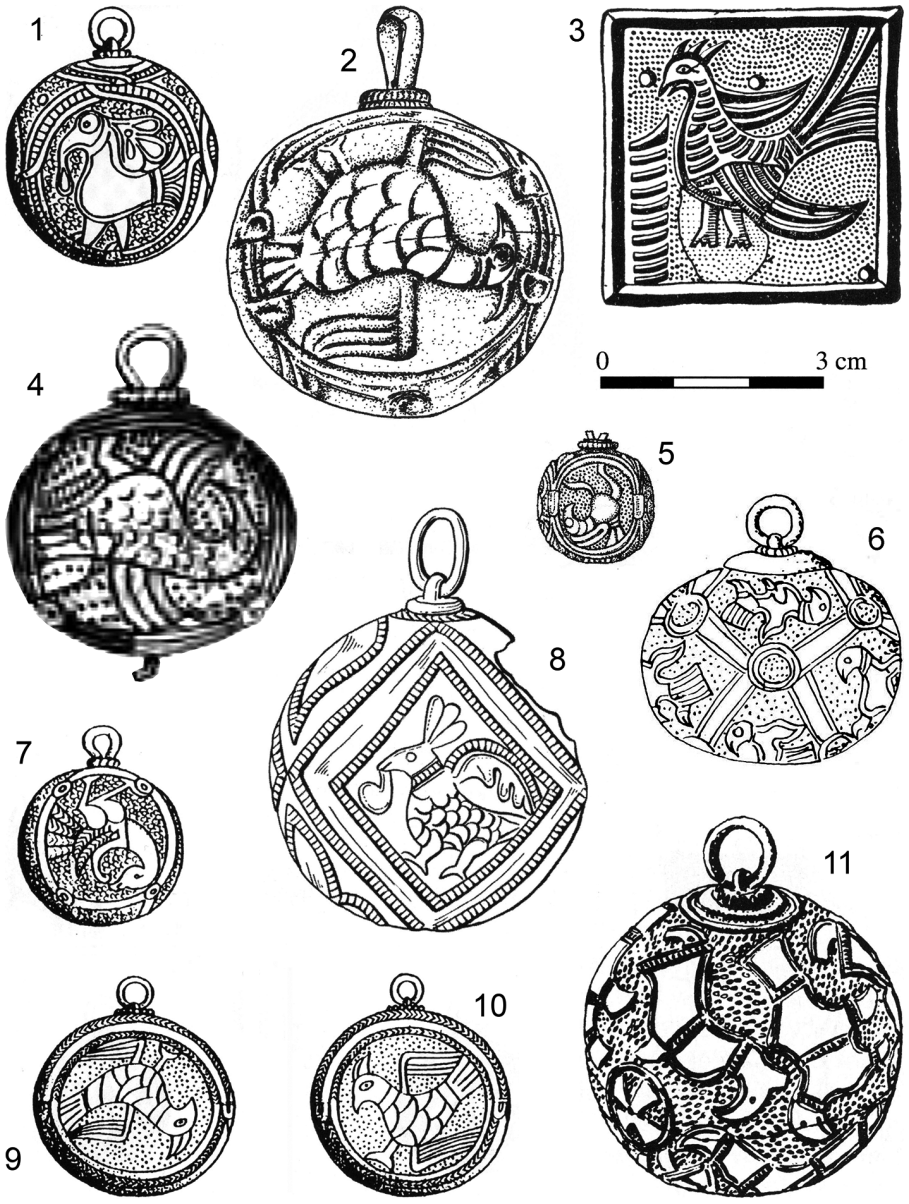


Fig. 14. Engraving of the bird on gombiks. 1 Staré Město – Na Valách, grave 251/49; 2 Staré Město – Špitálky; 3 Staré Město – Na Valách, grave 24/48; 4 Zalavár grave 1/2000; 5 Mikulčice grave 508; 6 Mikulčice, grave 1314; 7 Pohansko near Břeclav, grave 136; 8 Praha – Lumbe garden, grave 84; 9, 10 Pohansko near Břeclav, grave 38; 11 Mikulčice, near the church no. 12. After *Pavlovičová 1996*; *Galuška 2009* (without scaling); *Hrubý 1955* (without scaling); *Szöke 2010a*, fig. 17; *Ungerman – Kavánová 2010*, fig. 7; *Klanica 1970*, fig. 21; *Frolík – Smetánka 2014*, 152; *Kavánová 2003*, fig. 59: 1.

Obr. 14. Rytina ptáka na gombících. 1 Staré Město – Na Valách, hrob 251/49; 2 Staré Město – Špitálky; 3 Staré Město – Na Valách, hrob 24/48; 4 Zalavár hrob 1/2000; 5 Mikulčice hrob 508; 6 Mikulčice, hrob 1314; 7 Pohansko u Břeclavi, hrob 136; 8 Praha – Lumbeho zahrada, hrob 84; 9–10 Pohansko u Břeclavi, hrob 38; 11 Mikulčice, u 12. kostela.

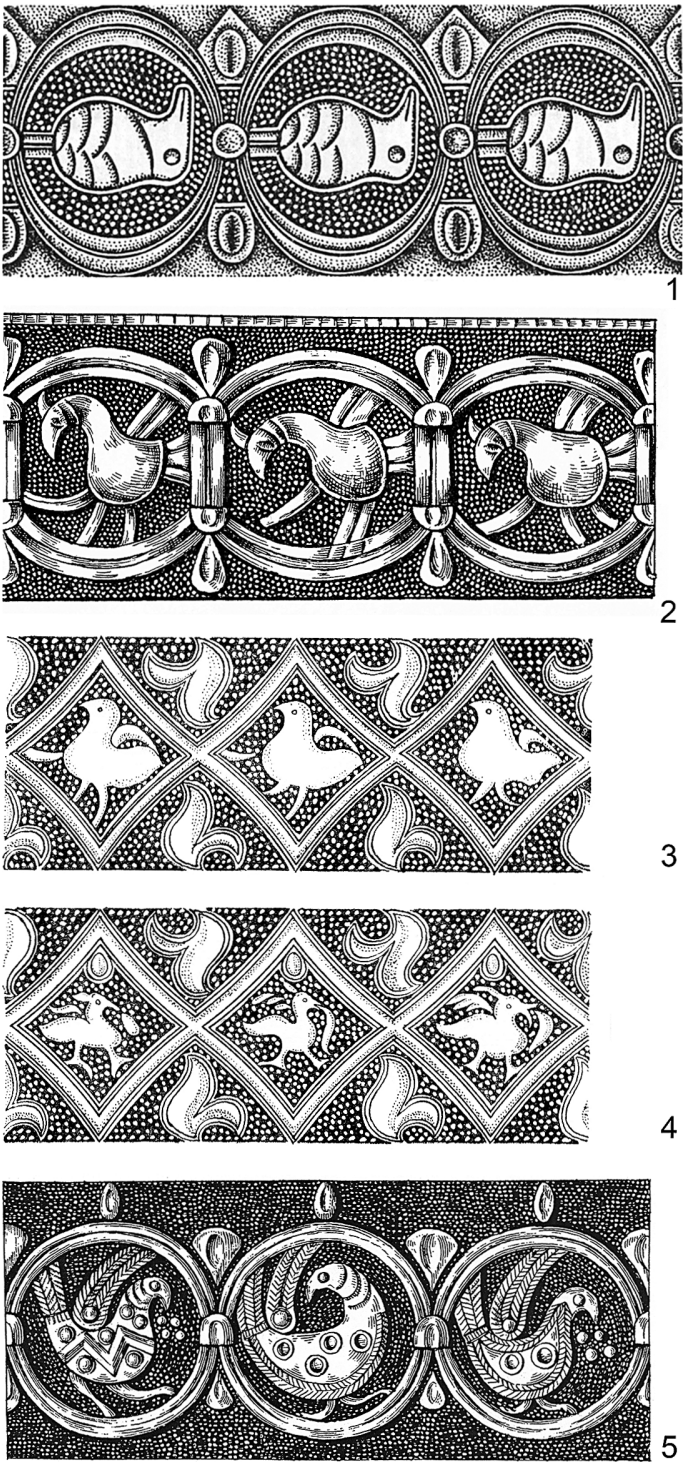


Fig. 15. Roll-out pattern of gombiks. 1 Staré Město, hrob 129/49; 2 Mikulčice, grave 94; 3 Zákolany; 4 Kačice; 5 Mikulčice grave 714. After *Hrubý 1955*; *Poulík 1963*; *1985*; *Sláma 1977*.

Obr. 15. Rozvitý dekor gombíků. 1 Staré Město, hrob 129/49; 2 Mikulčice, hrob 94; 3 Zákolany; 4 Kačice; 5 Mikulčice hrob 714.

a slim bird with raised talons and outstretched wings like an attacking raptor (*fig. 14: 9, 10*), a bird with an engraved scale-like chest (which, of course, is a way of depicting feathers) and wings in opposing directions (*fig. 14: 2, 4*), a bird with a "peacock" crown and an engraved scale-like chest (*fig. 14: 4*) and finally a plump bird without insinuated wings (*fig. 14: 1*). The plump bird on the kaptorga from Triangle resembles the latter one the most, its tail is similar to that of a rooster. The validity of B. Dostál's claim that Bohemian gombiks have different motifs than those from Moravia is a result of not only local differences, activities of various workshops, but also of development over time (*Dostál 1966*, 62). This observation is valid for the bird image on our kaptorga.

With regard to attempts to determine the species of the depicted bird, it is important to bear in mind that these images are always simplified renderings, not realistic representations. Hence, slender birds can be interpreted as raptors or roosters (*Hensel 1962*), the bird on the gombik from Špitálky as a pheasant (*Galuška 2009*, 163–164) and the plump birds as doves with only a certain degree of probability, never with absolute certainty.[3] For that matter, the images themselves need not represent an attempt to depict a concrete species but only a bird as a symbol. Special attention was paid to the depictions of a bird with a drop-shaped object in its beak (*Klanica 1970*, 440–442). Parallel depictions are found over the broad territory from Sasanian Persia across Central Asia, Russia, Ukraine to Scandinavia and Z. Klanica interpreted the ribbon with three pendants as a sign of the ruler (*Klanica 1991*, 181–193). N. Profantová also sees the origin of the bird motif in Iran and Central Asia (*Profantová 1996*, 32–33). K. Benda drew attention to a punched or otherwise dotted background as a stylistic element of Persian origin that began to appear in the Danube Region in the 8th century. As they moved from the Mediterranean to Europe, eastern motifs mixed with antique motifs (*Benda 1963*, 59–61). P. Charvát was interested in the broader time and geographic contexts by the depiction of birds on gombiks and pointed out that many motifs probably reached the Czech Lands as images on luxurious fabrics imported from the Orient. One of the motifs on these fabrics is a bird holding an elongated string-like object or a string with three beads in its beak (*Charvát 2010*, 19–21). Polish researchers agree with the opinion of the aforementioned researchers on the origin of the bird's motif in the Orient. They see a pattern for depicting bird on Polish kaptorgas in Simurg, a creature from Indian and Persian mythology. Its representation came to Poland mediated through silk textiles imported into Europe (*Zawol 2018*, 477–478).

Birds are a common motif on Byzantine artefacts as well. Bird motives are encountered on cast nape plates of Byzantine buckles, in particular on the buckles from type G3. M. Schulze-Dörrlamm interprets them as heraldic eagles, standing birds with folded wings or with outspread wings (*fig. 16*; *Schulze-Dörrlamm 2009*, 254–256, Abb. 97). Buckles of type G3 are dated from the 9th until the early 11th century AD and appear in the entire territory of the Byzantine Empire. M. Schulze-Dörrlamm notes that the motifs of doves, peacocks, eagles and lions were used since antiquity. Most of the depicted birds (except eagles) were identified as doves of peace (*Schulze-Dörrlamm 2009*, 261–262).

The depiction of a bird on a dotted background on antler panels in Bulgaria is clearly taken from Byzantine models, the symbolism of which comes from Early Eastern Christianity (*Grigorov 2016*). The motif of a bird holding a grapevine, a wine leaf or just a grape in its beak is common on the stones of the altar enclosure (Flechtwerkstein) in the churches of Dalmatia and inland Croatia and Carantania in the 9th–10th century. This scene was developed in the territory of the Roman Empire as a transformation of the old pagan theme of animals or birds at the foot of the Tree of Life. According to the interpretation of P. Gleirscher and B. Ponta-Zitterer, the dove symbolizes Christ, while the grapevine replaced the Tree of Life. A dove with vines in its beak is meant to represent paradise and eternal bliss (*Gleirscher – Ponta-Zitterer 2018*, 449–456).

Simplified and misunderstood, the three pendants in the original motif could have changed during the journey from Persia through the Roman Empire and Byzantium to Moravia and Bohemia into an uncertain trilobal or leaf-shaped object. Hence, even new finds confirm K. Benda's theory on the origin of the bird motif in Central Asia, where pre-Islamic Persian influences encountered those from Early Christianity and which were mediated in Europe by Byzantine culture (*Benda 1963*, 59–61).

[3] To determine the specific species of depicted birds tried *V. Anoškinová* (*1995*).

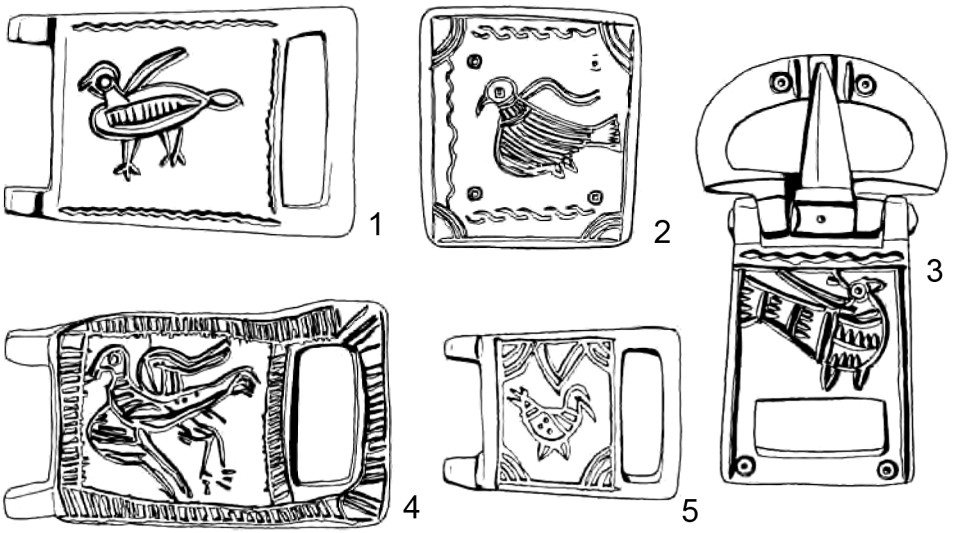


Fig. 16. Engraving of the birds on Byzantine buckles. After *Schulze-Dörrlamm 2009*.
Obr. 16. Rytiny ptáků na byzantských přezkách. Podle *Schulze-Dörrlamm 2009*.

Gombiks

Gombiks are hollow spherical objects with a suspension system. Their function is not entirely clear, some scholars suggest they could be decorative fasteners, whereas others suggest they were jewels of a purely decorative purpose (*Krupičková – Ottenwelter – Březinová 2019*). For this reason, the majority of authors no longer refer to gombiks as spherical buttons (for an overview of the discussion, see *Chorvátová 2008*).

Gombiks with smooth hemispheres densely covered with filigree rings either from plain wires or twisted strips are known from the 9th century at Great Moravian cemeteries, from the Na Valách cemetery in Staré Město near Uherské Hradiště (*Hrubý 1955*, 448, 499, 505, 522, 528; tab. 78: 13 and 75: 5; *Hochmanová-Vávrová 1962*, 251, tab. XX: 3), from the Horní Kotvice cemetery in Sady near Uherské Hradiště (*Marešová 1983*, 113), from Mikulčice (*Kouřil 2008*, 73, fig. 21; *Klanica 1985*, 512; *Klanica et al. 2019*, Abb. 85), from Rajhrad (*Hendrychová 2015*, 102), from Nechvalín (*Klanica 1985*, 531–532) and Prušánky (*Klanica 2006*, 85–86, tab. 36: 4–5 and 79: 7–8), from Boršice near Buchlovice (*Dostál 1966*, tab. III) and from Čakajovce (*Rejholcová 1995*, 22, tab. XXXVI: 8–9). Most gombiks of this type come from the Na Pískách cemetery in Dolní Věstonice (21 specimens recovered from 12 graves). They are mainly made of copper alloys and decorated with filigree rings from plain wires (types 14–16, *Ungerman 2007*, 135). Bohemian sites with finds of gombiks decorated with filigree rings are known from Stará Kouřim, one in grave no. 129 (*Šolle 1959*, 462, fig. 70: 7, 8; *Šolle 1966*, 271, fig. 40a: 5a–b), another one from structure 307 (*Pavlovičová 1996*, 124); a slightly deformed gombik with a surface covered with filigree rings comes from the destroyed cemetery in Libčice (*Sláma 1977*, 67, Abb. 19: 7). A gombik with rings from smooth wire was found in children's grave no. 47 in Žalov (*Tomková a kolektiv 2012*, 109–110, fig. 103) and a similar gombik was found outside of a grave unit on Rubín Hill in the cadastre of Dolánky (*Bubeník 1988*, 61, tab. IV/21). Two beads from female grave no. 5 at the cemetery in Lumbe Garden resemble gombiks they are made of silver and their surface is entirely covered with smooth filigree rings (*Frolík – Smetánka 2014*, 52–53). Z. Klanica connects Moravian gombiks with soldered rings with the cemeteries outside "court" environments (*Klanica 1985*, 532). This type of gombik appears in the graves during the 9th–10th century (*Chorvátová 2008*, 85).

Plain metal gombiks were manufactured over a long period of time across a vast territory, including the eastern European steppes (*Klanica 1970*, 427–430, fig. 7). Š. Ungerman categorises them in the early horizon of Veligrad ornaments under types 14–22 (*Ungerman 2005*, fig. 2).

Plain gombiks made from copper alloys, silver and gold were found in Great Moravian centres as well as at small localities. They are recorded in graves from the Na Pískách cemetery in Dolní Věstonice (*Ungerman 2007*, 134) and also found in Mikulčice (*Poulík 1957*, 368; *Kouřil 2008*, 71). They were recovered in Staré Město at the Na Valách cemetery (*Hrubý 1955*, 511; *Hochmanová-Vávrová 1962*, 251, tab. XV/6; *Pavlovičová 1996*, 127, tab. VII/18; *Galuška 2013*, fig. 159 and 160), and they are also known from Rajhrad (*Staňa 2006*, 61, 75, fig. 15, 28). They are present in Pohansko near Břeclav (*Kalousek 1971*, 182, 192; *Dostál 1970*, 122–124; *Macháček – Dresler – Přichystalová – Sládek 2016*, 75). They were also found in the cemeteries in Pěnčín (*Pavlovičová 1996*, 123), Čakajovce (*Rejholcová 1995*, 86, tab. CXXII: 8), Nitra-Lupka (*Chropovský 1962*, 179, 188, 194, tab. IX: 9, XIII: 12–13 and 15) and in Smolenice (*Dušek 1979*, 365–366, fig. 1: 10 and 3: 3). In Bohemia, they are known from the Malovanka cemetery in Prague-Břevnov (*Tomková 2006*, 122–124), and from children's graves in Želkovice (*Sláma 1977*, 188–189, Abb. 45: 4) and Žižice (*Sláma 1977*, 191, Abb. 47: 2).

The majority of these relatively simple gombiks were found in children's graves and were made of copper alloys or silver alloys; their diameters were typically in the 11–16 mm range. Gold gombiks are conspicuously smaller in size: the pair from grave no. H 71 in Mikulčice has a diameter of 8.4 mm, the pair from Staré Město grave no. 145/51 just 6 mm, while another gold gombik from the grave has a standard diameter of 15 mm. The plain gombiks of silver from Triangle have diameters from 10.7 mm to 10.9 mm, while gombiks with filigree rings are even smaller, with diameters in the 8.9–9.25 mm range.

Although plain gombiks clearly belong to simpler types of ornaments, even those with soldered rings cannot be placed in the sphere of Veligrad jewellery in all cases: copper-alloy gombiks with smooth filigree rings can be considered common ornaments, while silver or gold-plated gombiks with filigree rings definitely ranked among more expensive products. In contrast, gombiks from gold sheet metal, even plain, were undoubtedly luxury goods. While discussions have addressed their origin, for Bohemian specimens there is no doubt that their appearance originates in Moravia, as stated by *M. Šolle* (*1981*, 197). And yet, given the striking difference in size and the relatively uniform appearance, it can be assumed that the gombiks from grave no. 16 were made in a single workshop in Prague.

Beads

Metallic beads as necklace components appear occasionally from the second half of the 9th century in Moravia and in the 10th century in Bohemia. They are either made in open filigree work – basket beads or with plain hemispheres covered with granulation work. The inspiration for the production of filigree beads was Great Moravian basket earrings, made from "pretzels" (*Hrubý 1955*, 240) or rings/ovals (*Poulík 1975*, tab. 53: 3–5). Analogous beads formed part of the necklace found in grave no. 82 in Lumbe Garden (*Ottenwelter – Děd – Barčáková 2014*, 236, fig. 4: 41) and half of a similar bead (*Tomková 2006*, 38, 70, fig. 2/11). was found in grave no. 73/51 in part of the same cemetery called Za Jízdárnou.

In Bohemia, open filigree beads went through further development. A corrugated strip ornament connecting the two hemispheres appeared, a step of development represented by the type 1 bead from Triangle. Further development is also visible on four beads from grave no. 100 of an adult female recovered from the Lumbe Garden cemetery at Prague Castle (*Frolík – Smetánka 2014*, 169–171. However, the latter beads have a more complicated construction (hemispheres are formed with omega-shaped components) and decoration (the hemispheres are decorated with rings with fine granulation work) and twice as

much silver was used for their manufacture (2 g instead of 1 g). The beads from Lumbe Garden are dated at the earliest to the second half of the 10th century, as they were accompanied by S-shaped temple rings of a small diameter with a thick wire, which are typical for this period. They are therefore younger than their counterparts from Triangle, which are dated to the first half of the 10th century. We could therefore assume that the insertion of a corrugated strip decoration between the hemispheres represents a new local development of open filigree beads: from Moravian basket earrings to basket-like beads (as bead type 3, grave no. 16, Triangle), to basket-like beads to beads with a corrugated strip (type 1, grave no. 16 from Triangle from the first half of the 10th century) up to beads formed with omega-shaped components with a corrugated strip (e.g., grave no. 100 in Lumbe Garden). The corrugated strip is an element that also occurs on certain types of earrings and beads dated to the second half of the 10th century in Poland (e.g. *Kóčka-Krenz 1993*, 77, 80, 100–101). *Schulze-Dörrlamm 1992*, 139, 170–171 and in the Elbe region from the 11th century, in Oberwellenborn (*Spazier 2015*, 186–188) and Bodelwitz (*Schulze-Dörrlamm 1992*, 139).

Necklace

At first glance, the situation in grave no. 16 did not make clear the arrangement of the necklace, as with the disintegration of the string the individual pieces moved and fell into the deceased child's chest (*fig. 3: a*). The central position of the kaptorga was the only fixed point. After the types of individual ornaments were charted on a detailed drawing in the field documentation (*fig. 3: b*), the regularity of their placement became clear: two specimens of both types of gombiks and probably five beads were found to the right and the left. No consideration to the type of bead was given when the beads were strung on the cord, as small differences between them were not discerned when looking at the necklace as a whole. The right side reveals an unclear find situation, while the left side shows a clear placement of beads in the inner circle, gombiks in the outer. The original arrangement of ornaments can be reconstructed as follows: the child is wearing a necklace with beads and the kaptorga in the middle (*fig. 17*), while the gombiks were probably lining the neckline of the garment (*Chorvátová 2009*, 13).

Finds of necklaces among grave goods are common in rich graves in Moravia and Bohemia, but they are more often set with glass or semi-precious stones beads. A complete metallic necklace, either formed with an organic string on which metallic ornaments are threaded or formed with a metallic chain remain exceptional.

Two necklaces made of oval metallic beads with granulation work decoration were found in grave nos. 24/48 and 25/48 in the Na Valách cemetery in Staré Město (*Galuška 2013*, fig. 186–188). Grave no. 106b-c, the so-called grave of the "Kouřim princess", contained a total of three silver kaptorgas and four silver beads (*Šolle 1966*, 266–267), which probably formed a necklace. From the more distant parallels, we can mention two graves with necklaces with gold beads from Croatia, one from Trilj with a necklace of 24 gold beads, dated by a Byzantine coin (760–775), the other one in Golubić with a necklace of 28 gold beads with six small lunular pendants (*Petrinec 2009*, fig. 52–53, tab. 80, 83). These jewels are inspired by the Late Antique – Byzantine tradition. According to the author, these graves belong to the pre-Christian phase of the early Croatian culture and are therefore older than similar finds from Central Europe. In contrast, most Polish and Ukrainian metallic necklaces are younger and were found mainly in hoards of hacksilver

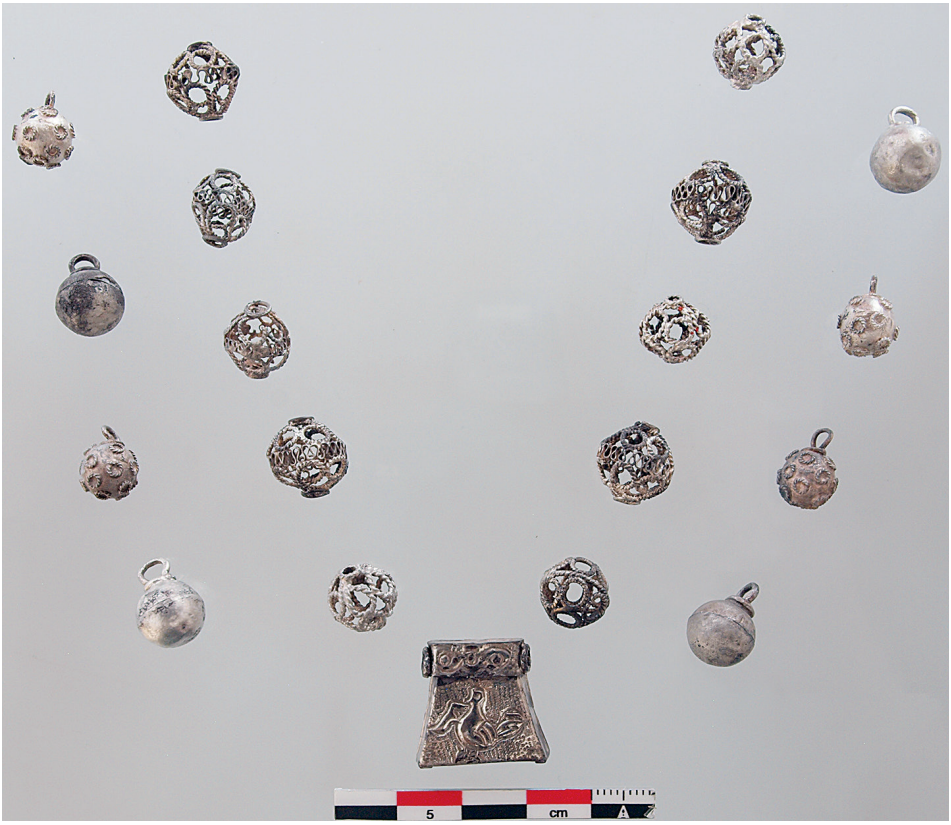


Fig. 17. Prague-Střešovice, cemetery Triangle, grave 16. Photo of the necklace after restoration. Photo E. Ottenwelter.
Obr. 17. Praha-Střešovice, pohřebiště Triangl, hrob 16. Rekonstruovaná sestava náhrdelníku, foto po restaurování.

(*Duczko 2016*, 138–142). Their presence in a funeral grave context is exceptional. One necklace was recovered from a barrow near Luck (*Brzeziński 2007*, 157), another necklace with small kaptorgas from a grave in Dziekanowice (*Duczko 2016*, 141).

A slightly more common type is a metal pendant – kaptorga or other element on a chain. An example of this type is represented by the necklace found in the "princess" grave of Želénky near Duchcov, which consisted of a silver chain and a medallion with an antique cameo (*Profantová – Militký 2000*, 188–195). Other examples of this type of necklace are known from the Lumbe Garden cemetery in grave nos. 16, 53 and 82 (*Frolík – Smetánka 2014*, 67–68, 108–111, 146–150).

5. Conclusion

A total of 23 children were uncovered in 22 graves at the Triangle cemetery, though only seven contained grave goods. These grave goods are relatively modest in almost all the

graves. They included temple rings: seven in grave no. 13 and eight in grave no. 29, a bucket and four beads from amber and glass in grave no. 25, a pot and an egg in grave no. 26, a knife and an egg in grave no. 38 and two eggs in grave no. 42. Grave no. 16 stands out significantly among the others. The necklace and the gombiks, all together a total of 19 jewels in solid silver, represent a total of 20 g of silver and around 74 hours of work according to the conducted experiments. The child buried in grave no. 16 from the Triangle cemetery in Prague-Střešovice undoubtedly came from a privileged social background. Nevertheless, it is clear that a child of this age did not wear this necklace every day and that it was instead given by the child's family as a loving and socially representative burial gift.

SEM/EDS elemental microanalysis and observation under stereomicroscope have shown that the necklace components were made in one workshop (except bead H 335). It has also been demonstrated that the kaptorgas from Prague's Lumbe Garden cemetery, Triangle cemetery and from Klecany II were manufactured in the same way, albeit with different decoration. The jewels found in grave no. 16 in Triangle as well as several other jewels from the Lumbe Garden (*Frolík – Smetánka 2014*; *Frolík a kolektiv 2014*) and Za Jízdárnou (*Tomková – Frolík 2005*; *Tomková 2006*) cemeteries in Prague and Klecany II (*Profantová a kolektiv 2010*) document the activity of a local jewellery workshop providing jewels for the Prague court. Although this workshop has not yet been localized, it is very likely that it was located either directly at Prague Castle or in its vicinity (*Frolík a kol. 2014*, 97–104). The production of the Prague jewellery workshop stands chronologically between Great Moravian jewellery and the jewellery recovered from the silver hoards from Poland and the Elbe River region. It is in the Prague jewellery workshop that new types of ornaments were produced – kaptorgas with chased zoomorphic decoration, basket beads and corrugated strip decoration, which had further development in Poland and the Elbe River region. The influence of the production of the Bohemian/Prague jewellery workshop on jewelry in Poland and the Elbe region was recognized by German and Polish scholars (*Kóčka-Krenz 1992*, 87; *Spazier 2015*, 193).

While the set of jewellery found in one grave does not reflect the entire production of the Prague jewellery workshop, it demonstrates a transfer of cultural elements and innovation over time and space.

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Dětský pohřeb s náhrdelníkem z pohřebiště Triangl v Praze-Střešovicích

Pohřebiště Triangl patří k věnci pohřebišť, na nichž pohřbívali obyvatelé hospodářského zázemí Pražského hradu. Výzkum v r. 2012 odkryl 49 hrobů z 10. století (*Frolíková-Kaliszová 2014*). V hrobě 16 byly mezi vlákny dřeva z rakve nalezeny fragmenty lebky a drobné zlomky kostí postkraniálního skeletu, které dovolily jejich antropologické určení jako *infans II*, tedy dítě 3–4 roky staré (*Stránská 2014*, 332, tab. 1). Mezi kostmi hrudníku jsme objevili korálky (10 ks), gombíky (8 ks) a jednu kaptorgu (*obr. 3–4*).

Kaptorga R 344 se skládá z lichoběžníkovité krabičky a víčka (*obr. 5–6*). Víčko i krabička byly společně proraženy na bočních stranách otvorem pro protažení šňůrky, na níž byla kaptorga nošena. Víčko je zdobené pletencem, tepaným až po nasazení na krabičku, do jejíhož plechu je vtištěn (*obr. 3: d*). Přední strana kaptorgy je zdobená tepaným reliéfem ptáka zobrazeného z boku na důlkovaném pozadí. Před zobákem ptáka se nachází nepravidelný podlouhlý útvar. Podle zavalitého těla, krátkých nohou a malé hlavy pták zřejmě představoval holuba/holubici. Kaptorga váží 1,9 g, výroba její repliky trvala 8 hodin.

Gombíky (*obr. 7–9*) dvou typů byly vyrobeny z materiálu shodného se surovinou použitou při výrobě kaptorgy. Typ s hladkým pláštěm zdobeným připájenými kroužky ze splétaného tordovaného drátku je zastoupen čtyřmi kusy (C 328, D 329, Ch 326, J332). Výroba repliky trvala 5 hodin. Typ s nezdobeným pláštěm je zastoupen rovněž čtyřmi kusy (B 330, E 331, L 327, M 333), výroba repliky trvala 3 hod.

Korálky (*obr. 10–12*) byly vyrobeny z dvojitého tordovaného drátku spleteného do preclíkovitého tvaru. Tyto základní prvky byly po třech spájeny, vzniklý útvar poté vytvarován v jamkovnici do polokoulí. Výjimkou je korálek H 335, jehož polokoule jsou tvořeny šesti ovály, nikoliv „preclíčky“. Navlékací otvory lemují kroužky. Korálky se dělí do tří typů podle způsobu spojení polokoulí: A 341, G 336, I 339, K 340, N 337, O 338 jsou spojeny úzkou meandrovitě zvlněnou páskou, korálky F 342, Q 343, S 334 jsou spojené pouze pájením, a korálek H 335 má polokoule spojené filigránovým drátkem. Doba výroby repliky korálku s meandrovitou páskou činí 4 hodiny, ostatních po 3 hodinách práce.

Analýzy prokázaly, že materiálem kaptorgy, gombíků a poloviny korálků je téměř čistě stříbrný plech čí drát, pouze s malou příměsí mědi (*tab. 1*). Binární slitina stříbra s vyšším obsahem mědi byla používána také jako pájka, a to na všech špercích. Drátky z ternární slitiny stříbra s mědí a zlatem byly použity při výrobě korálků s meandrovitou páskou A341, G 336, I 339, O 338 a korálku H 335,

a také na drátcích lemujících navlékací otvory kaptorgy. Pod mikroskopem byly rozpoznány některé detaily výrobního procesu, dosvědčující nesnadnost práce s tvrdou kovovou pájkou na materiálu velmi blízkého složení (zbytky pájky na kaptorze, *obr. 5: b*; pájkou rozplavený meandr na korálku N 337, *obr. 10: e*). U velmi kvalitního korálku H 335 byl pozorován silný otěr navlékacích otvorů, který svědčí o dlouhodobém nošení. Technologická studie kolekce šperků z hrobu 16 ukázala mnohé podobnosti svědčící o tom, že všechny (s výjimkou korálu H 335) byly vyrobeny v jedné dílně.

Srovnání s kaptorgami z hrobů 82 a 16 v Lumbeho zahradě na Pražském hradě, z hrobu 22 na pohřebišti Klecany II a z hrobu 2103 z Hostivic-Palouků ukázalo četné technologické podobnosti (motiv pletence na víčku, tepaný do víčka nasazeného na schránce s dočasnou výplní) a zároveň i některé rozdíly, zejména ve velikosti, ale také ve složení použité pájky či typu nástrojů použitých při tepání a rytí jejich výzdoby (*obr. 13*). Z pozorování vyplývá závěr, že se jednalo o výrobky jedné dílny, avšak záměrně individualizované. Celková váha stříbra použitého na celou kolekci šperků z hrobu 16 činí 20 g, což je poměrně dost. Časová dotace jejich výroby odhadnutá na základě výroby replik je 76 hodin bez započtení přípravy suroviny (roztepání hřivny na plech, vytažení drátu do požadovaného průměru).

Kaptorga z hrobu 16 je jedinečná svým motivem. Na dosud známých lichoběžníkovitých kaptorgách bývá vyobrazena buď dvojice stylizovaných živočichů symetrických podle svislé osy, nebo rovněž stylizované bájné zvíře s hlavou otočenou vzad (*Profantová – Šilhová 2010*, obr. 11; *Kóčka-Krenz 1993*, 87; *Sztyber 2006*, 62–95). Samostatně vyobrazený pták je znám hlavně z gombíků moravských i českých (*obr. 14*, *15*). Co se týče snahy určit druh zobrazeného ptáka (*Hensel 1962*; *Galuška 2009*, 163–164; *Anoškinová 1995*), musíme mít na zřeteli, že jde vždy o schematické zachycení, často mohlo jít jen o ptáka jako symbol. Původem motivů výzdoby velkomoravských gombíků včetně vyobrazení ptáčka se zabývali *K. Benda* (*1963*, 59–61), *Z. Klanica* (*1970*, 440–442; *1991*, 181–193), *P. Charvát* (*2010*, 19–21) a *H. Chorvátová* (*2009*, 14). Shodně dospěli k závěru, že jak styl vyobrazení na puncovaném pozadí, tak některé motivy mají původ v oblasti íránské až středoasijské, k nimž se cestou do Evropy přes oblast byzantské kultury přimísily antické a starokřesťanské motivy. Řada motivů se na naše území pravděpodobně dostávala prostřednictvím vzorů na přepychových látkách dovážených z Orientu. Jelikož v bohatě vybavených velkomoravských hrobech byly identifikovány cizokrajné hedvábné tkaniny, jeví se reálnou představa šperku zdobeného stejným motivem jako šat. Nabízejí se však také motivy, jako Noemova holubice přinášející zelenou ratolest po potopě světa nebo holubice s olivovou ratolestí jako posel míru, které jsou běžným motivem na artefaktech z oblasti Byzance, např. na přezkách mužského i ženského šatu (*obr. 16*).

Zatímco gombíky z hrobu 16 na pohřebišti Triangl ničím nevybočují z typů běžných v celé oblasti ovlivněné velkomoravskou šperkařskou tradicí, košíčkovité korálky jsou inovací. Technologicky navazují na typ košíčkovitých náušnic, jejichž prvek – košíček – je osamostatněn, zvětšen a zavěšen do náhrdelníku. Novým prvkem v jejich konstrukci je meandrovitě zvlněná páska spojující polokoule.

Původní uspořádání šperků můžeme rekonstruovat takto: na krku dítěte byl pověšen náhrdelník z korálků s kaptorgou uprostřed (*obr. 17*), zatímco gombíky byly pravděpodobně našity na lemu oděvu. Je jisté, že tak malé dítě náhrdelník běžně nenosilo, nýbrž že jde o dar jeho rodičů nebo jiných příbuzných, o láskyplné a zároveň společensky reprezentativní vystrojení do hrobu.

Šperky z hrobu 16 z pohřebiště Triangl jsou dalším dokladem produkce šperkařské dílny pracující pro dvůr přemyslovských knížat v 10. stol. na dosud nenalezeném místě, pravděpodobně na Pražském hradě nebo jeho předhradí (*Frolík – Smetánka 2014*, 99).

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