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# The fibula production of Brigetio

## Model, semi-finished products, and failed castings

Csilla Sáró
MTA – ELTE Research Group for Interdisciplinary Archaeology
sarocsilla@gmail.com

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Abstract: This article continues the author's paper *The fibula production of Brigetio: clay moulds* published in Dissertationes Archaeologicae 3.8 (2020). The main aim of this paper is the presentation of a model plus several semi-finished and waste fibulae from Brigetio, adding to our knowledge about the fibula production of this archaeological site.

Keywords: Brigetio, fibula manufacture, model of a fibula, semi-finished fibulae, waste fibulae

## Introduction

Fibulae are common personal articles and standard products of a bronze workshop. Only a small quantity of metal is used during the manufacture of one or two pieces. These objects were mass produced in significant quantities and have no special features. Based on the number of finds, the production centers could be more numerous than we know of. They can certainly be localized by such archaeological finds as moulds, semi-finished products, failed castings, models of fibulae, and ingots. Unfortunately, the availability of these finds is limited because of the fragility of the clay moulds and the recycling and remelting of metal objects. Above all, the frequent appearance of a variant in a closed territory testifies to a local manufacture.

A brief literature review is in place. About Pannonian bronze workshops, significant research has been done by N. Sey. In her PhD dissertation and papers, she discusses several sites with proved fibula production and the high significance of the workshop in Brigetio.[1] In a recently published monograph of S. Cociş, the author focuses on fibulae and has collected information about the fibula manufacture of the provinces along the Danube, namely Dacia, Moesia, Raetia, Noricum, and Pannonia.[2] Although S. Cociş addresses the activity of the workshop in Brigetio in a chapter,[3] I will summarize and complement the information.

In this paper, I discuss one model and several semi-finished or waste fibulae. Their types and detailed descriptions are presented in the text, and further information is in the catalogue. The local distribution of the fibula variants in Brigetio and Komárom-Esztergom County is summarized in the Appendix. In 2022, a third paper is added to this series about the production of enameled fibulae.[4]

1 Sey 2013; Sey 2015; Sey 2018.
2 Cociş 2019.
3 Cociş 2019, 51.
4 This paper was supported by the *Brigetiói fibulák elemzése hagyományos régészeti szemléletű és műszeres vizsgálati módszerekkel* (ÚNKP-19-3 New National Excellence Program of the Ministry of Human Capacities) the OTKA K-134522 and the *Vaskori elit és római centralizáció, technológiai fejlődés és társadalmi változások az ókori Európában* research projects. I would like to express my gratitude to Prof. Dr. László Borhy MHAS (Eötvös Loránd University, Faculty of Humanities), Dr. Richárd Schmidtmayer, Mária Kempf (Kunyi ▷

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## Types of the model, semi-finished and waste fibulae

Of the finds of fibula production, we can give details of the types of model, and the semi-finished and waste fibulae. While the less numerous and often fragmented clay moulds can provide only limited information about the cast variants,[5] the details of semi-finished and waste fibulae can be examined in all cases. One model and eight semi-finished or waste fibulae can be listed from Brigetio, which belong to the types of the Norico–Pannonian winged fibula, Pannonian trumpet fibula, knee fibula, and crossbow fibula. Most of the objects are known from Szőny/Brigetio without their exact location *(Cat. 1–2, 7–9)* but further pieces *(Cat. 3–6)* were found at the site Szőny-Vásártér, in the territory of the *municipium* in Brigetio. Most finds came from layers on the surface or were found as stray finds at the excavated area *(Cat. 3, 5–6)*, while a Pannonian trumpet fibula *(Cat. 4)* was found in an examinable archaeological context. Unfortunately, this object cannot contribute to the dating of the variant, as the *terra sigillata* fragments from this layer can be dated from the end of the 1st century to the beginning of the 3rd century AD.[6]

### Norico–Pannonian winged fibula

Manufacture of Norico-Pannonian winged fibulae is proved by one object from Szőny without exact location *(Cat. 1; Fig. 1,1)*. This piece is made from a copper-base alloy without the pin-construction. Its chord-cap remained in a temporary position, the wings are massive elements, and the catchplate is thick and rudimental. On the left-hand side of the object,[7] there are four engraved, regular shaped parallel lines that had some importance during the manufacturing process. Similar line-bunches on moulds allow the precise join of the two pieces[8] but in this case the role of the ornament is certainly different. Although there is no solid evidence to confirm the hypothesis it is supposed to be a sign of a serial number. *Cat. 1* can be defined as a model that served for making two-piece moulds. Based on the details of *Cat. 1*, the variant can be given a limited definition. Although the main elements can be described, no precise identification is possible. The reason is that the buttons on the wings and the decoration of the catchplate have a significant role in the typology but they were usually made at the end of the manufacturing process. Despite the missing details, other elements provide some starting point:

- two-piece fibulae were made by this model,
- the finished fibula had a chord-cap, instead of a simple hook
- the dividing knob is segmented, plain, and oval
- the wings are separated and bent at the end of the manufacturing process, rather than having a ring-like shape
- the embossed or riveted buttons on the wings were also made as a final step in the manufacture.

▷ Domokos Museum: KDM), Emese Számadó (Komáromi Klapka György Museum: KGyM), Zsolt Mráv, Erika Kovács, József Puskás (Hungarian National Museum: HNM), Julianna Kisné Cseh and Gabriella A. Pál (Tatabányai Museum: TBM) for the research opportunity and their help.

5 I used a 3D scanned picture to examine the moulds with imprints of the intact pieces and the imprints with a recognizable part of a fibula type but unfortunately the fragmented or featureless imprints cannot be interpreted (Sáró 2020a).

6 Actual examination of *terra sigillata* finds from Brigetio/Szőny-Vásártér is done by Barbara Hajdu (Budapest History Museum – Aquincum Museum). Her resume discusses the *terra sigillatae* found in 2010–2016 (Hajdu 2018). Unpublished finds were mentioned in this article, and for the definitions I am very grateful.

7 The bow fibulae were generally worn with a pin-construction facing down so the left and right-hand side of the object should be regarded in this position.

8 Bartus 2014a, 161–162, 2. kép; Bartus 2014b, 29–30, Fig. 2.

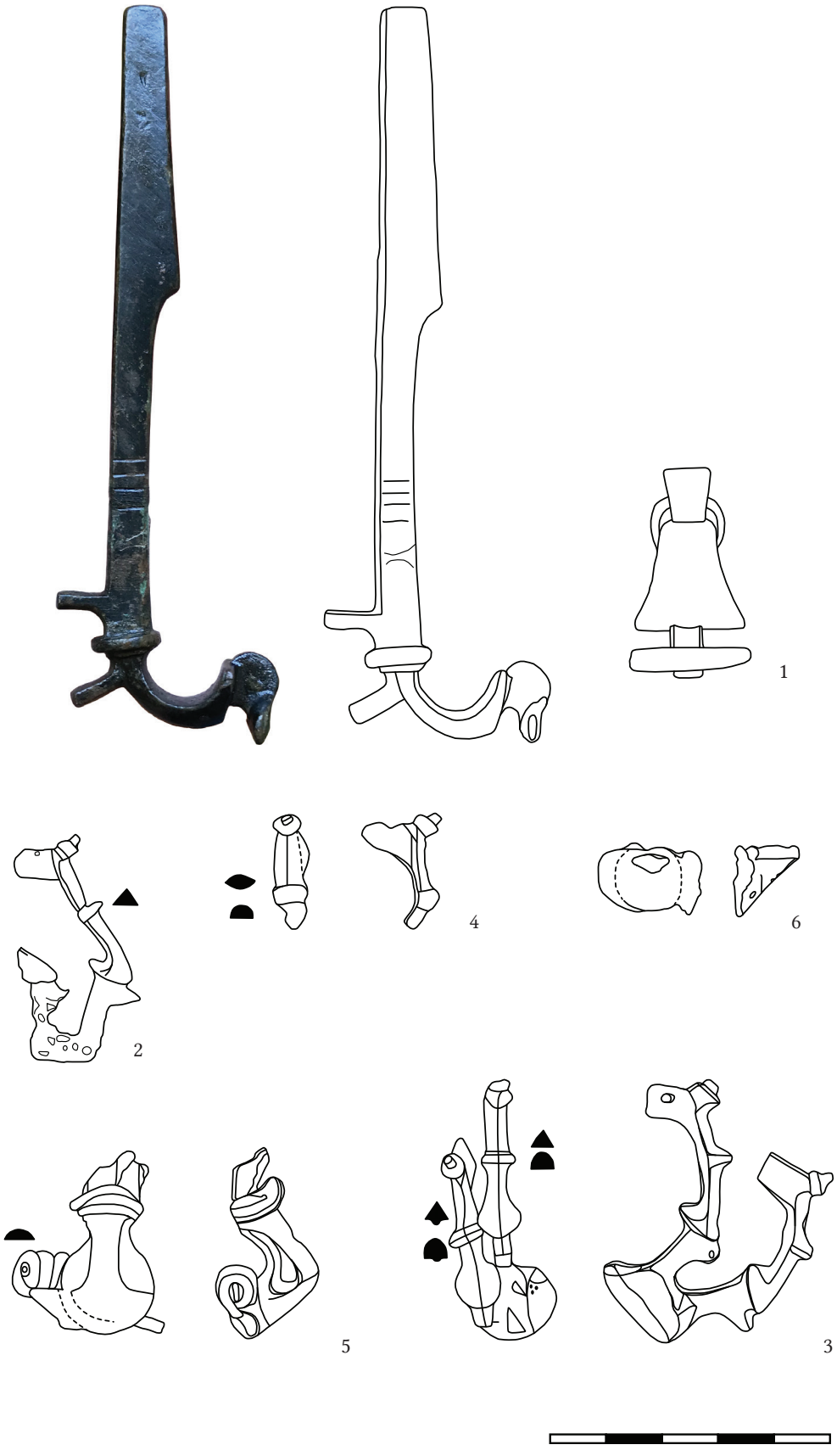


*Fig. 1.* Model, semi-finished and waste fibulae. 1 – Cat. 1 norico-pannonian winged fibula, 2 – Cat. 2 pannonian trumpet fibula, 3 – Cat. 3 pannonian trumpet fibula, 4 – Cat. 4 pannonian trumpet fibula, 5 – Cat. 5 pannonian trumpet fibula, 6 – Cat. 6 pannonian trumpet fibula.

According to the two-piece construction, it is certainly not one of the earliest variations, as the two-piece construction was characteristic from the 2nd century AD.[9] The two-piece construction can be observed at Garbsch A238p, A238q and A238u, while A238v fibulae were made both with one- and two-piece constructions.[10] For several types, the chord-cap and the hook can be varied but the chord-cap characterizes the Garbsch A238p and A238q pieces exclusively. The size of the different types is also informative. The A238p–q fibulae are smaller pieces. According to J. Garbsch, they vary between 45–80 mm (A238p) and 40–80 mm (A238q).[11] On the other hand, A238u–v fibulae are longer: 120–155 mm (A238u) and 102–145 mm (A238v) pieces were collected by J. Garbsch.[12] The length of the latter variants is close to the 131 mm of *Cat. 1*. Finally, the wings should be investigated. Both A238u and A238v were made both with separated and ring-shaped wings, while the buttons were usually cast together with the wing or were embossed at the end of the manufacturing process. Based on the recently collected fibulae, characteristics of the Garbsch A238v fibulae might be more variable: a chord-cap and riveted wing-buttons could also appear.[13] In conclusion, the *Cat. 1* model from Szőny was most likely used for making a Garbsch A238u or A238v fibula with a chord-cap and embossed or riveted wing-buttons.

Since there is little evidence for the production of the Norico-Pannonian wing fibulae in Pannonia, all available information is presented in the following section. According to the distribution of certain variants, local production is presumable[14] but further pieces provide more certain information. Semi-finished fibulae have been found in Győr-Ménfőcsanak/Hungary[15] and Szakály-Réti-földek/Hungary.[16] Based on the published illustrations, the casted and ring-shaped wing is their main characteristic so they may belong to Garbsch A238q, A238u or a variant of Garbsch A238v.[17] According to their size, these fibulae are rather A238u or A238v pieces.[18] Based on recent research, the A238v type can be divided into further variants. Fibulae with a ring-shaped wing, 1+1 casted wing-buttons, rectangular dividing knob and pointed circles can be defined as A238v4 variant (= Sáró 2020/4.4.4).[19] Some other pieces have the same characteristics but the decoration of the catchplate differs and stamped dot-circles can be seen on it (A238v5).[20] Based on their dividing knob and wing-buttons, fibulae from Győr and Szakály may belong to another variant of A238v or A238u. As further evidence, a lead model can also be mentioned from Zurndorf/Austria.[21]

9 Garbsch 1965, 49, Abb. 41.
10 Garbsch 1965, 49, 68–69, 73–75.
11 Garbsch 1965, 68–69.
12 Garbsch 1965, 73, 75.
13 A Norico–Pannonian wing fibula from Paks-Gyapa-Rosti-puszta was discussed as a Garbsch A238v fibula. This object has the same thin bow form after the dividing knob as the fibulae from grave No. 1/Nagyvenyim (newly studied in Sáró 2020b, II, 79, 41. tábla 1–2). The fibulae from this grave clearly belong to the Garbsch A238v. Unusually for the variant, the fibula from Paks-Gyapa has chord-cap and 2+1 segmented knobs on its wing (Sáró 2014, 300, Cat. 5, Fig. 2,1).
14 According to J. Garbsch, Garbsch A238s, A238t, A238u, A238v only came from Pannonian sites (Garbsch 1965, 75; Garbsch 1985, 562).
15 Bíró 2013, 251, Abb. 2,3. = Sey 2013, Kat. 95.
16 Gabler 1982, 90, Fig. 19. = Sey 2013, Kat. 418.
17 Sz. Bíró defines the fibula from Győr-Ménfőcsanak as a Garbsch A238v (Bíró 2013, 252). Contrary to my interpretation, D. Gabler describes the fibula from Szakály-Rétiföldek as a Garbsch A238c (Gabler 1982, 90). My definition is based on the supposedly ring-shaped wing. If the wings are separated, I should accept the opinion of D. Gabler.
18 The fragmented fibula from Szakály-Rétiföldek is approximately 6 cm long and the small fragment of the fibula from Győr-Ménfőcsanak is almost 4 cm (Gabler 1982, Fig. 19; Bíró 2013, Abb. 2,3).
19 Sáró 2020b, II, 159.
20 They are known from Adony (Barkóczi – B. Bónis 1954, 163, Abb. 15,7), Intercisa (Sáró 2011, Kat. 15, T. VII,1) and Leányvár or Brigetio (Lamiová-Schmiedlová 1961, 62, Nr. 404, Tab. XIX,1).
21 Winter 1981, 484, Abb. 533.

At several sites in Noricum, the production of Norico–Pannonian winged fibulae is well proved. A238 fibula were certainly manufactured in Flavia Solva,[22] the vicus at Gleisdorf,[23] Kalsdorf bei Graz,[24] Iuvavum,[25] Magdalensberg,[26] Ovilava[27] and Teurnia.[28] Evidence of their production was also found in Dacia, A238q and further A238 fibulae were manufactured at Cluj-Napoca.[29]

The main distribution area of the type is Noricum and Pannonia but they also appear in Raetia, Dacia and in the Barbaricum. Their presence in other areas is infrequent.[30] They were used from the end of the 1st century BC to the end of the 2nd century or the beginning of the 3rd century AD.[31] This type is a typical accessory of the native female attire. Depictions from stone monuments and finds from graves demonstrate their constant presence in the Principate.[32]

## Pannonian trumpet fibulae

Based on five objects *(Cat. 2–6; Fig. 1,2–6)*, Pannonian trumpet fibulae were also produced in Brigetio. Most of the fibulae were found in the territory of the *municipium (Cat. 3–6)* but a further one came without exact location *(Cat. 2)*. These objects belong to two variants of the Pannonian trumpet fibulae. Three pieces *(Cat. 2–4; Fig. 1,2–4)* confirm the manufacture of Cociş 21b1b = Sáró 2020/8.3[33] which is characterized by a small trumpet shaped bow. Another fibula *(Cat. 5)* belongs to Cociş 21b4a,[34] while *Cat. 6* is only a small fragment of the bow.

Firstly, the Cociş 21b1b = Sáró 2020/8.3 pieces are presented. The main characteristics of the variant can be easily observed on the following three objects. Casts of two parallelly situated Pannonian trumpet fibulae were found in Szőny *(Cat. 2)* and on the territory of the *municipium (Cat. 3)*. These are certainly semi-finished products because the ingots were not cut off. However, a further piece *(Cat. 4)* can only be described as waste fibula by the help of a stereomicroscope.[35] The definition is based on some details of the end knob and the second part of the bow. The edge of the second bow is deformed and some extra metal can be seen here, additionally a burr can also be observed on the end knob *(Fig. 2)*. The cast of *Cat. 6 (Fig. 1,6)* was certainly failed but the variant cannot be precisely defined. The small fragment of the trumpet shaped bow is similar to Cociş 21b1b = Sáró 2020/8.3 but other variants can also be described with this characteristic.[36]

22 Semi-finished fibula: Cocış 2019, 58, Pl. 130,67.
23 Waste fibula: Cocış 2019, 59.
24 Waste fibula: Cocış 2019, 60, Pl. 133,85.
25 Knauseder 2014, 157; Cocış 2019, 60. Lead models of fibulae: Knauseder 2014, 146, Abb. 2,11. = Cocış 2019, 60, Pl. 134,94; Knauseder 2014, 146, Abb. 2,12. Waste fibulae: Knauseder 2014, 146, Abb. 2,13–14.
26 Cocış 2019, 61; Sedlmayer 2009, 88–89, Tab. 81–83. Moulds: Sedlmayer 2009, 294, Taf. 31,G37–G45. Semi-finished fibula: Sedlmayer 2009, 266, Taf. 18,341. = Cocış 2019, 61, Pl. 138,110.
27 Cocış 2019, 61. Semi-finished (?) fibula: Sedlmayer 1995, 162, Taf. 15,97. = Cocış 2019, 61, Pl. 143,125.
28 Cocış 2019, 62. Waste fibula: Cocış 2019, 62, Pl. 143,124.
29 Cocış 2019, 25, Tab. 2; Pl. 9,10 = Pl. 71,6; Pl. 68,687–694.
30 Garbsch 1965, 164–234; Garbsch 1974, 182–183; Cocış 2004, 75; Demetz 1999; Sedlmayer 2009, 28–30.
31 Garbsch 1965, 49; Sáró 2011, 13–15; Sáró 2020b, II, 157–161.
32 Sáró 2020b, I, 32, 124–131, 202.
33 Cocış 2004, 113; Sáró 2020b, II, 171. Their main characteristics are the two-piece construction, the small trumpet shaped bow and a second bow part with a triangular cross section. Only the upper part of the trumpet shaped bow joins to the unsegmented dividing knob. These fibulae are made without a headplate.
34 Cocış 2004, 114. Their main characteristics are the two-piece construction, the big trumpet shaped bow and a second bow part with a triangular cross section. Both parts of the first bow-section join to the segmented or unsegmented, semicircular dividing knob. These fibulae are made without a headplate.
35 I used the ZEISS SteREO Discovery.V8: zoom (zoom range 6.3×–80×) stereomicroscope of the Archaeometry Laboratory of the Eötvös Loránd University, Faculty of Humanities, Institute of Archaeological Sciences. The microscope was purchased within the KMOP-4.2.1/B-10-2011-0002 tender.
36 For example, the Cocış 21b2b2 can be mentioned (Cocış 2004, 113).

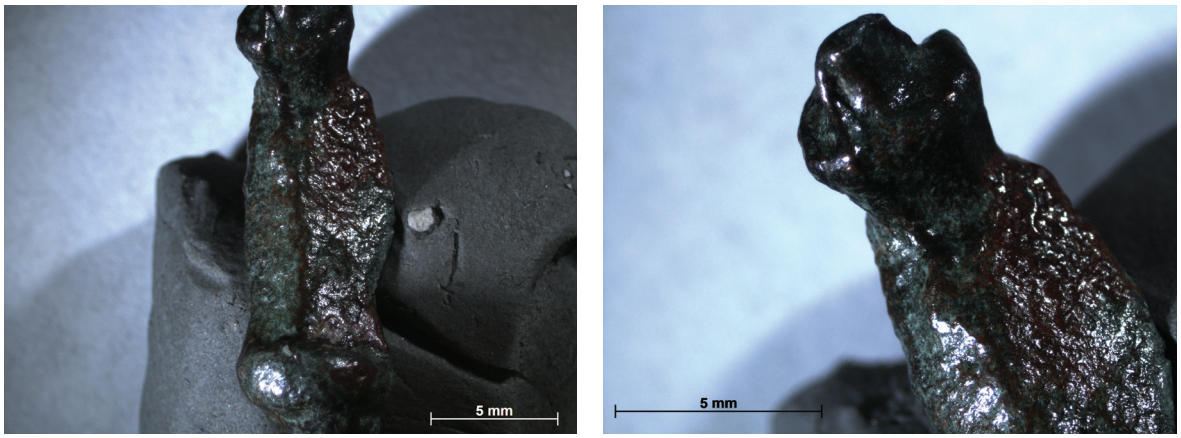


*Fig. 2.* Detail photos of Cat. 4 pannonian trumpet fibula.

Cociş 21b1b partly corresponds to Kovrig T. VI,60[37] but a difference should be emphasized. Under Kovrig T. VI,60, fibulae with big and small trumpet-shaped bow were discussed, thus the distribution of this variant is uninformative for us.[38] According to my research, Cociş 21b1b fibulae are known from Brigetio and its vicinity *(App.; Fig. 6,1–4)* but further examples can be mentioned from the whole territory of Pannonia.[39] In Carnuntum, the production of this variant is proved by a semi-finished fibula.[40] The variant is less known beyond Pannonia but it appears in Dacia[41] and the Barbaricum.[42]

Pannonian trumpet fibulae generally date back to the 2nd century AD. According to S. Cociş, the 21b1b was also used in this period.[43] M. Merczi draws attention to the similarity of Almgren 84 and Cociş 21b1b, because their second bow parts have a triangle shaped cross section. Based on this, Cociş 21b1b could be used simultaneously with Almgren 84 and it was still worn at the beginning of the 3rd century.[44]

Some fibulae of this variant can be mentioned from Pannonian grave contexts. These contexts cannot contribute to the dating of Cociş 21b1b but they can inform us about the range of wearers and their burial customs. In the inhumation grave No. 233/Páty, a pair of Cociş 21b1b fibulae has been found. In this grave, a child was buried and based on the objects, it might be a girl. Over the Pannonian trumpet fibulae on her shoulders, a pearl necklace belonged to her costume. Out of the three ceramic vessels in the grave one is a big bowl with the stamp of Resatus.[45] In tumulus No. 6/

37 Kovrig 1937, 17, 51–52, T. VI,60.

38 Kovrig 1937 T. VI,60. fibulae came from Brigetio, Carnuntum-camp, Loretto, Poetovio, Potzneusiedl/Lajtaújfalu, Siscia and Tolna County (Kovrig 1937, 52). Patek T. XXII,5. is identical to Kovrig T. VI,60. In addition to the sites listed by I. Kovrig, E. Patek mentions Aquincum, Donnerskirchen, Intercisa, Keszthely, Kiskőszeg, Koroncó, Leobersdorf, Lesencetomaj, Oslip, Mursa, Neviodunum, Rust, Savaria, Scarbantia, Sopianae, Stinkenbrunn, Sulb, Súr and an unknown site/Pannonia (Patek 1942, 197–198).

39 Andau, Aparhant-Hant, Budaörs-settlement, Carnuntum, Katzelsdorf, Mannersdorf am Leithagebirge, Neviodunum, grave No. 233/Páty (2 pieces), Savaria-Iseum, Siscia, tumulus No. 6/Söjtör-Bonta-bükki erdő, Schützen am Gebirge (2 pieces), Vindobona, Zsámbék and probably grave No. SE 6034–6035–6036/Aquincum- 60 Bécsi Street (Sáró 2020b, II, 24, 87, 171, 263. footnote, 350–351, Kat. B145–147).

40 Farka – Jungwirth 1985–1986, 297, Abb. 809.

41 Cociş 2004, 203, Pl. CXVI,1351. Maybe Cociş 2004, 203, Pl. CXVI,1348–1350. also belongs there.

42 For example: Bernhardsthal (Allerbauer – Jedlicka 2000a, 641, Abb. 608), Drösing (Stuppner 1990, 237, Abb. 950; Jedlicka – Schmidt 1994, 564, Abb. 690), Drösing (Allerbauer – Jedlicka 1999, 840, Abb. 520), Enzersfeld (Adler 1994, 564, Abb. 696).

43 Cociş 2004, 114.

44 Merczi 2012, 494.

45 Merczi 2019, 55–56, Kat. 17–18, 8. tábla 5–6; Ottományi 2019, 20, 56, 19. tábla, 26. tábla 3, 31. tábla 6, 32. tábla 4, 36. tábla 1, 36. tábla 12, 37. tábla 2; Sáró 2020b, II, 87, Kat. B145–146, 49. tábla.

Söjtör-Bonta-bükki erdő, a single Cociş 21b1b fibula has been found.[46] Unfortunately, the gender or age of the deceased is unknown. In this scattered cremation grave, two bowls with a stamp on one's bottom were found with further shreds of secondary burnt ceramic vessels, iron nails, and a halved bronze coin.[47] A cremation grave has been excavated at Aquincum- 60 Bécsi Street. In grave No. SE 6034–6036, an 8–22-year-old person was buried with a Cociş 21b1b and one other fibula. Based on the number of fibulae, the deceased could be a girl/woman. Over the dress accessories, a coin of Faustina, a Drag. 33 *terra sigillata* vessel and one fragment of a ceramic lamp have been found.[48]

In Brigetio, the manufacture of Cociş 21b4a is also proved. *Cat. 5 (Fig. 1,5)* waste fibula was found in the territory of the *municipium*. A main characteristic of Cociş 21b4a fibulae is the big trumpet shaped bow joining to the segmented dividing knob. In the case of *Cat 5*, the failed casting is clearly visible as a burr, and surplus metal can be observed on the trumpet shaped bow *(Fig. 3)*. This object is also interesting because it has a pin-construction, despite the failed casting. It proves that it was in actual use.

*Fig. 3.* Cat. 5 pannonian trumpet fibula (photos: ArtWork Tracking Service Kft.).

Although Pannonian trumpet fibulae are well known from the Danube area, there are only a few that match *Cat. 5*. From the closer area, one piece can be listed from Brigetio, and another from Brigetio or Iža *(App.; Fig. 6,5)*. Further information about the distribution is uncertain[49] but a fibula

46 I defined this fibula based on published information and pictures (Horváth 2000, 10. kép 6; Berecz 1991, 170, Kat. 24, 4. kép 1).

47 K. Palágyi – Nagy 2000, 44; Horváth 2000, 238, 10. kép. According to the illustration of L. Horváth, in addition to the two bowls, fragments of two jars, two bowls and one ovoid vessel were found (Horváth 2000, 10. kép 2–5, 10–11).

48 Sáró 2020b, II, 24, Kat. B147, 9. tábla.

49 In the monograph of E. Patek (1942), this fibula *(App. 2.1)* was probably listed among the T. XXII,5. fibulae. Several spots are mentioned under T. XXII,5. and these sites could theoretically be useful for a distribution map. Unfortunately, Patek 1942, T. XXII,5. is identical to Kovrig T. VI,60. as we have seen before and the known fibulae of these variants are different in details. The HNM 27.1894.18. (Brigetio) ▷

can be listed from Halbturn/Féltorony.[50] Cociş 21b4a with a segmented dividing knob is known from Moesia,[51] and a further piece with an unsegmented dividing knob came from Dacia.[52] This variant was certainly used in the 2nd century AD but its chronology cannot be described more precisely.

## Knee fibulae

In addition to a clay mould,[53] two semi-finished objects *(Cat. 7–8)* also prove the production of knee fibulae in Brigetio. These two fibulae remained at different stages of the manufacturing process.

The fibula form is well recognizable and the type can be easily defined, although the clay mould was not removed from *Cat. 7 (Fig. 4,1)*. It belongs to one form under M. Merczi's B/23. Therefore, I identify this fibula as Merczi B/23.2. = Sáró 2020/9.8.[54] This variant is characterized by a semicircular headplate and a bow with a thickened start. Not only the Sáró 2020/9.8 fibulae are mostly known from Pannonia,[55] they are even found in Brigetio or its vicinity *(App.; Fig. 6,6–10)*. Although these fibulae come from Noricum,[56] Moesia[57] and the Barbaricum,[58] their number is much smaller. Even though D. Bojović dated this variant to the 3rd century AD by its form,[59] they were probably used in the 2nd century AD as well.

*Cat. 8* is obviously a semi-finished fibula, as the ingot was not cut off *(Fig. 4,2)*. In spite of the pin-construction, all principal elements of the fibula are formed. The main characteristics are the equal width of the bow which only broadens above the catchplate and the upstanding rectangular cross section of the bow. *Cat. 8* was published under M. Merczi's B/24,[60] but this fibula seems to be unique. Although the same finds cannot be found in the published material of Pannonia and beyond the province, some similar items can be mentioned. The upstanding rectangular cross section of the bow can be observed on each fibula from Szőny-Vásártér[61] and Komárom-Esztergom County.[62] Unfortunately, their pin-constructions are missing and the directions of the cathchplates are different. This bow-form can match a covered sprung-pin construction as testified by some pieces from Brigetio and Noricum.[63] Similar items are known not just with rectangular headplate

▷ and the HNM 21.1921. (Súr) fibulae can probably refer to Patek 1942, T. XXII,5/Nr. 3–4 pieces. These objects have a trumpet shaped bow and only the upper part of the bow joins to the segmented dividing knob.

50 Jedlicka 1976, 242, Abb. 228.

51 Bojović 1983, 116, T. XVI,142, 144.

52 Cocış 2004, 204, Pl. CXVIII,1377.

53 Its latest publication is Sáró 2020a, 119–120, 124, Cat. 2.

54 Under type B/23, M. Merczi discusses Fig. 16,5 and Fig. 16,6–8 pieces together. This B/23 can be subdivided. The Fig. 16,6–8. fibulae belong to B/23.1 = Sáró 2020/9.7 while Fig. 16,5. refers to B/23.2. = Sáró 2020/9.8. (Sáró 2020b, II, 175–176).

55 Their distribution is summarized by I. Kovrig and E. Patek (Kovrig 1937, 64, T. X,104–104a; Patek 1942, 243). A further piece was found in grave No. 22/Aquincum- 58 Bécsi Street (Sáró 2020b, II, 33, 176, 356, Kat. B164, 14. tábla 1).

56 Flavia Solva (Kropf – Nowak 2000, 109, Taf. 38,188).

57 Unknown site/Muzej grada Beograda (Bojović 1983, 127, T. XXII,209 = Petković 2010, 143, Nr. 747, T. XXIV,8).

58 Sarmatian Barbaricum: Merczi 2011, 49. An example from the Northern Barbaricum: Ringelsdorf: Allerbauer – Jedlicka 2000b, 662, Abb. 807.

59 Bojović 1983, 58.

60 Merczi 2011, 24, 50, Kat. 156.

61 KGyM 2008.J11.058.9. Context: J11/SE 058: hard, pebbly layer with *terra sigillata* from South-Gallia plus Middle-Gallia which can be dated back to the second half of the 1st century – end of the 2nd century AD. *Terra sigillatae* were defined by B. Hajdu.

62 Merczi 2011, Kat. 157.

63 Brigetio: HNM 63.22.38. Noricum: Merczi 2011, 27, 38. footnote.

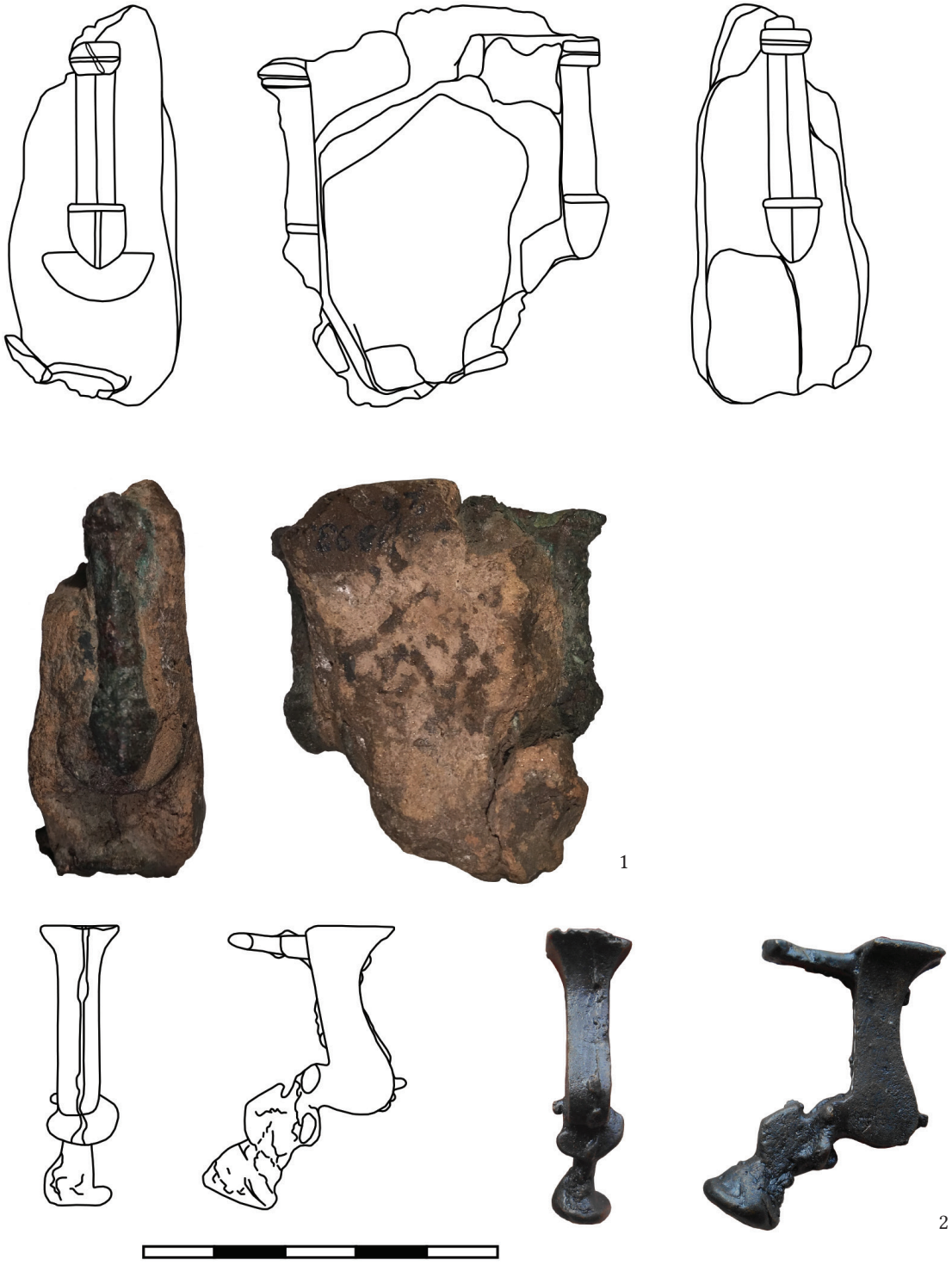


*Fig. 4.* Semi-finished fibulae. 1 – Cat. 7 knee fibula, 2 – Cat. 8 knee fibula.

and sprung-pin construction (Merczi 2011/B/24) but with covered sprung-pin construction as well (Merczi 2011/A/1). The upstanding rectangular cross section of the bow is their common feature which is a popular character of the knee fibulae in the area of Germania and Raetia.[64] These kinds of fibulae with covered sprung-pin construction are known from Britannia, Raetia, Noricum, and Pannonia. As M. Merczi supposed, these items were initially produced in the area of Germania–Raetia

64 Merczi 2011, 26, 49.

and reached the limes border by the military.[65] Knee fibulae with covered sprung-pin construction and transverse catchplate are dated back to the second half of the 2nd century AD by A. Böhme.[66] The dating of the fragmented fibula from Szőny-Vásártér also fits the picture. Both in the western limes area and the provinces along the Danube, knee fibulae with an upstanding rectangular cross section of the bow were probably used at the same time.

### Crossbow fibula

In Brigetio, the manufacturing of crossbow fibulae is proved by a single object *(Cat. 9; Fig. 5)*. This fibula is a failed casting: almost its entire surface is covered with surplus metal and burr. Nevertheless, the main characteristics are well recognizable. Each arm of the pin construction is decorated with one rectangular element, two ribs and a big, facetted, round knob, while the first bow-part is highly arched with a trapezoid cross section, and a cut can be seen on its end. Although the bows of the finished items are normally decorated, ornamentation on the top of *Cat. 9*'s bow cannot be observed. Based on the previous characteristics, *Cat. 9* belongs to Keller–Pröttel 1/B.[67]

Crossbow fibulae with two ribs and round knobs on the arm are well known from several sites of Raetia, Noricum, and Pannonia.[68] The close analogies of *Cat. 9* are the pieces with rectangular elements on the arm and rectangular cut in the end of the arched bow. No Keller–Pröttel 1/B fibula with all previous characteristics is known from Brigetio and Komárom-Esztergom County yet but it came from the late Roman cemetery of Vindobona.[69]

According to M. Pröttel, Keller–Pröttel, 1/A–B fibulae were used around 300 AD, more precisely 280–320 AD but their manufacture could have begun circa 260 AD.[70] In the case of the close analogy of *Cat. 9* from Vindobona, this dating is accepted.[71] The waste fibula from Brigetio also dates back to 260–320 AD.

## Chronology of the fibula production in Brigetio

After the investigation of moulds, models, semi-finished and waste fibulae, the production period can be summarized. Based on excavated features and finds, the operating time of the workshops in Brigetio is partly known.

The earliest type is the Norico–Pannonian wing fibula. The model *(Cat. 1)* can be defined as a Garbsch A238u or A238v which were in use from the end of the Age of Hadrian to the end of the Antonine Age.[72] The working period of the workshops in the 2nd century AD is attested by the Pannonian trumpet fibulae *(Cat. 2–6)* as well.[73] The mould with an imprint of a Merczi 2014/3 fibula[74] is also dated back to the 2nd century and possibly the beginning of the 3rd century AD.[75] The dating

65 Merczi 2011, 26–27.
66 Böhme 1972, 22.
67 Pröttel 1988, 349–350, Abb. 1.
68 Swift 2000, 31, Fig. 22. Listed items among the fibulae of App. 3/Type 1 Crossbow brooches with three egg shaped or cone shaped knobs (Swift 2000, 271–272). Additionally: Redžić 2007, 66, T. 34,358; Paul 2013, 107, Taf. 2,B10.
69 Kronberger 2005, 236, Abb. 43C, Taf. 27,B2,1. = Schmid 2010, 115, Taf. 26,234.
70 Pröttel 1988, 352.
71 Schmid 2010, 115.
72 Garbsch 1965, 73, 75, Abb. 41; Garbsch 1985, Abb. 5.
73 Cociş 2004, 114.
74 Sáró 2020a, 124, Cat. 1, Fig. 1, Fig. 4.
75 Sáró 2020a, 119.

of the knee fibulae is synchronized with the above information. Merczi 2011/B/2,[76] Sáró 2020/9.8 *(Cat. 7)* and Merczi 2011/B/24 *(Cat. 8)* were probably used from the middle/end of the 2nd century to the first half of the 3rd century AD.[77] The model of a plate fibula,[78] probably a skeumorph or bird shaped fibula can also be dated to the 2nd–3rd century AD.[79] The latest type is the crossbow fibula *(Cat. 9)*. After the research of M. Pröttel, the Keller–Pröttel 1/B fibula dates back to 260–320 AD.[80]

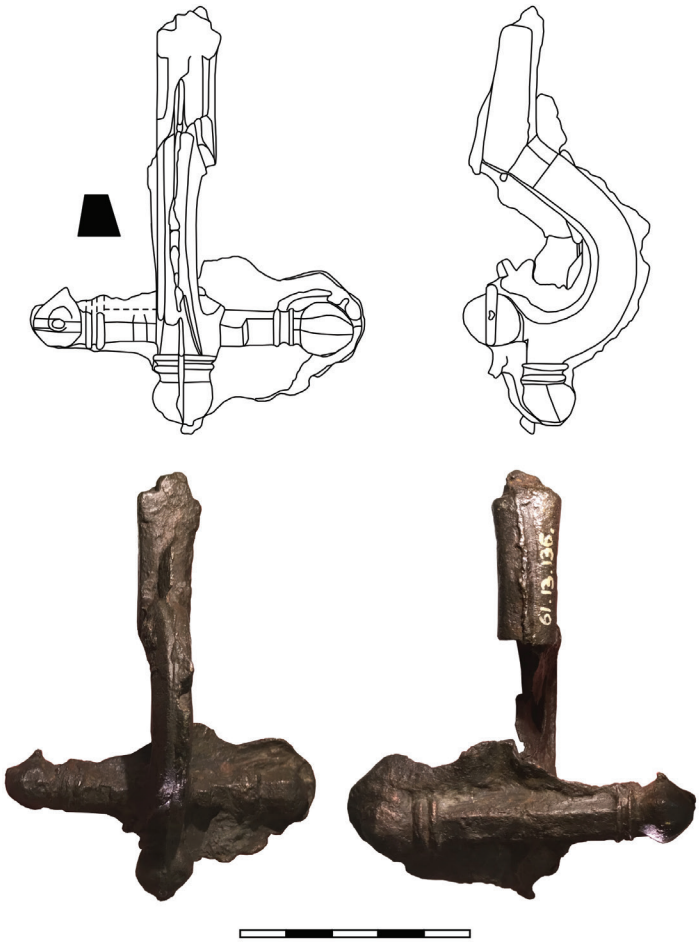

*Fig. 5.* Waste fibula. Cat. 9 crossbow fibula.

Unfortunately, most of the finds are without exact finding spots, therefore a detailed chronology of the workshops by area cannot be made. In the Principate, the Norico–Pannonian wing fibula is a typical accessory of the native female attire.[81] Its production can certainly be connected to the native habitants of the area. Strongly profiled fibulae, Pannonian trumpet fibulae, knee fibulae, and different plate fibulae were used by various people, namely soldiers and civilian men, women, and children as well[82] but the wearing of crossbow fibulae is more restricted. Based on the known information, soldiers and officers used this type.[83] According to the wearers, the production of strongly profiled fibulae, Pannonian trumpet fibulae and knee fibulae can be supposed in the territory of the civil town, the military town and the military camp as well. The existence of a workshop in the *municipium* is well proven[84] and the fibulae are useful for its dating. The Pannonian trumpet fibulae *(Cat. 3–6)* date back to the 2nd century and the beginning of the 3rd century AD. The existence of this workshop cannot have come to an end later than the

76 Sáró 2020a, 124, Cat. 2, Fig. 2, Fig. 5.
77 Böhme 1972, 22; Bojović 1983, 58; Sáró 2020a, 120.
78 Sáró 2020a, 124–125, Cat. 3, Fig. 3, Fig. 6.
79 Sáró 2020a, 122–123.
80 Pröttel 1988, 352.
81 Sáró 2020b, I, 124–131, 202.
82 Sáró 2020a, 122; Sáró 2020b, 33–35. The man on a tombstone from Iszkaszentgyörgy (Sáró 2020b, Cat. A75 = Lupa Nr. 735) and the left man on a tombstone from Tác (Sáró 2020b, Cat. A92 = Lupa Nr. 4027) wear a *paenula* or a Gallic cape with a Pannonian trumpet fibula on the chest. A man on a tombstone from Solymár (Sáró 2020b, Cat. 53 = Lupa Nr. 3059) wears a *paenula* or a Gallic cape with a Pannonian trumpet fibula on his right shoulder.
83 Patek 1942, 73; Jobst 1975, 93–94; Merczi 2012, 501, 471–472. footnote. It is rarely found in the graves of women (Merczi 2012, 501, footnote 470).
84 Sey 2013, 50–54; Bartus 2014a; Bartus 2014b; Sey 2015; Bartus et al. 2018, 66.

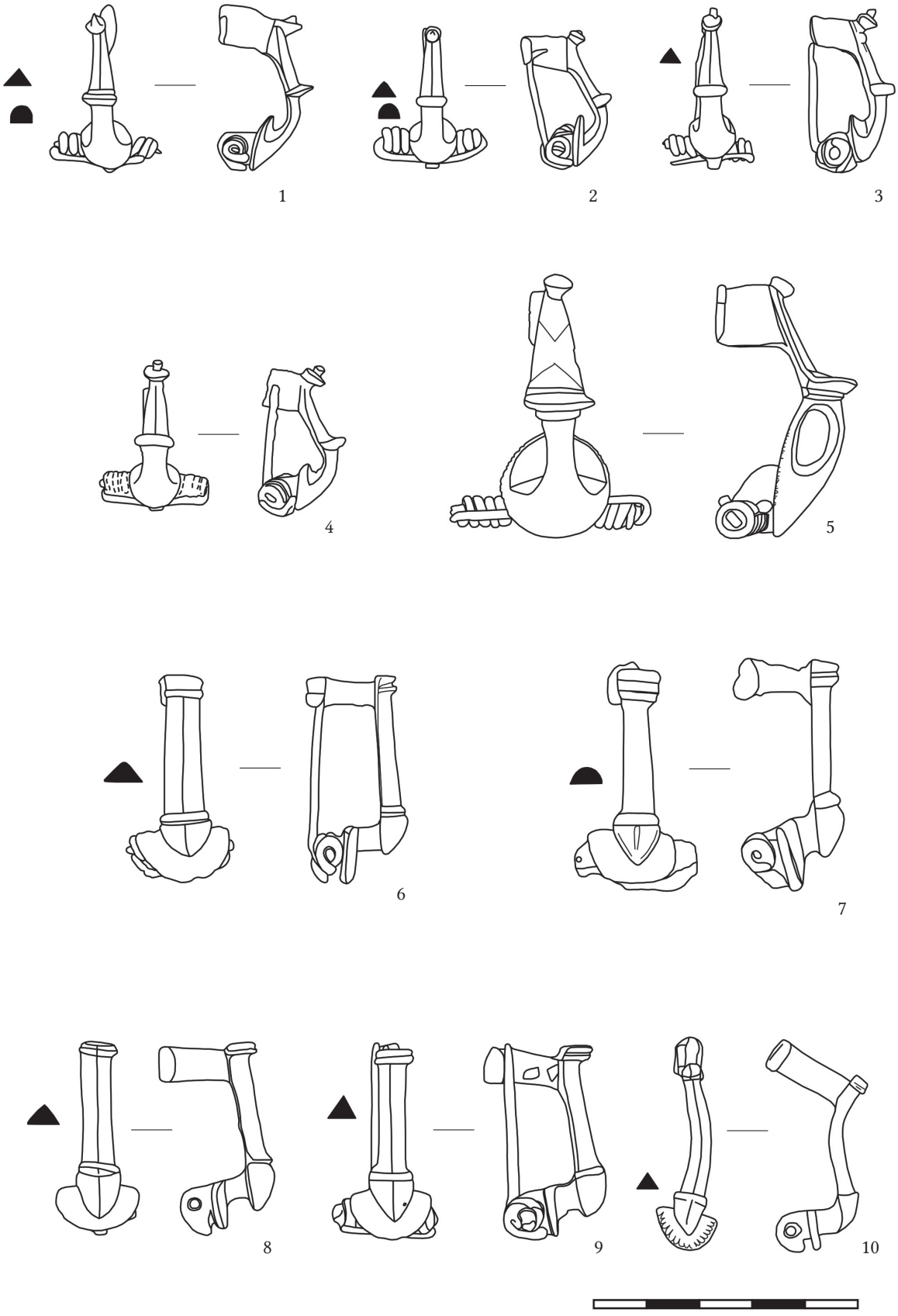


*Fig. 6.* Fibulae from Brigetio and Komárom-Esztergom County. Cociş 2004/21b1b: 1 – App. 1.1, 2 – App. 1.2, 3 – App. 1.3, 4 – App. 1.4. Cociş 2004/21b4a: 5 – App. 2.1. Sáró 2020/9.8: 6 – App. 3.1, 7 – App. 3.4, 8 – App. 3.5, 9 – App. 3.6, 10 – App. 3.8.

abandon of the *municipium*.[85] According to the group of users, the crossbow fibula was supposedly made in a workshop of the military camp. In the legionary fortress of Brigetio, the existence of a late Roman age workshop is also attested by a smelting-furnace excavated in 1942. According to L. Barkóczi, this furnace was found in the *retentura* and it was dated to the 4th century AD.[86] Further information is known about the bronze workshop of the *canabae*.[87] In 2014, several finds related to bronze working came to light at the investigated area of the *canabae*. Contrary to previous expectations, no remains of a workshop building or furnaces were excavated here in 2015.[88] However, the fibula production is attested by clay moulds and a bronze waste,[89] the manufactured types are indefinable and useless for dating. A lead model of a ring may prove the existence of a workshop as late as the 3rd century.[90]

## Summary

In this paper, nine objects related to fibula production have been presented. In all cases, types can be defined. The details have been investigated precisely and the typological variants can mostly be specified. Based on the finds from the closest area of Brigetio, the representation of these variants has been investigated. Their distribution is complemented with the help of the scientific literature. The dating of the fibula variants adds important information to the supposed production period of the workshops.

## Catalogue[91]

1 Model of a fibula *(Fig. 1,1).*
Cast of one fibula. The two-piece fibula is made of copper-base alloy. Hook: it is broadened and unfinished. Bow (1): it has a semi circle cross section. Dividing parts: it consists of one segmented, plain, oval knob and two broadened wings without buttons. Bow (2): it has a rectangular cross section; the high catchplate starts under it. Four short, chased lines can be observed on the left side of the bow (2). Catchplate: it is rectangular but only an aborted part of the object.
Type: norico-pannonian winged fibula, Garbsch A238u/A238v
Size: L.: 131 mm, $W._{broadened\ hook}$: 21 mm, $W._{bow}$: 19–5 mm
Finding place: Brigetio/Szőny. Context: stray find.
Coll.: HNM Inv.no.: 76.1880.1.
Lit.: –

85 The abandon of the *municipium* was probably in the 250s AD. Investigation of the coins, *terra sigillatae* and amphorae present well the prosperity in the Hadrian–Antonine Age and the Severan Age. The building structures can be separated into four different periods (Juhász 2018, 16–19; Dobosi 2020, 50–54, I,6,1. ábra).

86 Barkóczi 1954, 45; Sey 2013, 46.

87 Crucibles of the HNM plus the KGyM and a lead model of a ring are known from the *canabae* (Sey 2013, 48, 50, Kat. 35, Kat. 67–68). During the excavations of the 20th century, building structures of a bronze workshop were not found.

88 Sey 2018, 225–227; Bartus et al. 2018, 76.

89 Sey 2018, 227, Cat. 113–114, Cat. 143, Fig. IV,3, Fig. IV,6; Sáró 2020a, 118, 125, Cat. 5–6.

90 Borhy – Számadó 2003, 52, Kat. 70; Sey 2013, 50, Kat. 67.

91 Abbreviation: L.: length; W.: width; Th.: thickness; D.: diameter, C.s.: cross section; Coll.: collection; Inv.no.: inventory number; Lit.: literature; HNM: Hungarian National Museum (Budapest); KGyM: Komáromi Klapka György Museum (Komárom); KDM: Kuny Domokos Museum (Tata); TBM: Tatabányai Museum (Tatabánya).

2 Semi-finished fibulae *(Fig. 1,2).*
Cast of two fibulae. Their pin-constructions are missing, the hook is unperforated. The two-piece fibulae are made of copper-base alloy. Fibula$_{1}$: Bow (1): trumpet shaped, it has a semi circle cross section and the upper part of the bow joins to the dividing knob. Dividing knob: unsegmented, oval. Bow (2): it has a triangular cross section. End knob: segmented, it consists of a truncated cone and a cylinder shaped part. Catchplate: rectangular, unperforated. Fibula$_{2}$: Broken. Bow (1): trumpet shaped.
Type: pannonian trumpet fibula, Cociş 2004/21b1b
Size: L.: 39 mm, W.: 21 mm
Size $_{\text{fibula 1}}$: L.: 33 mm, W.$_{\text{bow}}$: 8 mm, C.s.$_{\text{bow 2}}$: 4×3 mm
Size $_{\text{fibula 2}}$: L.: 12 mm, W.$_{\text{bow}}$: 6 mm
Finding place: Brigetio/Szőny. Context: stray find.
Coll.: KDM Inv.no.: K-1451
Lit.: –

3 Semi-finished fibulae *(Fig. 1,3).*
Cast of two fibulae with the rest of the ingot. Their pin-constructions are missing, their hooks are unperforated. The two-piece fibulae are made of copper-base alloy. Burr can be observed on their bows and end knobs. Fibula$_{1\text{-}2}$: Bow (1): trumpet shaped, it has a semi circle cross section and the upper part of the bow joins to the dividing knob. Dividing knob: unsegmented, rib-like. Bow (2): it has a triangular cross section. End knob: segmented, it consists of a truncated cone and a cone shaped part. Catchplate: rectangular, unperforated.
Type: pannonian trumpet fibula, Cociş 2004/21b1b
Size$_{\text{fibula 1}}$: L.: 32 mm, W.$_{\text{bow}}$: 8 mm, C.s.$_{\text{bow 1}}$: 4×4 mm, C.s.$_{\text{bow 2}}$: 4×4 mm
Size$_{\text{fibula 2}}$: L.: 33 mm, W.$_{\text{bow}}$: 8 mm, C.s.$_{\text{bow 1}}$: 4×3 mm, C.s.$_{\text{bow 2}}$: 4×3 mm
Size$_{\text{ingot}}$: 18×15×11 mm
Finding place: Brigetio/Szőny-Vásártér, *municipium* (2009). Context: SE 001: stray find, found in the excavation.
Coll.: KGyM Inv.no.: 2009.001.11.
Lit.: Sey 2013, 176, Kat. 70; Sey 2015, Cat. 14, Fig. 2,14; Cociş 2019, 51, Pl. 120,16.

4 Waste fibula *(Fig. 1,4; Fig. 2).*
Cast of one fibula. Broken. The fibula is made of copper-base alloy. Bow (1): broken, it has a semi circle cross section. Dividing knob: unsegmented, rib-like. Bow (2): it has a triangular cross section and surplus metal can be observed on the right side of the bow. End knob: segmented, it consists of a truncated cone and a cylinder shaped part. Catchplate: it was possibly trapezoid and unperforated.
Type: pannonian trumpet fibula, Cociş 2004/21b1b
Size$_{\text{fibula}}$: L.: 22 mm, W.$_{\text{dividing knob}}$: 6 mm, C.s.$_{\text{bow1}}$: 4×3 mm, C.s.$_{\text{bow 2}}$: 5×3 mm
Finding place: Brigetio/Szőny-Vásártér, *municipium* (2013). Context: N18-19/SE 059: tawny loam layer. Finds from SE 059: *terra sigillata*: Drag. 37 South Gaulish, Drag. 18/31, 31, 33, 37, 38 Central Gaulish, Drag. 37 East Gaulish, Drag. 37 Rheinzabern (end of the 1$^{\text{th}}$ century – middle of the 3$^{\text{rd}}$ century).[92]
Coll.: KGyM Inv.no.: 2013.N18-19.059.1.
Lit.: Bartus et al. 2015, 43, Kat. 4, 25. tábla 4.

5 Waste fibula *(Fig. 1,5; Fig. 3).*

Cast of one fibula. Broken, deformed. The two-piece fibula is made of copper-base alloy. Burr and surplus metal can be observed on the bow, the dividing knob is hollow. Pin-construction: sprung-pin, external chord, 7+0 turns. Hook: turns upwards, cylinder shaped. Bow (1): trumpet shaped, it has a semi circle cross section and both parts of the bow join to the dividing knob. Dividing knob: segmented, it has three parts and a semi-circular shape. Bow (2): thin, plate-like.
Type: pannonian trumpet fibula, Cociş 2004/21b4a

92 Bartus et al. 2015, 13. and the definitions of Barbara Hajdu (BTM Aquincum Museum) for which I am very grateful.

$Size_{fibula}$: L.: 32 mm, $W._{pin\text{-}construction}$: 29 mm, $W._{bow}$: 17 mm, $C.s._{bow1}$: 17×2 mm, 6×3 mm
Finding place: Brigetio/Szőny-Vásártér, *municipium* (2013). Context: N15/SE 004: stray find, found in the excavation.
Coll.: KGyM Inv.no.: 2013.N15.004.1.
Lit.: Bartus et al. 2015, 43, Kat. 3, 25. tábla 3.

6 Waste fibula (*Fig. 1,6*).
Shred of a fibula. It is made of copper-base alloy. Bow (1): trumpet shaped.
Type: pannonian trumpet fibula
$Size_{fibula}$: L.: 12 mm, W.: 18 mm
Finding place: Brigetio/Szőny-Vásártér, *municipium* (2013). Context: N16-17/SE 016: surface-soil.
Coll.: KGyM Inv.no.: 2013.N16-17.016.16.
Lit.: –

7 Semi-finished fibula *(Fig. 4,1).*
Cast of two fibulae with the rest of the ingot and the traces of the clay mould. Their pin-constructions are missing. The fibulae are made of copper-base alloy. $Fibula_{1\text{-}2}$: Headplate: semicircular. Joining of the headplate and the bow: without a step. Bow: triangular crosssection, it is decorated with two ribs in the first third of the bow. End of the bow: possibly two ribs. Catchplate: rectangular, unperforated.
Type: knee fibula, Sáró 2020/9.8
Size: L.: 56 mm, W.: 45 mm, Th.: 24–17 mm
$Size_{fibula\ 1}$: L.: 37 mm, $W._{headplate}$: 17 mm, $W._{bow}$: 9–5 mm, $W._{catchplate}$: 19–18 mm, $Th._{bow}$: ca. 4 mm
$Size_{fibula\ 2}$: $L._{bow}$: 34 mm, $W._{headplate}$: –, $W._{bow}$: 9–5 mm, $W._{catchplate}$: 20–19 mm, $Th._{bow}$: 5 mm
Finding place: Brigetio/Szőny. Context: stray find.
Coll.: HNM Inv.no.: 56.1893.26.
Lit.: Kovrig 1937, 16, 91, T. 27,1b; B. Bónis 1986, 301, Abb. 1,2; Merczi 2011, 49; Sey 2013, 172, Kat. 56; Cociş 2019, 51, Pl. 119,15.

8 Semi-finished fibula *(Fig. 4,2).*
Cast of one fibula with the rest of the ingot. The pin-construction is missing. The fibula is made of copper-base alloy. Burr can be observed on the headplate and the bow. Headplate: possibly semi circular. Bow: narrow, it has an upstanding rectangular cross section. End of the bow: plain ending. Catchplate: transverse, without a perforation.
Type: knee fibula, Merczi 2011/B/24
Size: L.: 41 mm, W.: 10 mm
$Size_{fibula}$: L.: 33 mm, $W._{headplate}$: 10 mm, $W._{bow}$: 6 mm
Finding place: Brigetio/Szőny. Context: stray find.
Coll.: KDM Inv.no.: K-1837
Lit.: Brigetio 1990, 29; Merczi 2011, 24, Kat. 156, 17. tábla 3; Sey 2013, 170, Kat. 48; Cociş 2019, 51, Pl. 120,17.

9 Waste fibula *(Fig. 5).*
Cast of one fibula with surplus metal on the whole surface. The two-piece fibula is made of copper-base alloy. Pin-construction: hinged-pin, the fibula has a hole through all of the arms into which the axial bar fits; the arms have hexagonal cross section and decorated with one rectangular element, two ribs and a big, facetted, round knob on each of the arms. The same rib and knob can be observed on the beginning of the bow. Bow (1): highly arched, it has a trapezoid cross section, a cut can be seen on its end, but a longitudinal rib can't be observed. Bow (2): rectangular, casted decorations can't be observed. Catchplate: unfinished.
Type: crossbow fibula, Keller–Pröttel 1/B
Size: L.: 93 mm, W.: 72 mm, Th.: 39 mm
$Size_{fibula}$: L.: 91 mm, W.: 69 mm
Finding place: Brigetio/Szőny. Context: stray find.
Coll.: HNM Inv.no.: 61.13.136.
Lit.: B. Bónis 1986, 301, Abb. 1,3; Sey 2013, 173, Kat. 57; Keller 1971, 27, Abb. 10.

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# Appendix

## Evidence of the manufacture: Cat. 2–3. semi-finished fibulae and Cat. 4. waste fibula

Type: pannonian trumpet fibula: Cociş 2004/21b1b

Fibulae from Brigetio and Komárom-Esztergom County:

1 Szőny/Brigetio-Vásártér, *municipium* (2010) *(Fig. 6,1)*
Context: SE 001: stray find, found in the excavation.
Coll.: KGyM Inv.no.: 2010.001.1.
Size: L.: 31 mm, $W._{pin\ construction}$: 21 mm, $W._{bow}$: 10 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (6+5 turns), the bow (1) is trumpet shaped and it has a semicircular cross section, the dividing knob is unsegmented and semicircular, the bow (2) has a triangular cross section, the end knob is segmented, it consists of a truncated cone and a cylindrical shaped part.
Lit.: Bartus et al. 2012, 33, Kat. 7, 17. tábla 5.

2 Szőny/Brigetio-Vásártér, *municipium* (2014) *(Fig. 6,2)*
Coll.: KGyM Inv.no.: 2014.N18-19.005.2.
Context: SE 005: stray find, found in the excavation.
Size: L.: 27 mm, $W._{pin\text{-}construction}$: 21 mm, $W._{bow}$: 9 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (6+6 turns), the bow (1) is trumpet shaped and it has a semi circular cross section, the dividing knob is unsegmented and semicircular, the bow (2) has a triangular cross section, the end knob is segmented, it consists of a truncated cone part and a pointed end.
Lit.: Bartus et al. 2016, 159, Kat. 1, 18. tábla 1.

3 Szőny/Brigetio, stray find *(Fig. 6,3)*
Coll.: HNM, Tussla Collection Inv.no.: 63.22.46.
Size: L.: 30 mm, $W._{pin\text{-}construction}$: 18 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (4+5 turns), the bow (1) is trumpet shaped and it has a semi circular cross section, the dividing knob is unsegmented and semicircular, the bow (2) has a triangular cross section, the end knob is segmented, it consists of a truncated cone and a cylindrical part.
Lit.: –

4 Környe-Józseflapos, stray find *(Fig. 6,4)*
Coll.: TBM Inv.no.: – (temporary no.: finding place/11.)
Size: L.: 28 mm, $W._{pin\text{-}construction}$: 21 mm, $W._{bow}$: 9 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (6+6 turns), the bow (1) is trumpet shaped and it has a semi circular cross section, the dividing knob is unsegmented and semicircular, the bow (2) has a triangular cross section, the end knob is segmented, it consists of a truncated cone and a cylindrical part.
Lit.: –

## Evidence of the manufacture: Cat. 5. waste fibula

Type: pannonian trumpet fibula: Cociş 2004/21b4a

Fibulae from Brigetio and Komárom-Esztergom County:

1 Szőny/Brigetio, stray find *(Fig. 6,5)*
Coll.: KDM Inv.no.: K-1442
Size: L.: 49 mm, $W._{pin\text{-}construction}$: 39 mm, $W._{bow}$: 20 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (8+9 turns), the bow (1) is trumpet shaped and decorated with chased lines, it has a semi circle cross section and both parts of the bow join to the segmented, semi circular dividing knob, the triangular shaped bow (2) has a triangular cross section and it is decorated with chased lines, the end knob is segmented it consists of a truncated cone and a round part.
Lit.: Patek 1942, 197, T. XXII. 5/Nr. 1 or Nr. 2 (their size differ from the above mentioned datas)

2 Szőny/Brigetio or Iža/Leányvár/Celemantia, stray find
Lit.: Lamiová-Schmiedlová 1961, 135, Nr. 431, T. XVI. 8.

## Evidence of the manufacture: Cat. 7 semi-finished fibula

Type: knee fibula: Merczi 2011/B/23.2 = Sáró 2020b/9.8

Fibulae from Brigetio and Komárom-Esztergom County:

1 Szőny/Brigetio, Járóka cemetery, Grave No. 93 *(Fig. 6,6)*
Coll.: HNM Inv.no.: 2.1931.171.
Size: L.: 39 mm, $W._{pin\text{-}construction}$: 22 mm, $W._{headplate}$: 17 mm, $W._{bow}$: 10 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (4+4 turns), external chord, semi circular headplate, the bow has a triangular cross section and it is thickened in the first third, the bow ends in two rims, the bent end of the catchplate is thickened.
Lit.: –

2 Szőny/Brigetio-Cellás cemetery (Bélapuszta II), stray find
Coll.: KDM Inv.no.: K-155
Lit.: Merczi 2011, 24, Kat. 151, 16. tábla 8.

3 Szőny/Brigetio, stray find
Coll.: KDM Inv.no.: K-1478
Lit.: Merczi 2011, 24, Kat. 152, 16. tábla 7.

4 Szőny/Brigetio, stray find *(Fig. 6,7)*
Coll.: KDM Inv.no.: 55.482.1.
Size: L.: 43 mm, $W._{pin\text{-}construction}$: 23 mm, $W._{headplate}$: 17 mm, $W._{bow}$: 9 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (4+4 turns), external chord, semi circular headplate, the bow has a semi circular cross section and it is thickened in the first third, the bow ends in two rims.
Lit.: –

5 Szőny/Brigetio, stray find *(Fig. 6,8)*
Coll.: HNM Inv.no.: 27.1894.15.
Size: L.: 36 mm, $W._{headplate}$: 16 mm, $W._{bow}$: 8 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (0+4 turns), external chord, semi circular headplate, the bow has a triangular cross section and it is thickened in the first third, the bow ends in two rims.
Lit.: Patek 1942, 243; Kovrig 1937, T. X, 104/Nr. 1; Berecz 1987, 242, 368, Kat. 349.

6 Szőny/Brigetio, stray find *(Fig. 6,9)*
Coll.: HNM, Tussla Collection Inv.no.: 63.22.44.
Size: L.: 36 mm, $W._{pin\text{-}construction}$: 20 mm, $W._{headplate}$: 15 mm, $W._{bow}$: 8 mm
Main characteristics: Copper-base alloy, two-piece, sprung-pin (4+4 turns), external chord, semi circular headplate, the bow has a triangular cross section and it is thickened in the first third, the bow ends

in two rims.
Lit.: Berecz 1987, 241–242, 368, Kat. 347.

7 Szőny/Brigetio or Iža/Leányvár/Celemantia, stray find
Lit.: Lamiová-Schmiedlová 1961, 136, Nr. 458, T. XVI. 12.

8 Környe-Józseflapos, stray find *(Fig. 6,10)*
Coll.: TBM Inv.no.: – (temporary no.: finding place/10.)
Size: L.: 40 mm, $W._{headplate}$: 12 mm, $W._{bow}$: 17 mm
Main characteristics: Copper-base alloy, two-piece, the edge of the semi circular headplate is decorated with chased zigzag pattern, the bow has a triangular cross section and it is thickened in the first third, the bow ends in two rims.
Lit.: –

9 Sárisáp, stray find
Lit.: Merczi 2011, 24, Kat. 153, 16. tábla 6.

## Evidence of the manufacture: Cat. 8 semi-finished fibula

Type: knee fibula: Merczi 2011/B/24

Fibulae from Brigetio and Komárom-Esztergom County:

No pieces are known yet.

## Evidence of the manufacture: Cat. 9. waste fibula

Type: crossbow fibula: Keller–Pröttel 1/B with two ribs on each arm.

Fibulae from Brigetio and Komárom-Esztergom County:

No pieces are known yet.