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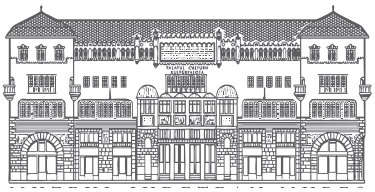

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ROMAN ARROWS FROM CĂLUGĂRENI / MIKHÁZA: A TYPOLOGICAL APPROACH

Zsolt-Szabolcs NAGY* – Szilamér-Péter PÁNCZÉL**

The recent excavations in Călugăreni / Mikháza (Mureș County, Romania) have revealed one of the most notable categories of militaria related to the oriental archers stationed here, namely the iron arrowheads. Beside the discovery of bow ear-lath fragments, bone arrow nocks attest the intensive use of composite bows at this Roman military site.

Keywords: arrowheads, bone nock, composite bow, auxiliary unit, Orient
Cuvinte-cheie: vârfuri de săgeată, nock din os, arcuri compozite, unități auxiliare, Orient

Călugăreni / Mikháza,[1] located in Mureș / Maros County, Romania, is one of the major Roman military sites in Eastern Transylvania, situated in the south-western part of the modern village. It extends along the left bank of the Niraj / Nyárád River, benefiting from the natural defence provided by the Gurghiu / Görgényi Mountains and the hills of the Subcarpații Târnavei Mici / Sóvidéki dombság. Along with a series of watchtowers and other defensive structures located to the east, it was tasked with controlling the Roman border section around the upper Niraj Valley and the Săcădat / Szakadát Valley, where the presumed ancient traffic routes to the *Barbaricum* passed through.

The Roman occupation of the site is limited to approx. 150 years and began most likely under Trajan or Hadrian and ended around the middle of the 3rd century. Based on data collected through intensive fieldwalking, geophysical surveys, and recent rescue excavations, we can confirm that the nearly 2.3 ha auxiliary fort was surrounded by an approximately 20 ha military *vicus*.

The main components of the site (Fig. 1): the auxiliary fort (Area A, Area D), the *balneum* (area B) and the surrounding military *vicus* (Area C, Area ERC 2018) have been systematically investigated in 2004 and since 2011 in the framework of research excavations and rescue excavations (ERA, ERC, CAP, CAB projects).

The *cohors I Augusta Ituraeorum* was stationed in the fort,[2] mentioned in the military diplomas for Dacia superior between 124 and 179 AD, and occasionally listed as a *sagittaria*

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[1] Due to various interconnected projects focusing on the research, conservation, and presentation of the sites along the eastern border of Roman Dacia, aerial archaeological, geophysical, architectural, and topographical surveys, as well as rescue and research excavations, have been undertaken at Călugăreni since 2004. We would like to thank our colleagues who participated in the field researches and in the restoration process of the finds, especially Éva-Eunika Vajna, Koppány-Bulcsú Ötvös, Márton Ferenczi and Krisztina Csibi for their help with the illustrations. For an overview concerning the state of research at Călugăreni, see: Szilágyi–Pánczél 2023, 45–46 and papers published since: Kovács 2023; Bálint–Pánczél 2024; Matei-Popescu–Pánczél 2024.

[2] Piso–Marcu 2008; Țentea 2012b, 52–60; Matei-Popescu 2014, 207; Sidó–Ötvös 2015; Matei-Popescu–Țentea 2016, 10.

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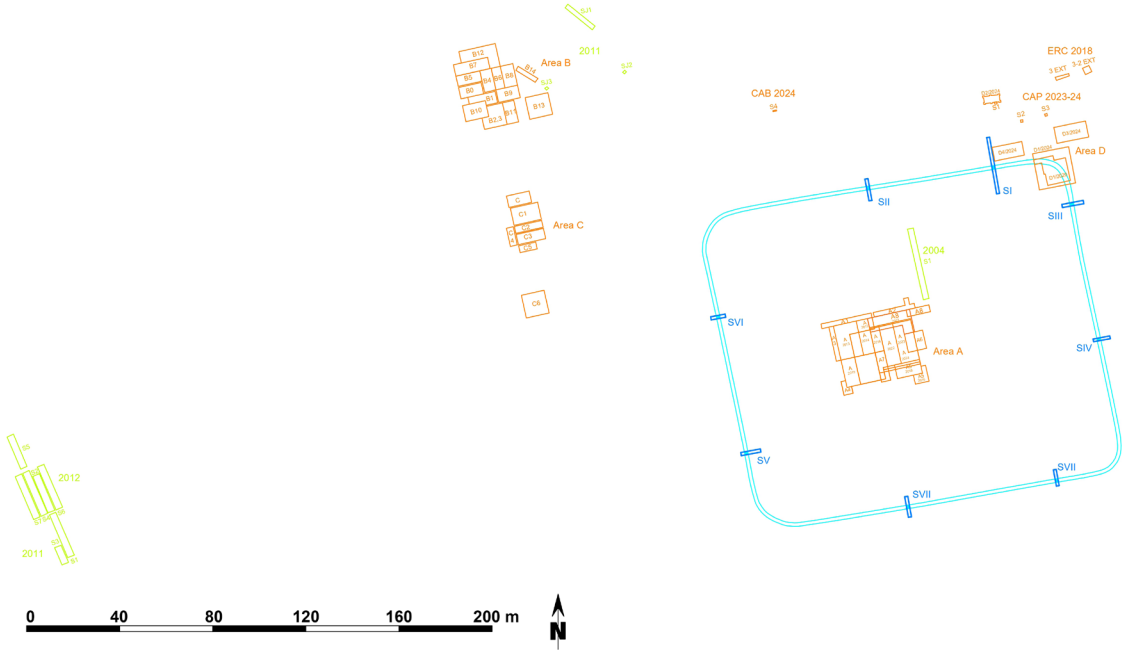

Fig. 1. The excavations until 2024 (auxiliary fort in turquoise): 1961 excavations in blue; 2004, 2011–2012 excavations in green; 2013–2024 excavations in orange (Made by P. Simon and Sz. P. Pánczél).

unit.[3] Beside the epigraphic evidence, the archaeological material supports the idea that a unit of oriental archers was garrisoned here.

From a chronological perspective, it is essential to emphasise that Călugăreni has suffered extensive damage due to modern interventions, including looting and agricultural activities conducted in the area over the past centuries. As a result, the stratigraphic layers corresponding to the latest Roman occupation phases are only partially preserved and can be documented to a limited degree. The majority of the documented demolition and destruction layers appear to be the result of re-deposition of original contexts in modern times. Since all the artefacts discussed below originate from these layers, or layers related to the last occupation layers, it is not possible to assign them to a strict chronological sequence. However, with caution, they can be tentatively dated to the final significant period of Roman habitation at the site, the late 2nd and first half of the 3rd century AD.

THE BOW EAR-LATH FRAGMENTS AND ARROW NOCKS[4]

The large number of bone and antler artefacts from Roman sites in Dacia reveals an organised and standardised mass production, although the study of bone working remains a relatively neglected field in archaeological research.[5] Worked bone objects are typically found at most major Roman sites, and evidence of bone-working workshops has been published in many cases.[6]

[3] Țentea 2012b, 55.

[4] The following typological abbreviations will be used: Gudea = Gudea 2006, 412, Fig. 8; Vass = Vass 2014, 103–104; Zanier = Zanier 1988, 6, Abb. 1.

[5] Vass 2010, 55–56.

[6] Evidence of bone-working workshops has been identified at: Pojejena / Alsópozsgás, Drobeta, Praetorium, Tibiscum, Ulpia Traiana Sarmmizegetusa, Micia, Apulum, Potaissa, Napoca, Bucium / Vármező, Certiae, Porolissum, Arcobadara, Cristești / Maroskeresztúr, Călugăreni / Mikháza, Cumidava, Feldioara / Barcaföldvár, Răcari, Romula, Sucidava, Gârla Mare. For evidence of local bone working workshops, see: Timoc 2007; Timoc 2008; Vass 2010. For evidence published since then, see: Băeștean–Barbu 2010 for Ulpia Traiana Sarmizegetusa, Bondoc–Gudea 2009, 275–276, nr. 1088, 1097, 453–454, pl. 154/1088, 155/1097 for Răcari. For Călugăreni, see below.

At Călugăreni, evidence for the presence of bone working workshops has been published from the *insula* in the north-western part of the *vicus* (Area C), the *balneum* (Area B) and the *principia* (Area A) of the military fort.[7] An analysis of the bone artefacts indicates that the abundant food remains of the most frequently consumed domestic species at the site also served as a source of raw materials for the workshops. Moreover, given the region's extensive forests, the procurement of antler would not have presented a significant challenge. Whether by hunting or collecting shed antlers, the artisan would have had ample resources to meet the workshop's needs.[8]

In the heavily militarised province of Roman Dacia, the primary consumers of bone and antler artisanal products were members of the army, despite some workshops being located in civilian settlements.[9] The diversity of certain categories of bone *militaria* suggests a relationship with the requirements of the army; however, none provide evidence as compelling as the components of composite bows, despite the possibility that some of these items were also used by civilians.[10]

Based on the material and the production technique, bows used in antiquity can be classified into three main categories: a) simple bows, made of a single wood; b) bows reinforced with sinew to prevent them from breaking; c) composite or reflex bows that combine layers of horn, wood and sinew. The composite bows provided superior penetration power by transferring potential energy to the arrow more efficiently, and increased accuracy and fluidity of action, since the place where the bow was held remained rigid during the shooting.[11]

Although the Roman Empire's military strategy was based on the heavy infantry of the legions, the Romans had to adapt to the new enemies who had various combat tactics. Starting from the time of the Principate, they introduced *sagittarii* units, indicated by their distinctive weapon. Beside their weapon of choice, the troops also retained their native garments and fighting style. In order to maximise the advantages of archers, mounted archers joined the pedestrian ones within the light cavalry. The archers were recruited mainly from areas of the Empire, which were known for their tradition of bow production and use, and during the 2nd and 3rd centuries the vast majority were recruited from Syria and Arabia. The mounted or pedestrian archers from the East, who afforded an expensive composite bow were part of the social elite. The archers originating from the western provinces came from the less prosperous social categories, were not equipped with highly efficient bows and were not extensively trained in archery.[12]

The only elements of composite bows that have been preserved at Roman sites are the bow laths or reinforcements, made of antler or bone. The ear-lath was used to reinforce the ears of composite bows made of an elongated straight or curved blade-like body, usually rounded, angular or square at the terminal and with a plano-convex section. The face is concave or flat and the back is roughened for a more effective gluing. The nock for the string varies from rounded to rectangular or U-shaped, and was cut close to the terminal. The central laths, which stiffen the grip, seem quite similar, but are usually flat and straight, or chopped at the edges.[13] The size and shape of reinforcing laths depends on the size of the bow, hence the long, wide and less curved ones were used for the larger bows of the pedestrians, while the smaller and more curved ones were employed by horse archers.[14] In the case of a composite bow, seven laths were used for stiffening it, a set of two ear-laths were mounted on the two tips, and three were attached to the grip.[15]

From the Dacian provinces, there is evidence from several sites for the use, and in some cases

[7] Pánczél–Lukácsi 2019, 420–422.
[8] Vass 2010, 57.
[9] For military workshops in Dacia, see: Benea 2008.
[10] Petculescu 2002, 766–767.
[11] Ureche 2013, 183–184.
[12] Țentea 2012a, 102–104; Ureche 2015, 10.
[13] MacGregor 1985, 155–158; Vass 2014, 99.
[14] Ureche 2013, 186.
[15] Ureche 2013, 185; Vass 2014, 100.

the production of composite bows, in the shape of bone ear and grip laths.[16]

Tibiscum represented a key position in the defence of the south-western border of the province. In the auxiliary fort and the *vicus,* a grip lath[17] and four ear lath fragments[18] have been identified. Debris and half-finished objects are strong evidence for the presence of local bone working workshops, in which composite bow implements were produced as well.[19]

In a building of the auxiliary fort of Micia, which existed between 106–170 AD, a total of 35 fragmentary ear laths made of antler have been discovered.[20] Beside these, two grip lath fragments,[21] unfinished objects and debris testify to the existence of a bone workshop with an intensive production period.[22]

Porolissum is considered the "cornerstone" of the defensive system of north-western Dacia. From the auxiliary fort on the Pomet Hill, the amphitheatre and the military *vicus,* 51 antler bow lath fragments have been published. Among the bone manufacturing debris from the weapon workshop in the fort, different semi-finished ear and grip lath fragments have been recovered. Based on the finds' distribution, there is no doubt that we have to reckon with several bone working and composite bow production workshops at this site.[23]

Also on the north-western border sector of the province, in the auxiliary fort from Certiae, an ear lath fragment[24] was discovered, but apart from the presence of 47 bone hairpins from the bathhouse, no clear evidence of a possible local bone workshop has been established yet.

From Cristești, an ear lath fragment was published.[25] From this site, we have some evidence for bone working as well,[26] so we can presume that among other artefacts, composite bows could have been produced.

In the auxiliary fort from Urluieni, located on the *limes transalutanus,* an ear lath fragment[27] was discovered.

From the *canabae* of the legionary fortress of Apulum, three ear-lath fragments are known.[28] Even if their presence does not necessarily have to be linked to the army or the veterans, based on the plenitude of bone working workshops,[29] we can presume that they were made locally.

From Călugăreni we have three bow ear-lath fragments, one with a U-shaped nock (Cat. 1),[30] one with a rounded nock (Cat. 2)[31] and an unfinished ear lath fragment (Cat. 3), which was probably damaged during the production process, so the nock was not finished. We shall not exclude the possibility that this might be a grip lath fragment,[32] even though its shape and finish are not typical of such implements.

All our ear-lath fragments are made of antler and belong to the straight massive types used for larger infantry bows.[33] Only one is from the bath, the other two have been discovered in the fort, so we can conclude, that there is enough evidence that the bone working workshop from the military fort was producing composite bow implements for the military workshops.

Bone arrow nocks, which attest a clear oriental influence, have a cylindrical body, sometimes decorated with grooves, ribs and mouldings, and have a notch at the bottom for the bowstring, and a narrow tang at the top, which was inserted into the reed shaft of the arrow. These nocks had the role of preventing the arrows from splitting under the pressure

[16] See the summaries of: Petculescu 2002, 765–766; Dinulescu 2010, 148–150; Țentea 2012a, 106–108; Vass 2014, 100–101.

[17] Bona et al. 1983, 417, no. 1, 431, pl. XI/1.

[18] Benea 1983, Fig. II/2; Bona et al. 1983, 418, no. 4–5, 431, Pl. XI/2, 11; Petrescu–Rogozea 1990, 117, no. 2, pl. XI/5.

[19] Benea 2003.

[20] Petculescu 2002, 765, 768–769, fig. 1–3/1–35.

[21] Petculescu 2002, 765, 769, fig. 3/36–37.

[22] Petculescu 2002, 765, 769, fig. 3–4/38–52.

[23] Vass 2014.

[24] Matei–Bajusz 1997, 129, 226, Pl. LXXXII/1.

[25] Petică–Zrinyi 2000, 127, no. 41, 134, pl. V/7; Man 2011, 235, no. 38, 447, pl. CLXIX/38.

[26] Petică–Zrinyi 2000, 124–125, no. 12–17, 131, pl. II/4–9; Man 2011, 232–233, no. 12–17, 444, pl. CLXVI/12–17.

[27] Bogdan-Cătăniciu 1994, 348, fig. 14/a.

[28] Ciugudean 1997, 37–38, 77 no. 459–461, 180, pl. XXX/2–4.

[29] Vass 2010, 60–61.

[30] Vass type 1a.

[31] Vass type 1b.

[32] Vass type 3.

[33] Ureche 2013, 186.

of the bowstring.[34] Beside ours, a total of five items are known from Dacia, three from Tibiscum[35] and two from Micia.[36] Except for the nock from Micia,[37] which is quite simple and has a V-shaped notch quite similar to ours (Cat. 4–6), all the others are more elaborate and have a U-shaped notch. Recently, it has been pointed out, that beside aesthetic aspects, the grooves from the grip facilitated a better grasp of the arrow. [38] This may have been the intention in the case of the one nock with an extra horizontal groove (Cat. 7).

All the nocks have been recovered from the *principia*, their findspot and the morphological elements suggest that they might come from the same workshop in the fort, but not necessarily from the same artisan, which might explain the slight differences.

From the size of the notch the diameter of the bowstring can be estimated as well, which might be thicker in the case of the first three (Cat. 4–6) and slightly thinner in the case of the most elaborate one (Cat. 7).

Of the sites mentioned above, the presence of units recruited in the Orient has been confirmed in the case of Tibiscum, Micia, Porolissum, Certiae, Cristești and is presumed in the case of Urluieni. If we look at the same sites, it is not surprising that bone nocks, iron or even bone arrowheads[39] have been discovered at these sites as well. Based on this, linking the presence of composite bow implements and bone nocks to oriental archer units can be done with a certain degree of certitude.

THE ARROWHEADS

Arrowheads are quite frequent finds at Roman military sites, but usually only a small amount is published.[40] In most of the cases the research focuses on a few distinctive pieces and ignores the quantitative features, the analysis concentrates on the typological and chronological datasets, without examining the archaeological context.

Since 2013 more than 350 arrowheads[41] have been discovered in the auxiliary fort, the *balneum* and the military *vicus* in Călugăreni, but due to their state of conservation not all of them can be classified typologically without conservation treatment.

A total of 112 arrowheads discovered in the fort and the *vicus* will be analysed in this paper, divided into two main categories according to the mounting method (Fig. 2). In the case of the tang method (Fig. 2/A), the metal pin of the arrowhead is inserted into a wooden shaft. 107 pieces belong to this category. The other method, represented by only 5 pieces, is the one with a socket, where the wooden shaft fits into the metal tube (Fig. 2/B).

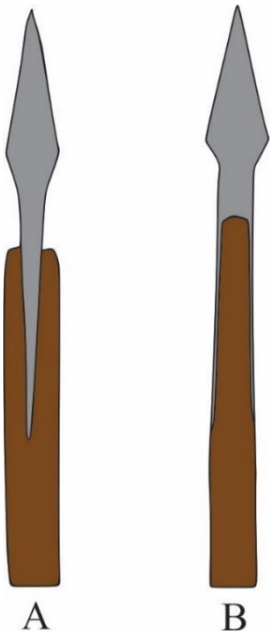

Fig. 2. Mounting method for tanged (A) or socketed (B) arrowheads.

Based on morphology, we can differentiate three main categories: trilobate, bodkin and flat bladed arrowheads, all of them listed in the typology created by N. Gudea for the finds from Porolissum (Fig. 3),[42] where he also differentiates them based on the mounting method (SAA are the socketed ones and SAB the tanged).

Even though the trilobate arrowheads appear in Gudea's typology, we have used the one created by W. Zanier, because it allows a more detailed analysis (Fig. 4).[43] Of the four types of Zanier, only three are represented in our material. The

[34] Petculescu 2002, 766.

[35] Bona et al. 1983, 418, no. 6–8, 431, Pl. XI/4–6; Petculescu 2002, 766, 770, fig. 5/66–68; Benea 2003, 226, Taf. VII/1, 12.

[36] Petculescu 2002, 766, 770, fig. 5/64–65.

[37] Petculescu 2002, 766, 770, fig. 5/64.

[38] Riesch 2017, 143.

[39] Vass 2010, 58, fig. 8.

[40] Petculescu 2002, 766.

[41] Their state of preservation does not allow us to integrate all of them into our analysis.

[42] Gudea 2006, 397–398, 408, 412, fig. 8; Gudea 2008, 205–207, Abb. 8.

[43] Zanier 1988, 6, Abb. 1.

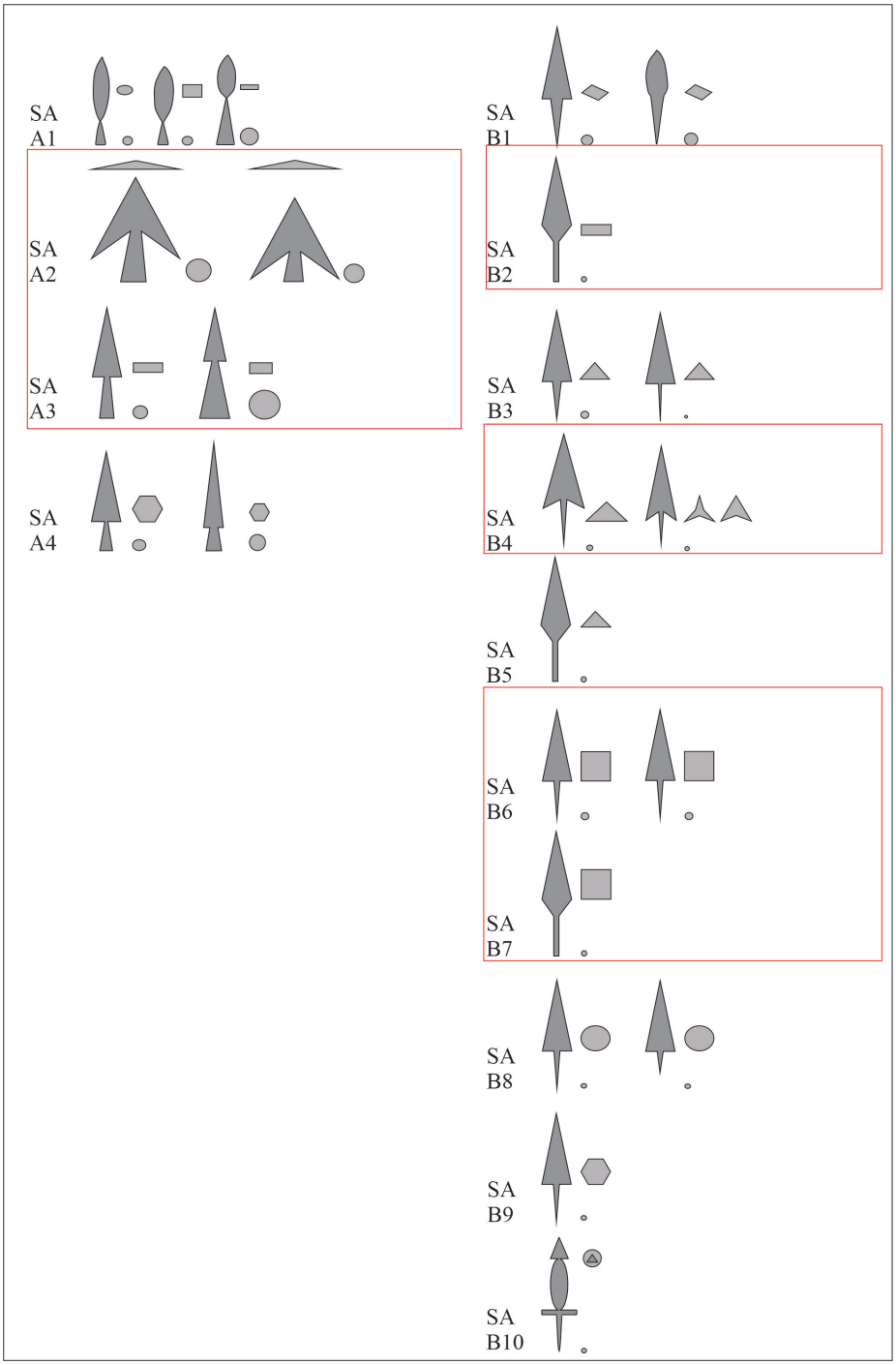

Fig. 3. The adapted Gudea typology (Gudea 2006, 412, fig. 8). We have marked with red squares the types identified in Călugăreni.

major difference between the types is the angle between the lower part of the arrowhead and the tang. In the case of type Zanier 1 this angle is acute, in Zanier 2 it is right and in Zanier 3 it is obtuse.

Of the arrowheads analysed, 72 are trilobates, 35 bodkins and 5 flat bladed socketed arrowheads.

Typologically, the trilobate arrowheads can be divided into three subtypes: 7 belong to Zanier 1 (Cat. 8–14), 39 to Zanier 2 (Cat. 15–53) and 25 to Zanier 3 (Cat. 54–78). In the case of one arrowhead (Cat. 79), the exact type cannot be determined due to poor preservation.

The dimensions and the weight can hint towards the possible functionality. The Zanier

1 type weighs between 1.2–7.5 g, the Zanier 2 between 1.6–5.7 g, the Zanier 3 between 1.5–8.1 g, and the undetermined piece weighs 3.2 g. The length of the arrowheads, including the tang, is between 3.6–6.5 cm for the Zanier 1 type, 2.2–6.9 cm for the Zanier 2 type, 2.6–7.6 cm for the Zanier 3 type and 3.8 cm for the undetermined piece. Based on the maximum weight and length established by N. Gudea for the light arrowheads (without specifying whether the length includes the tang or not), all our trilobate arrowheads can be included in the category of light arrowheads.[44]

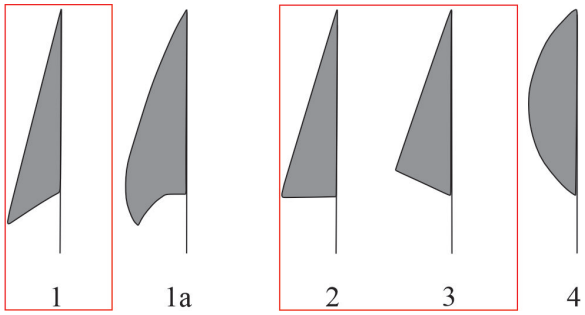

Fig. 4. The adapted Zanier typology of the trilobate arrowheads (Zanier 1988, 6, Abb. 1). We have marked with red squares the types identified in Călugăreni.

The origin of this type of trilobate arrow can be in the East, where this type was used in the area of Mesopotamia, Syria, Palestine, Egypt, Asia Minor and the Caucasus as early as the 8th century BC. Thanks to the Scythians, it also reached the Greeks, from where it was gradually adopted by the Romans.[45] Pieces similar to ours, made of iron and with a glove fastener shaft, began to appear from the 2nd century BC.[46] However, the popularity of this type can be observed until the late Roman period.[47] Although this piece has its origins in the Orient, it cannot be considered characteristic of the oriental units, because this type of arrowhead is found throughout the Empire,[48] becoming the most common type in the Roman military, with a wide range of analogies.[49] Examples are also known from Dacia at Porolissum,[50] Micia,[51] Jidava,[52] Tibiscum[53] and Urlueni.[54]

From a quantitative point of view, the next group of arrowheads are of the bodkin type, with a quadrangular section, classified in three categories in the typology of N. Gudea: SAB2, SAB6 and SAB7.

The SAB2 type is represented by 3 pieces (Cat. 80–82), the SAB6 by 10 pieces (Cat. 83–92), the SAB7 by 19 pieces (Cat. 93–111), and in the case of three arrowheads (Cat. 112–114), the exact type could not be determined because of the bad state of preservation.

The weight of the bodkin arrowheads varies between 0.6–9.9 g. The SAB2 type weighs between 1.6 and 6 g, the SAB6 between 1.3 and 4.7 g, the SAB7 between 0.6 and 9.9 g and the undetermined pieces weigh between 2.5–7.8 g. The length of the arrowheads, including the tang, varies between 2.8–4.9 cm for the SAB2 type, 2.3–6.5 cm for the SAB6 type, 2.3–8.6 cm for the SAB7 type, and the undetermined pieces are 3.9–4 cm long. Based on these characteristics, all our bodkin arrowheads can be included in the light arrowhead category.

The function of this type may have been piercing the armour of the enemy.[55] The origin of this type dates back to the 2nd century BC, a period when the Romans had already encountered Orientals.[56] The version with socket was used in Asia Minor, Cyprus, Mesopotamia,

[44] The maximum weight is 10 g and the maximum length ±5–6 cm (Gudea 2006, 397; Gudea 2008, 205). The exact length is not clear in these two papers, but in our interpretation this length can be accepted as a light arrowhead because the heavy arrowheads, or "munitions with a bigger calibre" are much heavier and longer (James 2007, 216–221).

[45] Coulston–Phil 1985, 265.

[46] Erdmann 1976, 6–7, 9.

[47] Zanier 1988, 6.

[48] Zanier 1988, 7. In Roman Dacia in most cases their presence can be linked to oriental units.

[49] For a selection, see: Radman-Livaja 2001, 142, Tab. 149/1; Radman-Livaja 2004, 56; Aviram et al. 2007, 22–26, 39–51, pl. 23–26; Nicolay 2007, 32–33, pl. 35/222.4, 166.3; Bishop–Coulston 2009, 79, 112–113, 135–139; James 2007, 202–204; Bruno 2016, 301, pl. 8.

[50] Gudea 2006, 409, fig. 9, 411, fig. 11, 412, fig. 12/1–2.

[51] Petculescu 2002, 766, 770, fig. 6/78–90; Barbu–Țuțuianu 2021, 86, 90, pl. I/2–3.

[52] Popescu–Popescu 1970, 261, fig. 12/2 (top row).

[53] Benea–Bona 1994, fig. 22 (last two).

[54] Bogdan-Cătăniciu 1994, 331, fig. 4/2; Bogdan-Cătăniciu 2008, 174, fig. 3/4.

[55] Stephenson 1999, 85.

[56] Erdmann 1982, 7–9.

Palestine, and Egypt.[57] The type discovered at Călugăreni can be dated more likely to the 3rd century.[58]

Bodkin arrowheads are known from Porolissum,[59] Micia,[60] Jidava,[61] Tibiscum,[62] Ilișua / Alsóilosva – Cristeștii Ciceului / Csicsókeresztúr,[63] Ulpia Traiana Sarmisegetuza,[64] Urluieni,[65] so from almost all the sites where trilobate arrowheads were discovered, but in smaller numbers.

The last category of arrowheads is the flat-bladed, socketed category. Based on the typology of N. Gudea, two types can be differentiated, one arrowhead belongs to the SAA2 type (Cat. 115) and four to the SAA3 type (Cat. 116–119). The weight varies between 2.2–6.6 g. The length is between 3.9–6.2 cm. Based on this information, all the socketed pieces can be included in the light arrowhead category.

This type of arrowhead was used from the antiquity to the Middle Ages, which makes it harder to date without its context,[66] our examples seem to date from the 3rd century.

Flat-bladed arrowheads from Dacia are only attested at Porolissum.[67] They are also rare in other provinces, some examples are known from Viminacium[68] and Siscia.[69]

The tang of the trilobate and bodkin arrowheads is mostly broken, which can have several explanations. One possible reason could be the use of arrows, which might lead to the deformation or dislocation of the tang.[70] Another reason might be related to the context of the discovery, namely the destruction of the *principia*, from which most of the pieces originate. This can also be true in the case of the socketed ones, where the socket is usually broken or damaged.

The distribution of arrowheads is clearly dominated by the *principia*, where a total of 101 pieces have been found. Of these 101 arrowheads, 68 are trilobate, 28 bodkin and 5 flat-bladed. The dominance of the trilobate ones can be explained by the fact that this was the most common type in the roman military,[71] and the bodkin and the flat-bladed arrowheads have a specific function, like piercing armour in the case of bodkin arrowheads.

The *vicus* shows a different image, of the 11 pieces 7 are bodkin type, and 4 trilobate, one explanation for this can be the quicker manufacturing process.[72]

Two concentrations of arrowheads have been discovered in the principia, one of which was briefly mentioned in a 2019 publication.[73] In the south-western room of the southern wing 21 arrowheads were discovered in a small deposit (Cx. 506 and Cx. 510, which are two fills of the same pit), 12 in the clay levelling of the same room (Cx. 482) and 8 arrowheads in the destruction of the possible wooden floor of the room (Cx. 416). All these contexts are related to the last phase of use of the *principia* building, mainly the 3rd century, which also corresponds to the dating of the bodkin arrowheads.[74]

The second concentration was found on the top of a collapsed wall, in the northern wing, which suggests that the arrowheads were deposited on the eastern side of the wall. Unfortunately, only 8 pieces could be analysed from this concentration (Cx. 692).

Based on this, we can confirm that these rooms may have functioned as *armamentaria*.[75] The rest of the arrowheads were discovered

[57] Radman-Livaja 2001, 142.
[58] Bishop–Coulston 2009, 167, fig. 106/11–13.
[59] Gudea 2006, 412, fig. 12/3–7.
[60] Petculescu 2002, 766, 770, fig. 6/102–105.
[61] Popescu–Popescu 1970, 261, fig. 12/2 (bottom row).
[62] Benea–Bona 1994, fig. 22 (first two).
[63] Hica-Cîmpeanu 1982, 604, fig. 4/4.9.
[64] Alicu et al. 1994, 97, pl. 22/172–173.
[65] Bogdan-Cătăniciu 2008, 174, fig. 4/14–16, fig. 5, 175/fig. 6.
[66] Radman-Livaja 2001, 143.
[67] None of them are discussed in the catalogues of Gudea 2006 or Gudea 2008.
[68] Miomir–Nemanja 2009, pl. 8/31.
[69] Radman-Livaja 2004, 168, Tab 19; Radman-Livaja 2001, 150, Tab 1 (two are tanged).
[70] Barbu–Țuțuianu 2021, 87.
[71] Zanier 1988, 7.
[72] Based on W. Zanier's experiments, and considering the manufacturing process of the trilobate arrowheads, it is visible that a bodkin arrowhead can be made by the first three steps of the trilobate arrowheads (Zanier 1995, 20, Abb. 2/1–3, 21, Abb. 3/1–3).
[73] Panczél–Lukácsi 2019, 417.
[74] Bishop–Coulston 2009, 167, fig. 106/11–13.
[75] A similar situation was identified in Dacia at Samum (Isac 2003, 127, pl. V/1).

individually in layers related to the disuse of the building or their latest phase of use.

The function of an arrow is extremely difficult to determine, as each object has different dimensions, and ideally, they are made for a specific person, taking into account the archery skills of the owner. This is also true of the bow, which is optimised for a particular user in order to achieve maximum performance.[76]

In general, archers prefer arrowheads with more than two blades, such as the trilobate arrows or other types with multiple blades, because the wind can divert two-bladed arrowheads more easily.[77]

Trilobate arrows were probably used for military purposes or hunting.[78] The ones used for hunting have a larger diameter, with longer blades and the arrowhead is heavier. However, they are not capable of killing the hunted animal instantly, but they cause wounds that can eventually lead to the animal's death.[79]

From a military viewpoint, trilobate arrowheads are the most effective against unarmoured enemies, as they have the necessary qualities to penetrate deep into the enemy's body, but they are not strong enough to pierce an armour.[80] In combat situations, different methods can be applied to cause maximum damage to the enemy. For example, when an arrow is used in battle, the arrowhead is not fixed too tightly, because this increases the chances of the arrowhead remaining in the enemy's body. Another method is the formation of a „barb" on the lower side of the arrowhead. The barb is the acute angle formed at the bottom of the arrowhead and the tang or the socket. These correspond to the Zanier 1 type of trilobate arrowheads. With this method, the arrowhead penetrates the enemy's body, but the barb makes it more difficult to remove, and after removal, the wound becomes larger. Tanged arrows are more suitable for military purposes, but they also have a disadvantage: when they hit hard surfaces, the arrow may crack, which results in a loss of impact power. In these cases, using a socketed arrowhead is better.[81]

Bodkin arrows were used for piercing armour,[82] probably because they have a relatively small diameter compared to other arrows, thus concentrating the power in a small area, giving them a chance to break the armour. Of the different armour types used by the Romans, bodkin arrows can be most effectively used against *lorica hamata*, because the arrowhead fits between the rings of the armour and the impact can break them, thus penetrating the enemy's body.

The smallest arrowheads could also be used for hunting smaller animals or birds.[83] Due to their very low weight, these arrowheads have a higher speed, which prevents the hunted animal from escaping, but the wound is not necessarily lethal. However, the small diameter of the arrows allows the shaft, which has a diameter between 0.8–1 cm, to strike across its entire width, and thus stun the animal.

The flat bladed arrowheads with a socket are mostly just mentioned in papers, without discussing their function, which was most probably varied. They could be used against armoured enemies, because the power of the impact was concentrated on a relatively small surface, but not as small as the bodkin type, and they could also do enough damage in unarmoured enemies to kill them. In addition to military use, the small diameter of the socket could also be an argument, because when the target tries to remove the arrow from the body, the arrowhead can easily break, thus remaining in the body.

In concluding the possible functions of the arrowheads discovered at Călugăreni, we can affirm that those suitable for military purposes predominated, namely the trilobate arrowheads (the most effective against unarmoured enemies), bodkin arrowheads (against armoured enemies, wearing *lorica hamata*) and the flat-bladed socketed arrowheads. For hunting, two types of arrows can be differentiated: the trilobate arrows with a large diameter, used for hunting large animals, and the small-sized

[76] Coulston–Phil 1985, 264.
[77] James 2007, 195.
[78] Delrue 2007, 246.
[79] Coulston–Phil 1985, 268.
[80] Coulston–Phil 1985, 268.
[81] Delrue 2007, 246.
[82] Delrue 2007, 246; Stephenson 1999, 85.
[83] Petculescu 2002, 767.

arrowheads (both trilobate and bodkin) used for hunting small animals and birds.

The established functionalities are only useful in ideal cases when different archery activities have their specific arrows. In extreme situations, the functionality of the arrows loses its purpose, and they are used where the need is greatest.[84]

CATALOGUE[85]

1. Antler bow ear-lath fragment (Pl. I/1).
Description: Partly broken rounded terminal, rounded nock, broken edge. Worked only on one side, with file marks and green colouring on the surface.
Dimensions (cm): L. 8.9; W. 1.76; th. 2.1; Weight (g): 4.67.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 550; Sf. no. 12002; Inv. no. 14407).
Type: Vass 1a.

2. Antler bow ear-lath fragment (Pl. I/2).
Description: Broken terminal, rounded nock, broken edge. Worked only on one side, with file marks on the surface.
Dimensions (cm): L. 7; W. 1.7; th. 3.1; Weight (g): 5.14.
Findspot: *thermae* (CAL 2013; Tr. B1/2013; Cx. 3003; Sf. no. 3069; Inv. no. 14423).
Type: Vass 1b. Published: Pánczél–Lukácsi 2019, 420, no. 1, pl. 1/1.

3. Unfinished antler bow ear-lath fragment (Pl. I/3).
Description: Terminal slightly damaged, without nock, broken edge. Worked only on one side, with file marks on the surface.
Dimensions (cm): L. 6.3; W. 1.9; th. 3.1; Weight (g): 3.63.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 404; Sf. no. 10865; Inv. no. 14431).
Type: Vass 1. Published: Pánczél–Lukácsi 2019, 421, no. 2, pl. 1/2.

4. Bone arrow nock (Pl. II/4).
Description: Bone component fixed to the rear of the arrow shaft designed to grip the string of the bow, V-shaped notch, the grip and the tang are separated by a horizontal groove. The top of the tang is broken, burning traces, with visible file and knife marks on the surface.
Dimensions (cm): L. 4.9; Dmax. 1.2; Weight (g): 3.24.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 556; Sf. no. 11706; Inv. no. 14432).
Published: Pánczél–Lukácsi 2019, 421, no. 3, pl. 1/3.

5. Bone arrow nock (Pl. II/5).
Description: Bone component fixed to the rear of the arrow shaft designed to grip the string of the bow, V-shaped notch, the grip and the tang are separated by a horizontal groove. The top of the tang is slightly damaged, prominent knife and file marks on the surface.
Dimensions (cm): L. 4.7; Dmax. 1.3; Weight (g): 3.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 654; Sf. no. 12264; Inv. no. 14413).

6. Bone arrow nock (Pl. II/6).
Description: Bone component fixed to the rear of the arrow shaft designed to grip the string of the bow, V-shaped notch, the grip and the tang are separated by a horizontal groove. The top of the tang is broken, file marks on the surface.
Dimensions (cm): L. 3.58; Dmax. 1.2; Weight (g): 2.18.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 692; Sf. no. 12456; Inv. no. 14415).

7. Bone arrow nock (Pl. II/7).
Description: Bone component fixed to the rear of the arrow shaft designed to grip the string of the bow, V-shaped notch, the grip and the tang are separated by a double horizontal groove. The top of the tang is broken, with visible file and knife marks on the surface.
Dimensions (cm): L. 3.7; Dmax. 1.1; Weight (g): 1.7.

[84] Petculescu 2002, 767.

[85] In the catalogue the following abbreviations have been used: L. = length; Dm. = diameter; Dmax. = maximum diameter; W. = width; th. = thickness, CAL = Călugăreni research excavations; ERC = Călugăreni rescue excavations; Tr. = trench; Cx. = context; Sf. no. = small find number; Inv. no. = inventory number. The artefacts belong to the Archaeological collection of the Mureș County Museum.

Findspot: *principia* (CAL 2023; Tr. A/2023; Cx. 845; Sf. no. 13396; Inv. no. 17235).

8. Iron trilobate tanged arrowhead (Pl. III/8).
Description: The head is composed of three barbed blades. Conserved.
Dimensions (cm): L.: 6.5; W.: 1.8; Dm: 0.4; Weight (g): 3.7.
Find spot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11463; Inv. no. 8915).
Type: Zanier 1.

9. Iron trilobate tanged arrowhead (Pl. III/9).
Description: The head is composed of three barbed blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 5.9; W.: 1.2; Dm: 0.3; Weight (g): 5.7.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11454; Inv. no. 8913).
Type: Zanier 1.

10. Iron trilobate tanged arrowhead (Pl. III/10).
Description: The head is composed of two barbed blades. One blade is broken. Conserved.
Dimensions (cm): L.: 4.2; W.: 1; Dm: 0.3; Weight (g): 2.6.
Findspot: *principia* (CAL 2013; Tr. A; Cx. 36; Sf. no. 531; Inv. no. 15743).
Type: Zanier 1.

11. Iron trilobate tanged arrowhead (Pl. III/11).
Description: The head is composed of three barbed blades. Two of the blades and the tang are broken. Conserved.
Dimensions (cm): L.: 3.6; W.: 1.3; Dm: 0.3; Weight (g): 2.2.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 560; Sf. no. 11731; Inv. no. 17174).
Type: Zanier 1.

12. Iron trilobate tanged arrowhead (Pl. III/12).
Description: The head is composed of three barbed blades. One of the blades and the tang are broken. Conserved.
Dimensions (cm): L.: 4.3; W.: 1.2; Dm: 0.4; Weight (g): 3.2.
Findspot: *principia* (CAL 2015; Tr. A2; Cx. 118; Sf. no. 969; Inv. no. 17175).
Type: Zanier 1.

13. Iron trilobate tanged arrowhead (Pl. III/13).
Description: The head is composed of three barbed blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 5.2; W.: 1.7; Dm: 0.4; Weight (g): 3.6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 416; Sf. no. 11360; Inv. no. 8904).
Type: Zanier 1.

14. Iron trilobate tanged arrowhead (Pl. III/14).
Description: The head is composed of three barbed blades. One of the blades and the tang are broken. Conserved.
Dimensions (cm): L.: 4.1; W.: 1.3; Dm: 0.3; Weight (g): 1.6.
Findspot: *vicus* (ERC 2018; Tr. AIII/80 CM 3–4; Cx. 47; Sf. no. 106; Inv. no. 16127).
Type: Zanier 1.

15. Iron trilobate tanged arrowhead (Pl. IV/15).
Description: The head is composed of three barbed blades. Conserved.
Dimensions (cm): L.: 6.7; W.: 1.2; Dm: 0.3; Weight (g): 4.2.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11481; Inv. no. 14011).
Type: Zanier 2.

16. Iron trilobate tanged arrowhead (Pl. IV/16).
Description: The head is composed of three barbed blades. Conserved.
Dimensions (cm): L.: 6.9; W.: 1.4; Dm: 0.4; Weight (g): 6.4.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11477; Inv. no. 8920).
Type: Zanier 2.

17. Iron trilobate tanged arrowhead (Pl. IV/17).
Description: The head is composed of three barbed blades. The blades are slightly damaged. Conserved.
Dimensions (cm): L.: 4.9; W.: 1.1; Dm: 0.3; Weight (g): 3.2.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11458; Inv. no. 14004).
Type: Zanier 2.

18. Iron trilobate tanged arrowhead (Pl. IV/18).
Description: The head is composed of three blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 3.9; W.: 1.2; Dm: 0.3; Weight (g): 3.7.

Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11530; Inv. no. 14014).
Type: Zanier 2.

19. Iron trilobate tanged arrowhead (Pl. IV/19).
Description: The head is composed of three blades. One blade is damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 2.9; W.: 1.4; Dm: 0.4; Weight (g): 1.8.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11475; Inv. no. 8918).
Type: Zanier 2.

20. Iron trilobate tanged arrowhead (Pl. IV/20).
Description: The head is composed of three blades. The tang is fragmentary. Conserved.
Dimensions (cm): L.: 4; W.: 1.3; Dm: 0.4; Weight (g): 3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11488; Inv. no. 14003).
Type: Zanier 2.

21. Iron trilobate tanged arrowhead (Pl. IV/21).
Description: The head is composed of three blades. The blades are slightly damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 3.8; W.: 1; Weight (g): 2.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11529A; Inv. no. 14024).
Type: Zanier 2.

22. Iron trilobate tanged arrowhead (Pl. IV/22).
Description: The head is composed of three blades. The blades are slightly damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 2.2; W.: 1.2; Weight (g): 2.9.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11484; Inv. no. 14009).
Type: Zanier 2.

23. Iron trilobate tanged arrowhead (Pl. IV/23).
Description: The head is composed of three blades. One blade is slightly damaged. Conserved.
Dimensions (cm): L.: 3.6; W.: 0.9; Dm: 0.4; Weight (g): 3.1.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11498; Inv. no. 14021).
Type: Zanier 2.

24. Iron trilobate tanged arrowhead (Pl. IV/24).
Description: The head is composed of three blades, the tang is bent. Conserved.
Dimensions (cm): L.: 5; W.: 0.9; Dm: 0.3; Weight (g): 3.1.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11466; Inv. no. 8916).
Type: Zanier 2.

25. Iron trilobate tanged arrowhead (Pl. IV/25).
Description: The head is composed of three blades. One of he blades and the tang are broken. Conserved.
Dimensions (cm): L.: 4.5; W.: 1.1; Dm: 0.3; Weight (g): 3.2.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11349; Inv. no. 8903).
Type: Zanier 2.

26. Iron trilobate tanged arrowhead (Pl. IV/26).
Description: The head is composed of three blades. The blades are damaged. Conserved.
Dimensions (cm): L.: 6.8; W.: 1.1; Dm: 0.4; Weight (g): 7.5.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11462; Inv. no. 8914).
Type: Zanier 2.

27. Iron trilobate tanged arrowhead (Pl. IV/27).
Description: The head is composed of three blades. One of the blades is slightly damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 3.2; W.: 1; Dm: 0.3; Weight (g): 2.6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11430; Inv. no. 8911).
Type: Zanier 2.

28. Iron trilobate tanged arrowhead (Pl. V/28).
Description: The head is composed of three blades. One of the blades is damaged. Conserved.
Dimensions (cm): L.: 4.2; W.: 1.1; Dm: 0.3; Weight (g): 4.1.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 416; Sf. no. 11345; Inv. no. 8900).
Type: Zanier 2.

29. Iron trilobate tanged arrowhead (Pl. V/29).
Description: The head is composed of three blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 3.6; W.: 1.1; Dm: 0.3; Weight (g): 3.7.

Findspot: *principia* (CAL 2017; Tr. A7; Cx. 416; Sf. no. 11424; Inv. no. 8908).
Type: Zanier 2.

30. Iron trilobate tanged arrowhead (Pl. V/30).
Description: The head is composed of three blades. The tip and the tang are broken. Conserved.
Dimensions (cm): L.: 2.3; W.: 1.1; Weight (g): 1.2.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 416; Sf. no. 11547; Inv. no. 14018).
Type: Zanier 2.

31. Iron trilobate tanged arrowhead (Pl. V/31).
Description: The head is composed of three blades. One of the blades and the tang are broken. Conserved.
Dimensions (cm): L.: 5.3; W.: 1; Dm: 0.4; Weight (g): 3.6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 416; Sf. no. 11426; Inv. no. 8910).
Type: Zanier 2

32. Iron trilobate tanged arrowhead (Pl. V/32).
Description: The head is composed of three blades. Conserved.
Dimensions (cm): L.: 4.4; W.: 1.3; Dm: 0.4; Weight (g): 4.3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 510; Sf. no. 11514; Inv. no. 14015).
Type: Zanier 2.

33. Iron trilobate tanged arrowhead (Pl. V/33).
Description: The head is composed of three blades. One of the blades is broken. Conserved.
Dimensions (cm): L.: 4.1; W.: 1.1; Dm: 0.3; Weight (g): 3.3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 510; Sf. no. 11515; Inv. no. 14013).
Type: Zanier 2.

34. Iron trilobate tanged arrowhead (Pl. V/34).
Description: The head is composed of three blades. One of the blades is broken. Conserved.
Dimensions (cm): L.: 5.3; W.: 0.9; Dm: 0.2; Weight (g): 3.6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 510; Sf. no. 11509; Inv. no. 14012).
Type: Zanier 2

35. Iron trilobate tanged arrowhead (Pl. VI/35).
Description: The head is composed of three blades. One of the blades is broken and another is slightly damaged. Conserved.
Dimensions (cm): L.: 5.5; W.: 1.4; Dm: 0.3; Weight (g): 3.7.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 510; Sf. no. 11510; Inv. no. 14010).
Type: Zanier 2.

36. Iron trilobate tanged arrowhead (Pl. VI/36).
Description: The head is composed of three blades. One of the blades is broken and another is slightly damaged. Conserved.
Dimensions (cm): L.: 4.3; W.: 1; Dm: 0.3; Weight (g): 2.9.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 466; Sf. no. 11336; Inv. no. 8899).
Type: Zanier 2.

37. Iron trilobate tanged arrowhead (Pl. VI/37).
Description: The head is composed of three blades. The blades are damaged, the tip and the lower part of the tang are broken. Not restored.
Dimensions (cm): L.: 3.6; W.: 1.4; Dm: 0.3; Weight (g): 4.8.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 692; Sf. no. 12441; Inv. no. 17193).
Type: Zanier 2.

38. Iron trilobate tanged arrowhead (Pl. VI/38).
Description: The head is composed of three blades. One of the blades is damaged, the tang is broken. Not restored.
Dimensions (cm): L.: 3.9; W.: 1.6; Dm: 0.4; Weight (g): 6.5.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 692; Sf. no. 12466; Inv. no. 17206A).
Type: Zanier 2.

39. Iron trilobate tanged arrowhead (Pl. VI/39).
Description: The head is composed of three blades. One of the blades is broken. Not restored.
Dimensions (cm): L.: 4.5; W.: 1.3; Dm: 0.4; Weight (g): 5.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 692; Sf. no. 12466A; Inv. no. 17206B).
Type: Zanier 2.

40. Iron trilobate tanged arrowhead (Pl. VI/40).
Description: The head is composed of three blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.3; W.: 1.3; Dm: 0.4; Weight (g): 2.6.

Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 542; Sf. no. 11601; Inv. no. 17170).
Type: Zanier 2.

41. Iron trilobate tanged arrowhead (Pl. VI/41).
Description: The head is composed of three blades. The tang is bent and the lower part is broken. Conserved.
Dimensions (cm): L.: 5.2; W.: 1.4; Dm: 0.3; Weight (g): 3.9.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 542; Sf. no. 11626; Inv. no. 17171).
Type: Zanier 2.

42. Iron trilobate tanged arrowhead (Pl. VI/42).
Description: The head is composed of three blades. The tip, one blade and the tang are damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.1; W.: 1.1; Weight (g): 3.7.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 563; Sf. no. 11760; Inv. no. 17177).
Type: Zanier 2.

43. Iron trilobate tanged arrowhead (Pl. VI/43).
Description: The head is composed of three blades. One of the blades and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 3.9; W.: 1.3; Dm: 0.4; Weight (g): 2.7.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 563; Sf. no. 11784; Inv. no. 16120).
Type: Zanier 2.

44. Iron trilobate tanged arrowhead (Pl. VII/44).
Description: The head is composed of three blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 2.6; W.: 0.7; Dm: 0.7; Weight (g): 1.4.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 441; Sf. no. 11095; Inv. no. 14002).
Type: Zanier 2.

45. Iron trilobate tanged arrowhead (Pl. VII/45).
Description: The head is composed of three blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4; W.: 1.1; Dm: 0.3; Weight (g): 1.6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 483; Sf. no. 11375; Inv. no. 8906).
Type: Zanier 2.

46. Iron trilobate tanged arrowhead (Pl. VII/46).
Description: The head is composed of three blades. One of the blades and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 4.7; W.: 1.5; Dm: 0.4; Weight (g): 3.5.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 404; Sf. no. 10884; Inv. no. 14001).
Type: Zanier 2.

47. Iron trilobate tanged arrowhead (Pl. VII/47).
Description: The head is composed of three blades. Not restored.
Dimensions (cm): L.: 3.9; W.: 0.9; Dm: 0.3; Weight (g): 2.6.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 654; Sf. no. 12195; Inv. no. 17202).
Type: Zanier 2.

48. Iron trilobate tanged arrowhead (Pl. VII/48).
Description: The head is composed of three blades. The lower part of the tang is broken. Not restored.
Dimensions (cm): L.: 3.8; W.: 1.4; Dm: 0.3; Weight (g): 4.3.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 708; Sf. no. 12512; Inv. no. 17196).
Type: Zanier 2.

49. Iron trilobate tanged arrowhead (Pl. VII/49).
Description: The head is composed of three blades. The blades are damaged, the lower part of the tang is broken. Not restored.
Dimensions (cm): L.: 4.8; W.: 1.5; Dm: 0.5; Weight (g): 7.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 708; Sf. no. 12495; Inv. no. 17194).
Type: Zanier 2.

50. Iron trilobate tanged arrowhead (Pl. VII/50).
Description: The head is composed of three blades. The tip and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 2.6; W.: 1.5; Dm: 0.4; Weight (g): 3.3.
Findspot: *principia* (CAL 2015; Tr. A1; Cx. 192; Sf. no. 10320; Inv. no. 14044).
Type: Zanier 2.

51. Iron trilobate tanged arrowhead (Pl. VII/51).
Description: The head is composed of one

remaining blade Two blades and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 4.4; W.: 1; Dm: 0.4; Weight (g): 2.6.
Findspot: *principia* (CAL 2015; Tr. A1; Cx. 116; Sf. no. 989; Inv. no. 17176).
Type: Zanier 2.

52. Iron trilobate tanged arrowhead (Pl. VII/52).
Description: The head is composed of three blades. The blades are damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 2.9; W.: 0.7; Dm: 0.4; Weight (g): 2.2.
Findspot: *vicus* (CAL 2019; Tr. N/A; Cx. N/A; Sf. no. 11997; Inv. no. 14038).
Type: Zanier 2.

53. Iron trilobate tanged arrowhead (Pl. VII/53).
Description: The head is composed of three blades. The blades are damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 3.6; W.: 1.5; Dm: 0.4; Weight (g): 3.2.
Findspot: *vicus* (CAL 2019; Tr. C6; Cx. 2136; Sf. no. 6186; Inv. no. 14039).
Type: Zanier 2.

54. Iron trilobate tanged arrowhead (Pl. VIII/54).
Description: The head is composed of three blades. Conserved.
Dimensions (cm): L.: 3.5; W.: 0.9; Dm: 0.3; Weight (g): 3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11491; Inv. no. 14019).
Type: Zanier 3.

55. Iron trilobate tanged arrowhead (Pl. VIII/55).
Description: The head is composed of three blades. The blades are slightly damaged. Conserved.
Dimensions (cm): L.: 4.9; W.: 1.1; Dm: 0.3; Weight (g): 4.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11480; Inv. no. 14022).
Type: Zanier 3.

56. Iron trilobate tanged arrowhead (Pl. VIII/56).
Description: The head is composed of three blades. The blades are slightly damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 5.4; W.: 1.3; Dm: 0.3; Weight (g): 6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11529; Inv. no. 14023).
Type: Zanier 3.

57. Iron trilobate tanged arrowhead (Pl. VIII/57).
Description: The head is composed of three blades. Conserved.
Dimensions (cm): L.: 4.8; W.: 1.2; Dm: 0.3; Weight (g): 3.3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11476; Inv. no. 8919).
Type: Zanier 3.

58. Iron trilobate tanged arrowhead (Pl. VIII/58).
Description: The head is composed of three blades. The tang is fragmentary. Conserved.
Dimensions (cm): L.: 5.8; W.: 1.4; Dm: 0.3; Weight (g): 5.1.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11532; Inv. no. 14000).
Type: Zanier 3.

59. Iron trilobate tanged arrowhead (Pl. VIII/59).
Description: The head is composed of three blades. The blades are slightly damaged, the tip and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 2.9; W.: 0.9; Dm: 0.3; Weight (g): 1.5.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11490; Inv. no. 14007).
Type: Zanier 3.

60. Iron trilobate tanged arrowhead (Pl. VIII/60).
Description: The head is composed of three blades. The tang is broken. Conserved.
Dimensions (cm): L.: 4.1; W.: 1; Dm: 0.3; Weight (g): 3.7.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11468; Inv. no. 8917).
Type: Zanier 3.

61. Iron trilobate tanged arrowhead (Pl. VIII/61).
Description: The head is composed of three blades. The tang is broken. Conserved.
Dimensions (cm): L.: 3.5; W.: 1; Dm: 0.3; Weight (g): 3.3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11493; Inv. no. 14016).
Type: Zanier 3.

62. Iron trilobate tanged arrowhead (Pl. VIII/62).
Description: The head is composed of three blades. The tang is broken. Conserved.
Dimensions (cm): L.: 3.2; W.: 1.4; Dm: 0.4; Weight (g): 2.8.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11495; Inv. no. 14005).
Type: Zanier 3.

63. Iron trilobate tanged arrowhead (Pl. IX/63).
Description: The head is composed of three blades. Conserved.
Dimensions (cm): L.: 7.6; W.: 1.6; Dm: 0.4; Weight (g): 5.2.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11433; Inv. no. 8912).
Type: Zanier 3.

64. Iron trilobate tanged arrowhead (Pl. IX/64).
Description: The head is composed of three blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.3; W.: 0.9; Dm: 0.3; Weight (g): 3.4.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 416; Sf. no. 11347; Inv. no. 8901).
Type: Zanier 3.

65. Iron trilobate tanged arrowhead (Pl. IX/65).
Description: The head is composed of three blades. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.4; W.: 1.1; Dm: 0.3; Weight (g): 3.9.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 416; Sf. no. 11425; Inv. no. 8909).
Type: Zanier 3.

66. Iron trilobate tanged arrowhead (Pl. IX/66).
Description: The head is composed of two blades. One blade and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 3.6; W.: 1; Dm: 0.3; Weight (g): 1.7.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 416; Sf. no. 11504; Inv. no. 14006).
Type: Zanier 3.

67. Iron trilobate tanged arrowhead (Pl. IX/67).
The head is composed of three blades. The tang is bent and the lower part is broken. Conserved.
Dimensions (cm): L.: 3.6; W.: 1.1; Dm: 0.3; Weight (g): 2.1.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 510; Sf. no. 11513; Inv. no. 14020).
Type: Zanier 3.

68. Iron trilobate tanged arrowhead (Pl. IX/68).
Description: The head is composed of three blades. The lower part of the tang is broken. Not restored.
Dimensions (cm): L.: 6.3; W.: 2.4; Dm: 0.3; Weight (g): 8.1.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 692; Sf. no. 12434; Inv. no. 17204).
Type: Zanier 3.

69. Iron trilobate tanged arrowhead (Pl. IX/69).
Description: The head is composed of one blade. Two blades are broken. Not restored.
Dimensions (cm): L.: 4.8; W.: 0.8; Dm: 0.4; Weight (g): 3.2.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 692; Sf. no. 12428; Inv. no. 17203).
Type: Zanier 3.

70. Iron trilobate tanged arrowhead (Pl. IX/70).
Description: The head is composed of three blades. One blade is damaged, the tang is broken. Not restored.
Dimensions (cm): L.: 3.5; W.: 1.2; Weight (g): 3.4.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 692; Sf. no. 12451; Inv. no. 17205).
Type: Zanier 3.

71. Iron trilobate tanged arrowhead (Pl. IX/71).
Description: The head is composed of three blades. The blades are slightly damaged, the tang is broken. Conserved.
Dimensions (cm): L.: 5.9; W.: 1.4; Dm: 0.4; Weight (g): 5.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 563; Sf. no. 11769; Inv. no. 17178).
Type: Zanier 3.

72. Iron trilobate tanged arrowhead (Pl. X/72).
Description: The head is composed of three blades. The tang is broken. Conserved.
Dimensions (cm): L.: 2.6; W.: 0.9; Weight (g): 2.3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 483; Sf. no. 11373; Inv. no. 8905).
Type: Zanier 3.

73. Iron trilobate tanged arrowhead (Pl. X/73).
Description: The head is composed of three blades. The blades are slightly damaged, the tang is broken. Conserved.
Dimensions (cm): L.: 2.6; W.: 1.2; Weight (g): 2.6.
Findspot: *principia* (CAL 2017; Tr. A6; Cx. 505; Sf. no. 11540; Inv. no. 14017).
Type: Zanier 3.

74. Iron trilobate tanged arrowhead (Pl. X/74).
Description: The head is composed of three blades. One blade and the tang are broken. Not restored.
Dimensions (cm): L.: 4.3; W.: 1.4; Dm: 0.4; Weight (g): 5.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 654; Sf. no. 12251; Inv. no. 17195).
Type: Zanier 3.

75. Iron trilobate tanged arrowhead (Pl. X/75).
Description: The head is composed of three blades. The blades are slightly damaged. Not restored.
Dimensions (cm): L.: 5.3; W.: 1.4; Dm: 0.3; Weight (g): 5.7.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 688; Sf. no. 12373; Inv. no. 17197).
Type: Zanier 3.

76. Iron trilobate tanged arrowhead (Pl. X/76).
Description: The head is composed of three blades. The blades are slightly damaged, the tang is broken. Conserved.
Dimensions (cm): L.: 3.2; W.: 1.1; Weight (g): 3.3.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 539; Sf. no. 11604; Inv. no. 17173).
Type: Zanier 3.

77. Iron trilobate tanged arrowhead (Pl. X/77).
Description: The head is composed of three blades. One blade is broken. Conserved.
Dimensions (cm): L.: 4.5; W.: 1.2; Dm: 0.3; Weight (g): 2.3.
Findspot: *principia* (CAL 2015; Tr. A3; Cx. 114; Sf. no. 10072; Inv. no. 14043).
Type: Zanier 3.

78. Iron trilobate tanged arrowhead (Pl. X/78).
Description: The head is composed of three blades. The blades are damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.1; W.: 1.2; Dm: 0.5; Weight (g): 2.2.
Findspot: *vicus* (ERC 2018; Tr. AIII/80 CM 11–12; Cx. 228; Sf. no. 373; Inv. no. 17172).
Type: Zanier 3.

79. Iron trilobate tanged arrowhead (Pl. X/79).
Description: The head is composed of three blades. The blades are damaged, the tip and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 4.1; W.: 1.2; Dm: 0.5; Weight (g): 2.2.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11531; Inv. no. 14008).

80. Iron bodkin tanged arrowhead (Pl. XI/80).
Description: Rhomboidal head with rectangular section. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 2.8; W.: 0.7; Dm: 0.3; Weight (g): 1.6.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 323; Sf. no. 11573; Inv. no. 16128).
Type: Gudea SAB2.

81. Iron bodkin tanged arrowhead (Pl. XI/81).
Description: Rhomboidal head with rectangular section. The tang is broken. Conserved.
Dimensions (cm): L.: 4.9; W.: 1.2; Weight (g): 6.
Findspot: *principia* (CAL 2018; Tr. A6; Cx. 479; Sf. no. 11384; Inv. no. 14031).
Type: Gudea SAB2.

82. Iron bodkin tanged arrowhead (Pl. XI/82).
Description: Rhomboidal head with rectangular section. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 2.9; W.: 0.7; Dm: 0.5; Weight (g): 1.7.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 406; Sf. no. 10773; Inv. no. 14027).
Type: Gudea SAB2.

83. Iron bodkin tanged arrowhead (Pl. XI/83).
Description: Rhomboidal head with square section. Conserved.
Dimensions (cm): L.: 4.6; W.: 0.7; Dm: 0.2; Weight (g): 3.3.
Findspot: *principia* (CAL 2019; Tr. A/2019; Cx. 587; Sf. no. 11958; Inv. no. 14036).
Type: Gudea SAB6.

84. Iron bodkin tanged arrowhead (Pl. XI/84).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 5.2; W.: 0.7; Dm: 0.2; Weight (g): 4.4.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 506; Sf. no. 11478; Inv. no. 8979).
Type: Gudea SAB6.

85. Iron bodkin tanged arrowhead (Pl. XI/85).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.1; W.: 0.6; Dm: 0.3; Weight (g): 2.7.
Findspot: *principia* (CAL 2017; Tr. A6; Cx. 478; Sf. no. 11353; Inv. no. 14033).
Type: Gudea SAB6.

86. Iron bodkin tanged arrowhead (Pl. XI/86).
Description: Rhomboidal head with square section. The tip is broken. Conserved.
Dimensions (cm): L.: 6.5; W.: 0.8; Dm: 0.3; Weight (g): 4.7.
Findspot: *principia* (CAL 2015; Tr. A1; Cx. 117; Sf. no. 10045; Inv. no. 17181).
Type: Gudea SAB6.

87. Iron bodkin tanged arrowhead (Pl. XI/87).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 3.6; W.: 0.7; Dm: 0.3; Weight (g): 3.1.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 406; Sf. no. 10881; Inv. no. 14028).
Type: Gudea SAB6.

88. Iron bodkin tanged arrowhead (Pl. XI/88).
Description: Rhomboidal head with square section. Conserved.
Dimensions (cm): L.: 3.5; W.: 0.5; Dm: 0.5; Weight (g): 1.3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 441; Sf. no. 11094; Inv. no. 8896).
Type: Gudea SAB6.

89. Iron bodkin tanged arrowhead (Pl. XI/89).
Description: Rhomboidal head with square section. The tip is bent. Conserved.
Dimensions (cm): L.: 2.3; W.: 0.9; Dm: 0.4; Weight (g): 2.2.
Findspot: *vicus* (ERC 2018; Tr. AIII/81 CM 4–5; Cx. 105; Sf. no. 196; Inv. no. 17191).
Type: Gudea SAB6.

90. Iron bodkin tanged arrowhead (Pl. XI/90).
Description: Rhomboidal head with square section. Slightly damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 3.3; W.: 0.7; Dm: 0.3; Weight (g): 4.3.
Findspot: *vicus* (ERC 2018; Tr. AIII/80 CM 4–5; Cx. 54; Sf. no. 109A; Inv. no. 17187A).
Type: Gudea SAB6.

91. Iron bodkin tanged arrowhead (Pl. XI/91).
Description: Rhomboidal head with square section. The tip is bent, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.3; W.: 0.7; Dm: 0.3; Weight (g): 3.
Findspot: *vicus* (ERC 2018; Tr. AIII/80 CM 4–5; Cx. 54; Sf. no. 109B; Inv. no. 17187B).
Type: Gudea SAB6.

92. Iron bodkin tanged arrowhead (Pl. XI/92).
Description: Rhomboidal head with square section. The upper part of the tang is bent, the lower part is broken. Conserved.
Dimensions (cm): L.: 3.3; W.: 0.9; Dm: 0.3; Weight (g): 3.2.
Findspot: *vicus* (CAL 2013; Tr. C; Cx. 2001; Sf. no. 2212; Inv. no. 17183).
Type: Gudea SAB6.

93. Iron bodkin tanged arrowhead (Pl. XII/93).
Description: Rhomboidal head with square section. The tang is broken. Conserved.
Dimensions (cm): L.: 2.3; W.: 0.4; Dm: 0.2; Weight (g): 0.6.
Findspot: *principia* (CAL 2019; Tr. A/2019; Cx. 587; Sf. no. 11965; Inv. no. 14037).
Type: Gudea SAB7.

94. Iron bodkin tanged arrowhead (Pl. XII/94).
Description: Rhomboidal head with square section. Slightly damaged, the lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 8.6; W.: 0.7; Dm: 0.3; Weight (g): 7.5.
Findspot: *principia* (CAL 2019; Tr. A/2019; Cx. 587; Sf. no. 11923; Inv. no. 14035).
Type: Gudea SAB7.

95. Iron bodkin tanged arrowhead (Pl. XII/95).
Description: Rhomboidal head with square section. Conserved.
Dimensions (cm): L.: 3.1; W.: 0.8; Dm: 0.2; Weight (g): 2.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 560; Sf. no. 11779; Inv. no. 17189).
Type: Gudea SAB7.

96. Iron bodkin tanged arrowhead (Pl. XII/96).
Description: Rhomboidal head with square section. The tang is bent. Conserved.
Dimensions (cm): L.: 2.6; W.: 0.5; Dm: 0.3; Weight (g): 0.7.
Findspot: *principia* (CAL 2017; Tr. A6; Cx. 411; Sf. no. 10857; Inv. no. 17188).
Type: Gudea SAB7.

97. Iron bodkin tanged arrowhead (Pl. XII/97).
Description: Rhomboidal head with square section. The tang is slightly bent. Conserved.
Dimensions (cm): L.: 6.4; W.: 1.1; Dm: 0.3; Weight (g): 9.9.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 476; Sf. no. 11358; Inv. no. 14030).
Type: Gudea SAB7.

98. Iron bodkin tanged arrowhead (Pl. XII/98).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 2.8; W.: 0.7; Dm: 0.6; Weight (g): 1.6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 441; Sf. no. 11099; Inv. no. 8897).
Type: Gudea SAB7.

99. Iron bodkin tanged arrowhead (Pl. XII/99).
Description: Rhomboidal head with square section. The tip and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 4.2; W.: 0.6; Dm: 0.3; Weight (g): 2.6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 459; Sf. no. 11413; Inv. no. 8907).
Type: Gudea SAB7.

100. Iron bodkin tanged arrowhead (Pl. XII/100).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.6; W.: 0.6; Dm: 0.3; Weight (g): 2.3.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 406; Sf. no. 10829; Inv. no. 14026).
Type: Gudea SAB7.

101. Iron bodkin tanged arrowhead (Pl. XII/101).
Description: Rhomboidal head with square section. The tip and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 8.1; W.: 0.4; Dm: 0.3; Weight (g): 5.6.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 483; Sf. no. 11369; Inv. no. 14029).
Type: Gudea SAB7.

102. Iron bodkin tanged arrowhead (Pl. XII/102).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Not restored.
Dimensions (cm): L.: 4.2; W.: 0.7; Dm: 0.3; Weight (g): 4.3.
Findspot: *principia* (CAL 2015; Tr. A1; Cx. 116; Sf. no. 10139; Inv. no. 14052).
Type: Gudea SAB7.

103. Iron bodkin tanged arrowhead (Pl. XIII/103).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Not restored.
Dimensions (cm): L.: 4.6; W.: 0.8; Dm: 0.4; Weight (g): 4.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 692; Sf. no. 12482; Inv. no. 17207).
Type: Gudea SAB7.

104. Iron bodkin tanged arrowhead (Pl. XIII/104).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Not restored.
Dimensions (cm): L.: 4.3; W.: 0.8; Dm: 0.3; Weight (g): 5.5.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 649; Sf. no. 12065; Inv. no. 17200).
Type: Gudea SAB7.

105. Iron bodkin tanged arrowhead (Pl. XIII/105).
Description: Rhomboidal head with square section. The tip and the lower part of the tang are broken. Conserved.
Dimensions (cm): L.: 2.9; W.: 0.7; Dm: 0.4; Weight (g): 1.3.
Findspot: *principia* (CAL 2016; Tr. A4; Cx. 254; Sf. no. 10402; Inv. no. 17184).
Type: Gudea SAB7.

106. Iron bodkin tanged arrowhead (Pl. XIII/106).
Description: Rhomboidal head with square section. The tip is bent. Conserved.
Dimensions (cm): L.: 4.6; W.: 0.6; Dm: 0.2; Weight (g): 2.2.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 550; Sf. no. 11715; Inv. no. 17182).
Type: Gudea SAB7.

107. Iron bodkin tanged arrowhead (Pl. XIII/107).
Description: Rhomboidal head with square section. The lower part of the tang is broken. Conserved.
Dimensions (cm): L.: 4.4; W.: 0.7; Dm: 0.2; Weight (g): 2.7.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 542; Sf. no. 11671; Inv. no. 16129).
Type: Gudea SAB7.

108. Iron bodkin tanged arrowhead (Pl. XIII/108).
Description: Rhomboidal head with square section. Slightly damaged. Conserved.
Dimensions (cm): L.: 3.2; W.: 0.3; Dm: 0.2; Weight (g): 0.9.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 542; Sf. no. 11580; Inv. no. 17180).
Type: Gudea SAB7.

109. Iron bodkin tanged arrowhead Pl. XIII/109.
Description: Rhomboidal head with square section. Slightly damaged. Conserved.
Dimensions (cm): L.: 5.4; W.: 0.7; Dm: 0.3; Weight (g): 4.7.
Findspot: *vicus* (CAL 2016; Tr. N/A; Cx. N/A; Sf. no. 6042; Inv. no. 17185).
Type: Gudea SAB7.

110. Iron bodkin tanged arrowhead Pl. XIII/110.
Description: Rhomboidal head with square section. The head is bent, the tang is missing. Conserved.
Dimensions (cm): L.: 3.3; W.: 0.5; Weight (g): 1.7.
Findspot: *vicus* (ERC 2018; Tr. AIII/80 CM 3–4; Cx. 26; Sf. no. 52; Inv. no. 17190).
Type: Gudea SAB7.

111. Iron bodkin tanged arrowhead (Pl. XIII/111).
Description: Rhomboidal head with square section. The tang is bent. Conserved.
Dimensions (cm): L.: 3.3; W.: 0.4; Dm: 0.3; Weight (g): 1.1.
Findspot: *vicus* (ERC 2018; Tr. AIII/81 CM 1–2; Cx. 109; Sf. no. 190; Inv. no. 17186).
Type: Gudea SAB7.

112. Iron bodkin tanged arrowhead (Pl. XIII/112).
Description: Rhomboidal head with square section. The tang is broken. Conserved.
Dimensions (cm): L.: 3.9; W.: 0.8; Weight (g): 7.3.
Findspot: *principia* (CAL 2019; Tr. A/2019; Cx. 583; Sf. no. 11819; Inv. no. 14034).

113. Iron bodkin tanged arrowhead (Pl. XIII/113).
Description: Rhomboidal head with square section. The tip is broken. Conserved.
Dimensions (cm): L.: 3.9; W.: 0.5; Weight (g): 2.5.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 482; Sf. no. 11499; Inv. no. 14032).

114. Iron bodkin tanged arrowhead (Pl. XIII/114).
Description: Rhomboidal head with trapeze section. The tip is broken. Conserved.
Dimensions (cm): L.: 4; W.: 1.4; Weight (g): 7.8.
Findspot: *principia* (CAL 2019; Tr. A/2019; Cx. 593; Sf. no. 11877; Inv. no. 17199).

115. Iron flat bladed socketed arrowhead (Pl. XIV/115).
Description: Flat two-bladed head. The lower part of the socket is broken. Conserved.
Dimensions (cm): L.: 3.9; W.: 1.4; Dm: 0.5; Weight (g): 2.2.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 563; Sf. no. 11740; Inv. no. 17192).
Type: Gudea SAA2.

116. Iron flat bladed socketed arrowhead (Pl. XIV/116).
Description: Flat two-bladed head. The tip is broken, the lower part of the socket is slightly damaged. Conserved.
Dimensions (cm): L.: 4.6; W.: 1.2; Dm: 0.5; Weight (g): 2.9.
Findspot: *principia* (CAL 2018; Tr. A5/2018; Cx. 563; Sf. no. 11732; Inv. no. 17198).
Type: Gudea SAA3.

117. Iron flat bladed socketed arrowhead (Pl. XIV/117).
Description: Flat two-bladed head. The lower part of the socket is slightly damaged. Conserved.

Dimensions (cm): L.: 6.2; W.: 1.3; Dm: 0.6; Weight (g): 5.7.
Findspot: *principia* (CAL 2017; Tr. A7; Cx. 418; Sf. no. 10921; Inv. no. 14034).
Type: Gudea SAA3.

118. Iron flat bladed socketed arrowhead (Pl. XIV/118).
Description: Flat two-bladed head. The lower part of the socket is slightly damaged. Conserved.
Dimensions (cm): L.: 5.3; W.: 1.2; Dm: 0.7; Weight (g): 4.
Findspot: *principia* (CAL 2016; Tr. A4; Cx. 259; Sf. no. 10416; Inv. no. 15744).
Type: Gudea SAA3.

119. Iron flat bladed socketed arrowhead (Pl. XIV/119).
Description: Flat two-bladed head. The tip and the lower part of the socket are broken. Not restored.
Dimensions (cm): L.: 3.9; W.: 1.2; Dm: 0.5; Weight (g): 6.6.
Findspot: *principia* (CAL 2021; Tr. A8/2021; Cx. 649; Sf. no. 12107; Inv. no. 17201).
Type: Gudea SAA3.

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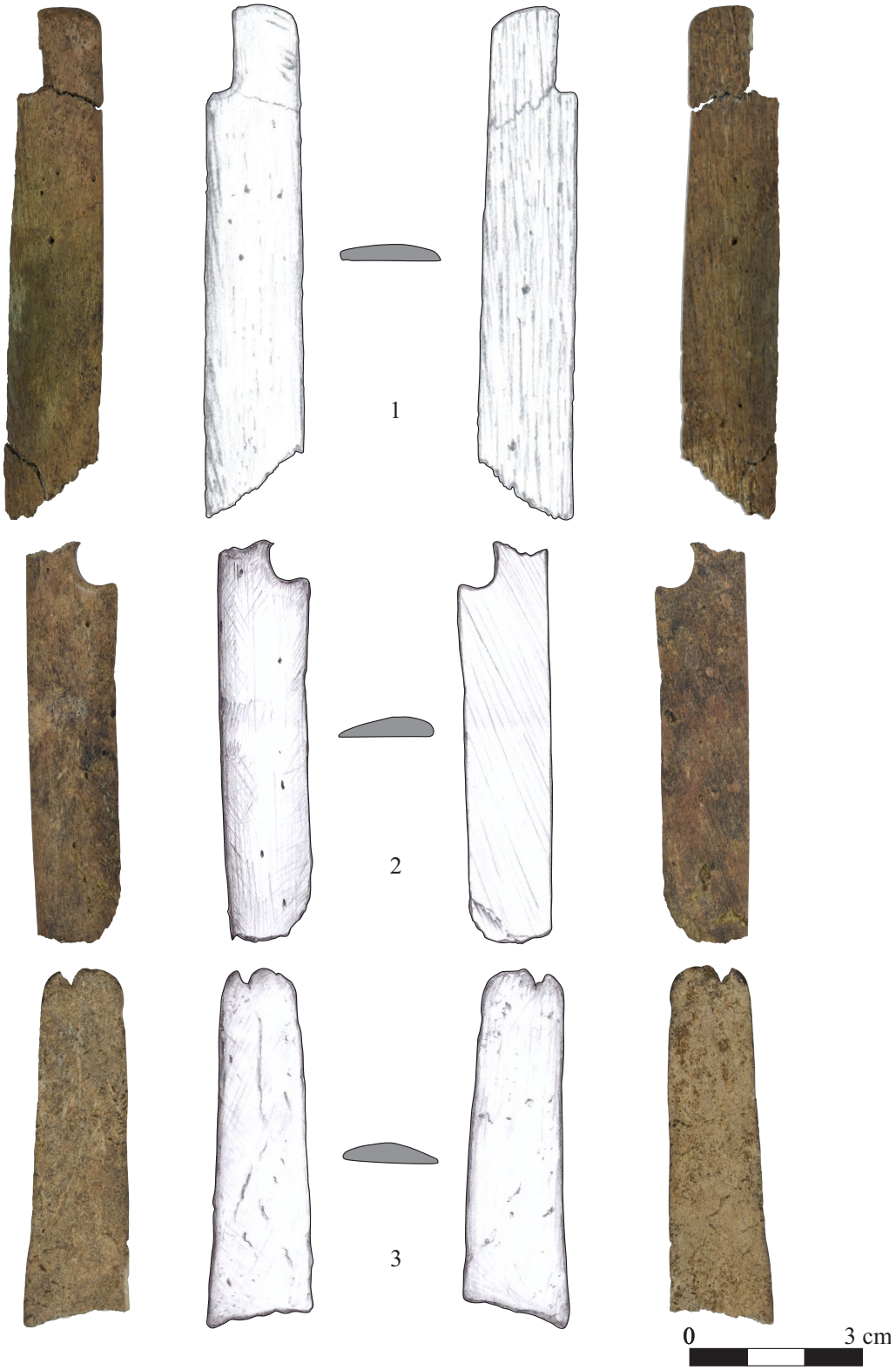
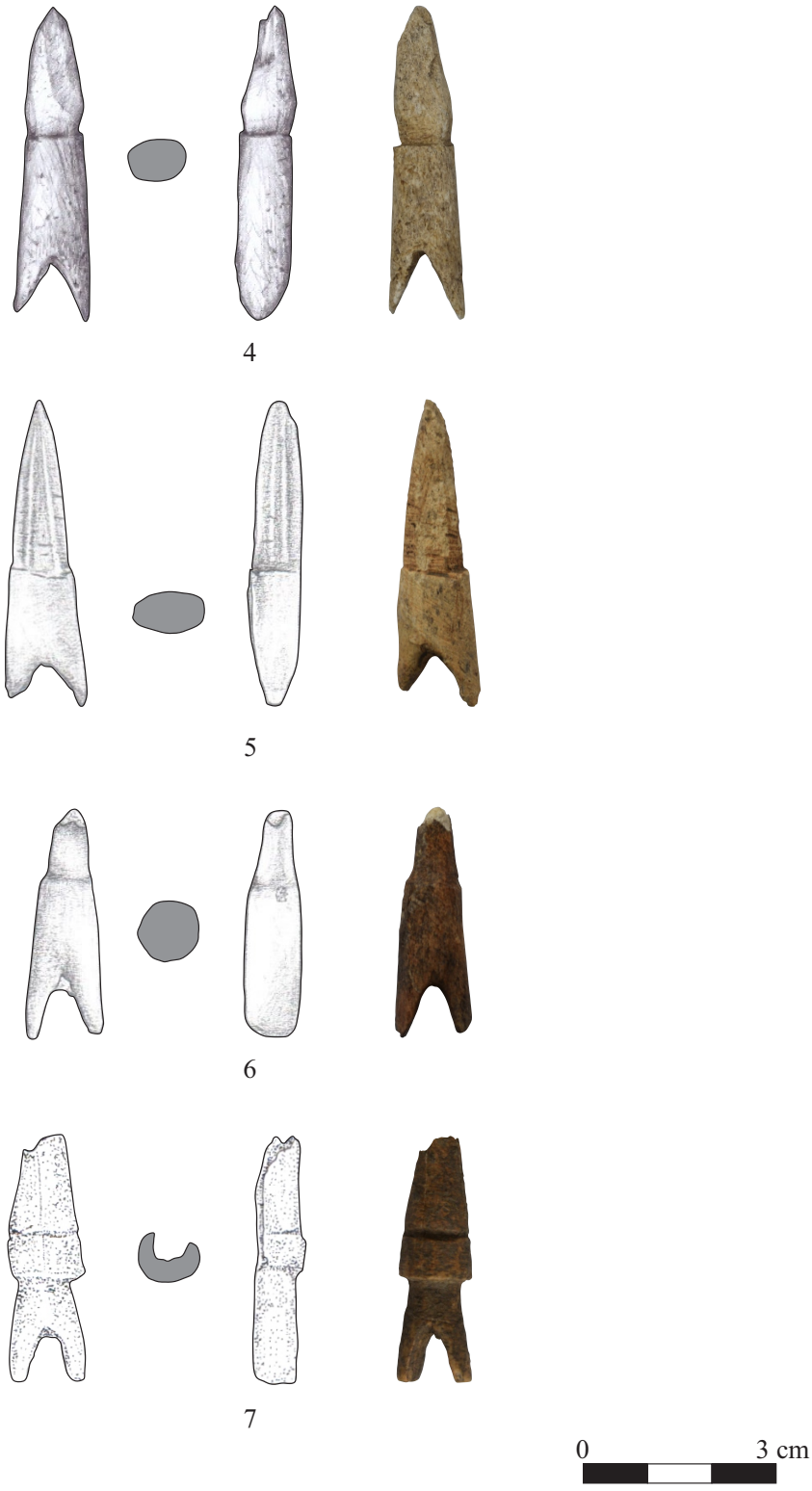
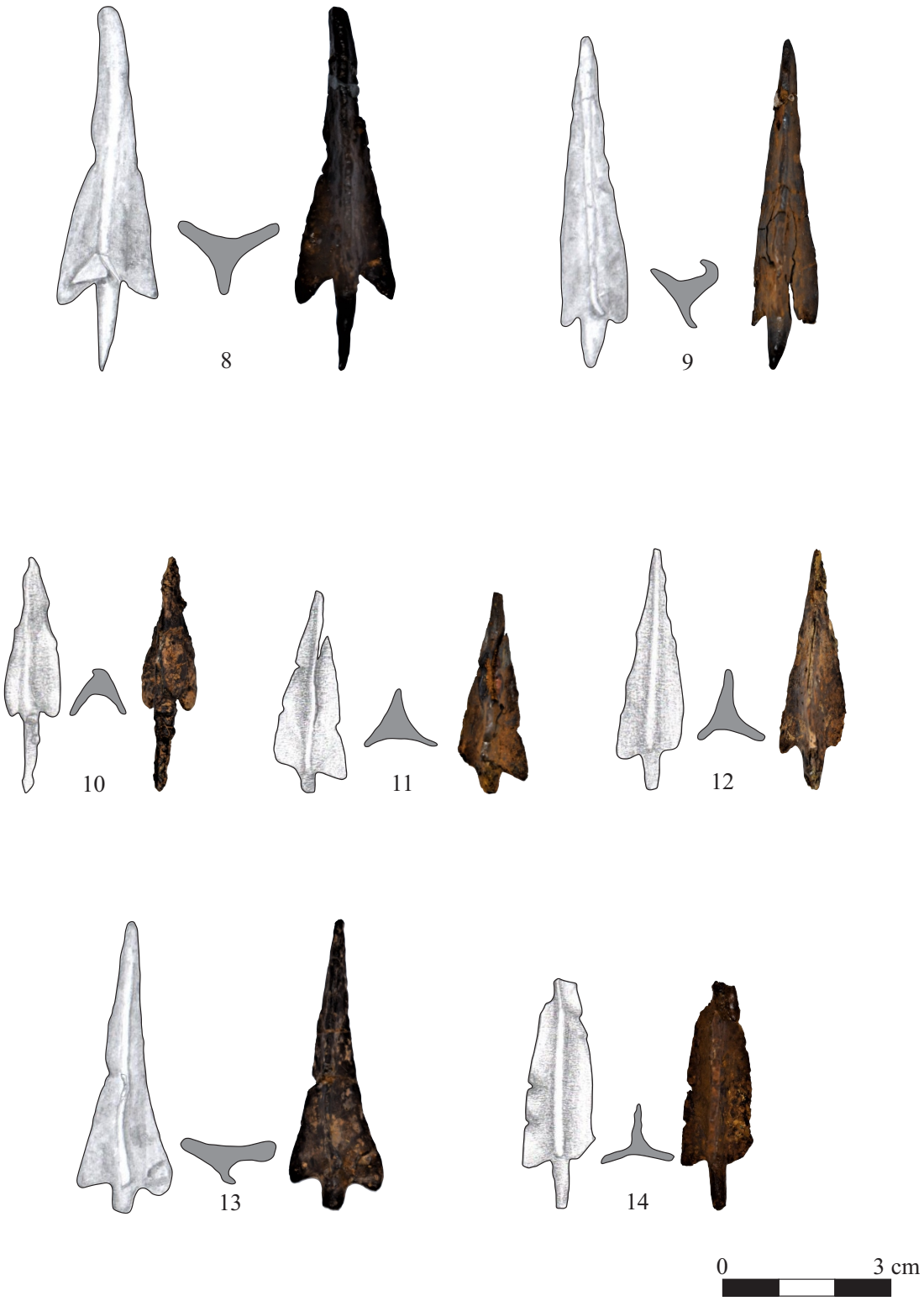


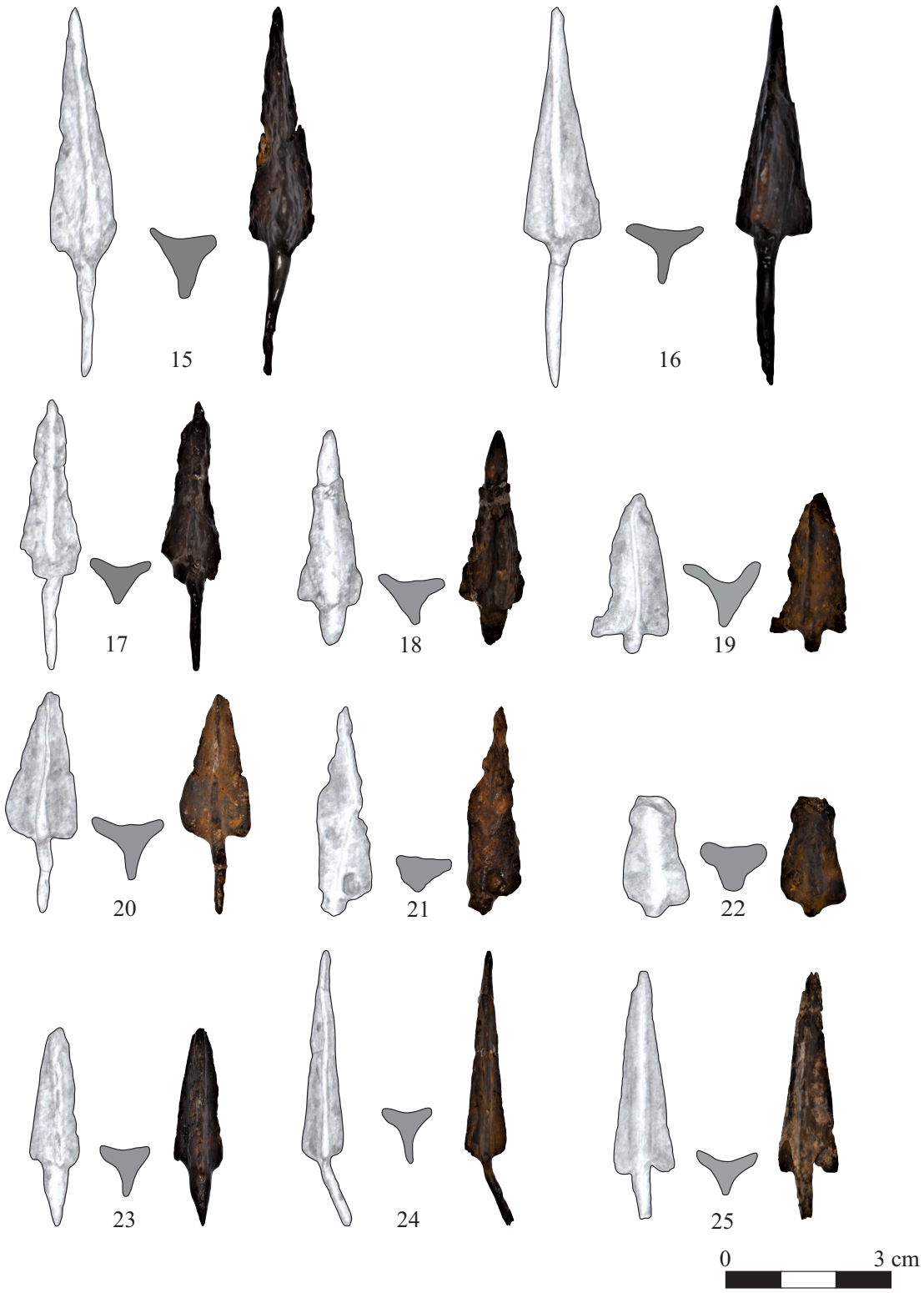
Pl. I. Bone ear-lath fragments (Cat. 1–3).



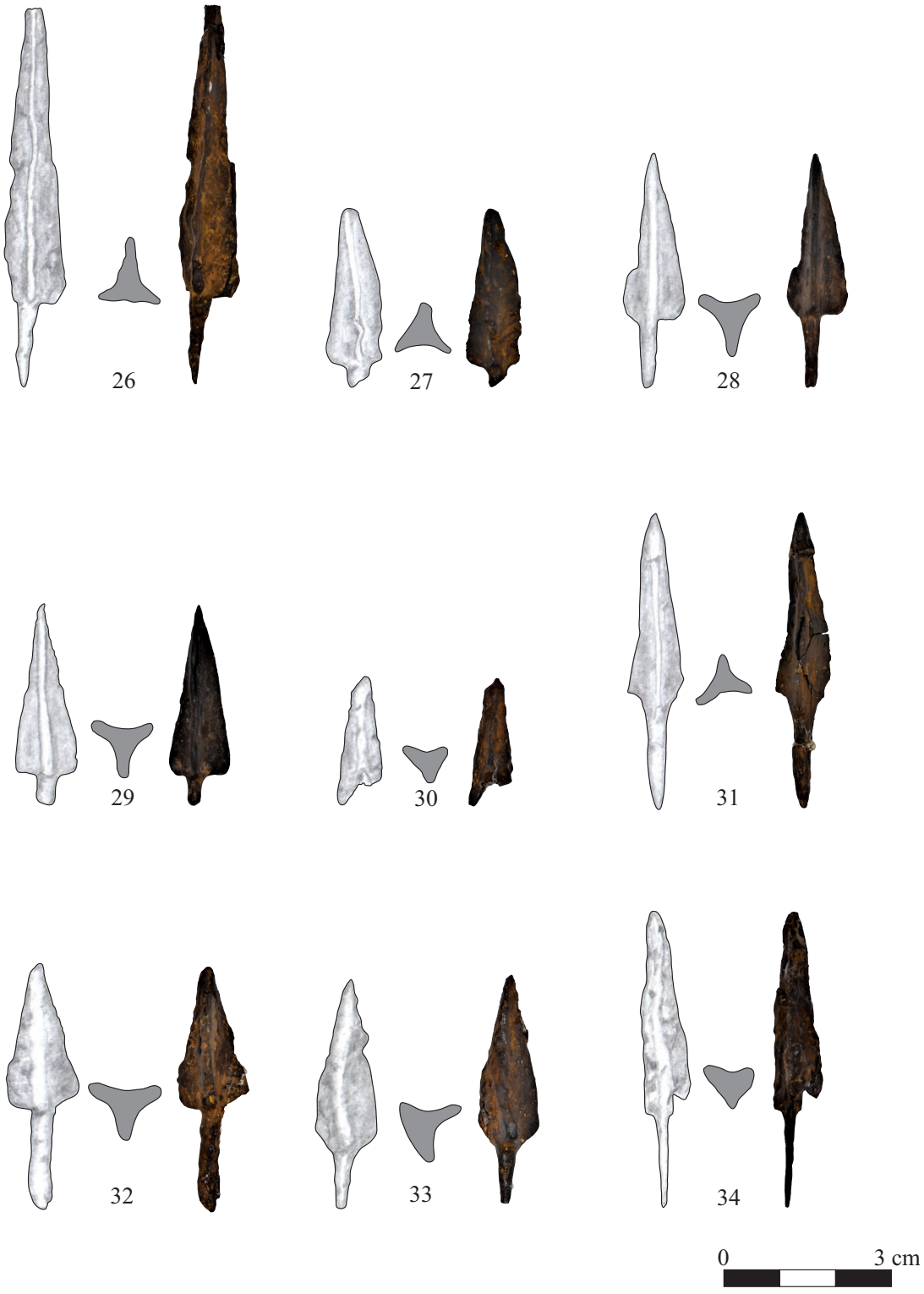
Pl. II. Bone arrow nocks (Cat. 4–7).



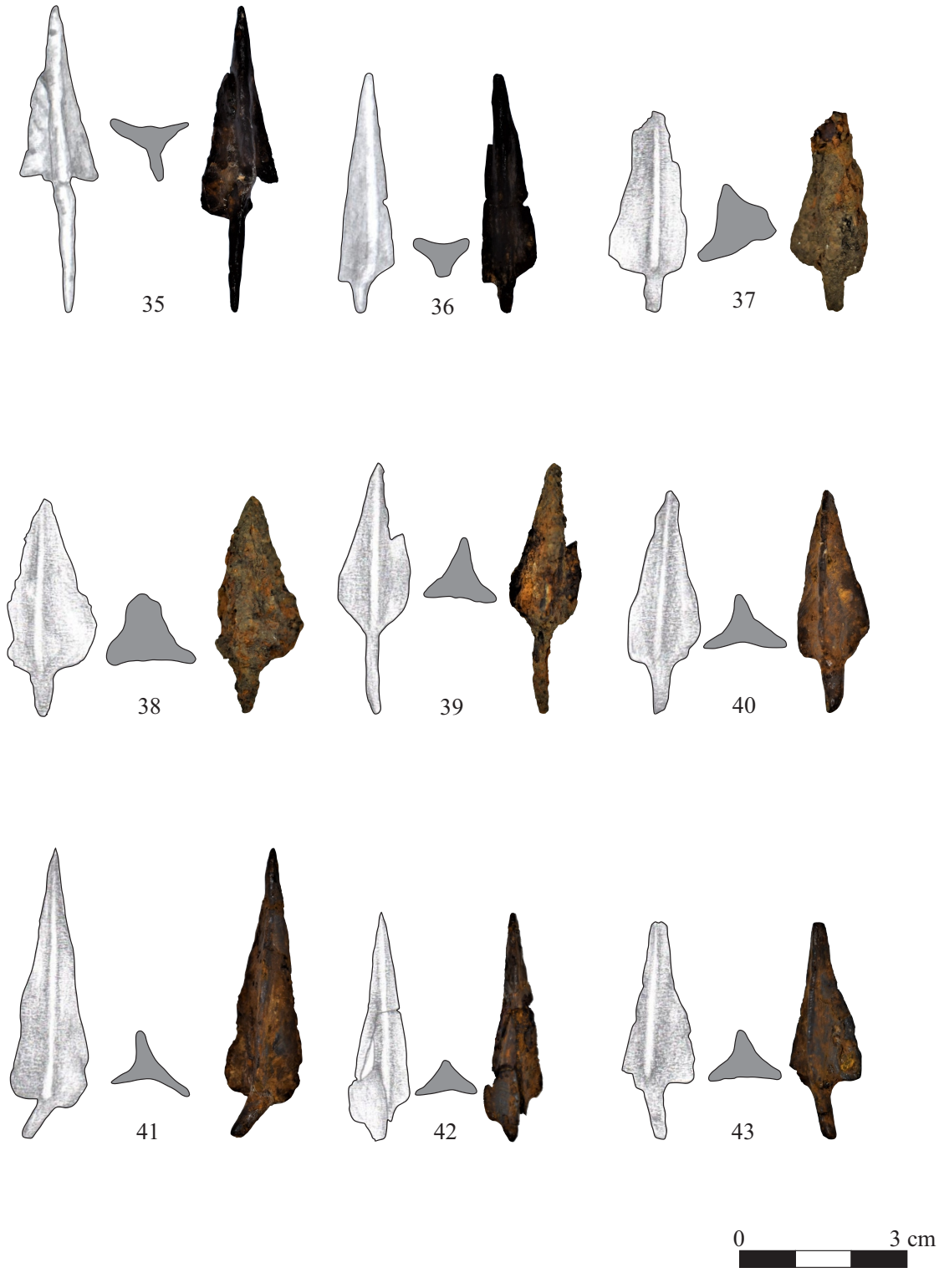
Pl. III. Trilobate arrowheads type Zanier 1 (Cat. 8–14).



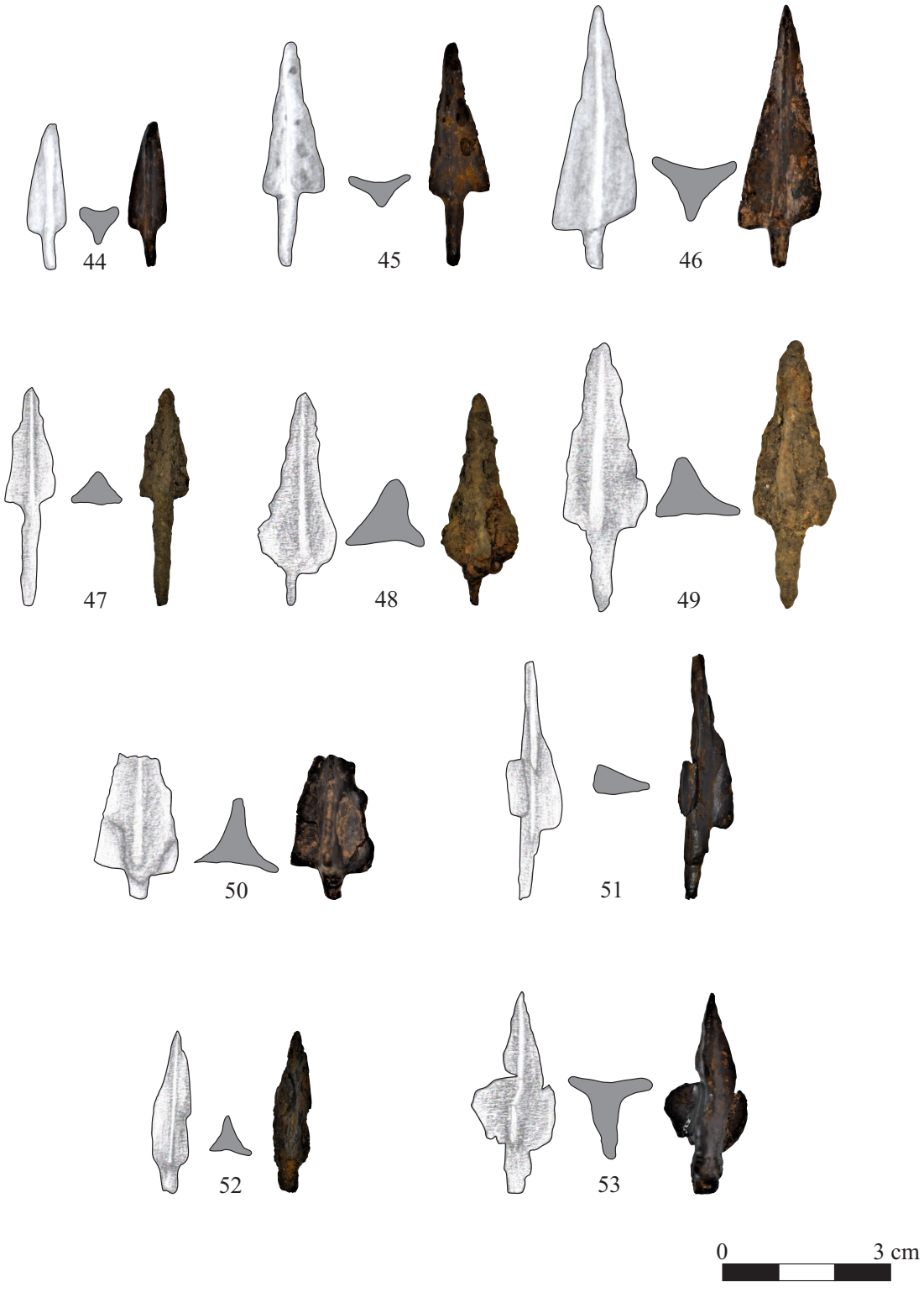
Pl. IV. Trilobate arrowheads type Zanier 2 (Cat. 15–25).



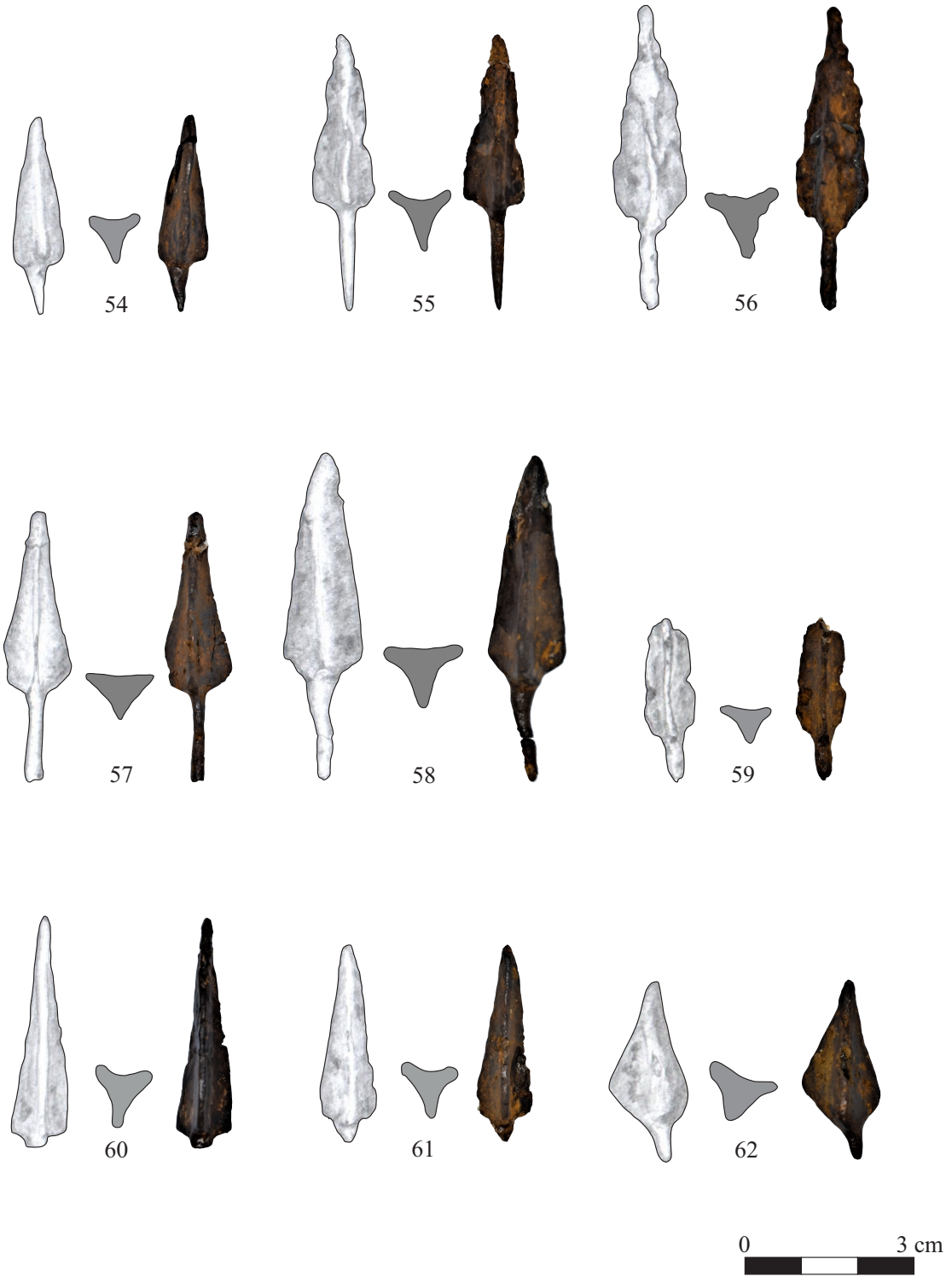
Pl. V. Trilobate arrowheads type Zanier 2 (Cat. 26–34).



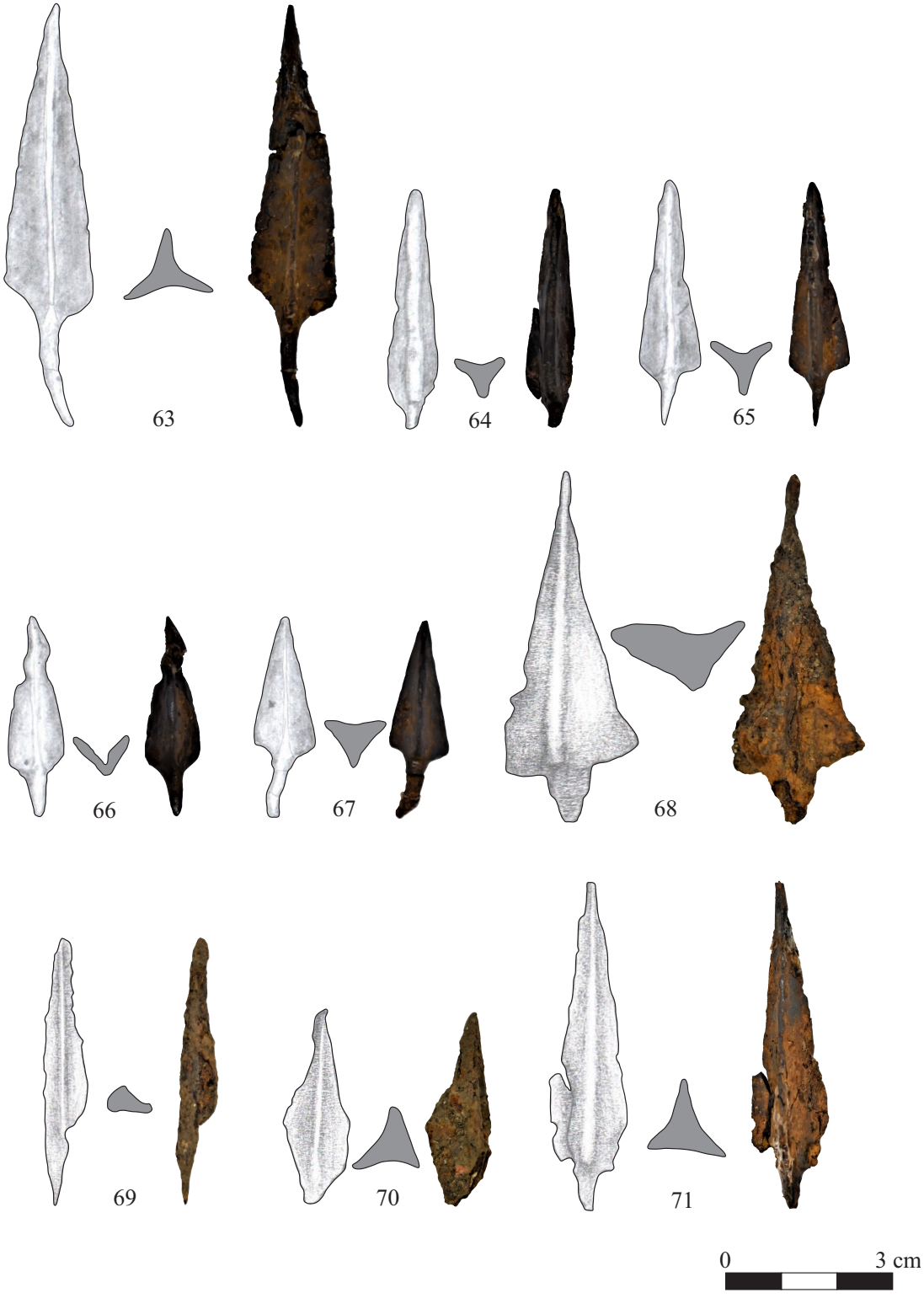
Pl. VI. Trilobate arrowheads type Zanier 2 (Cat. 35–43).



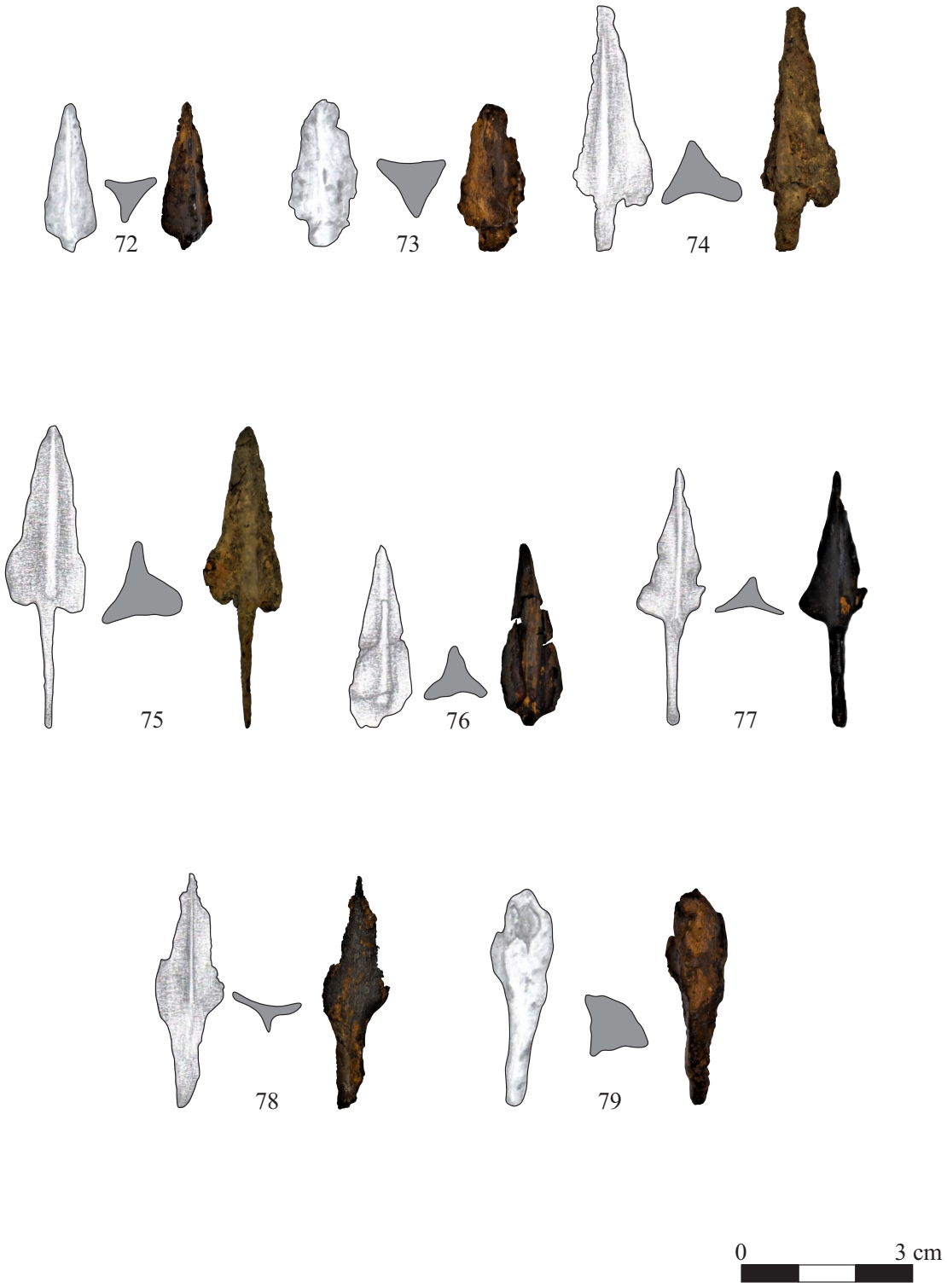
Pl. VII. Trilobate arrowheads type Zanier 2 (Cat. 44–53).



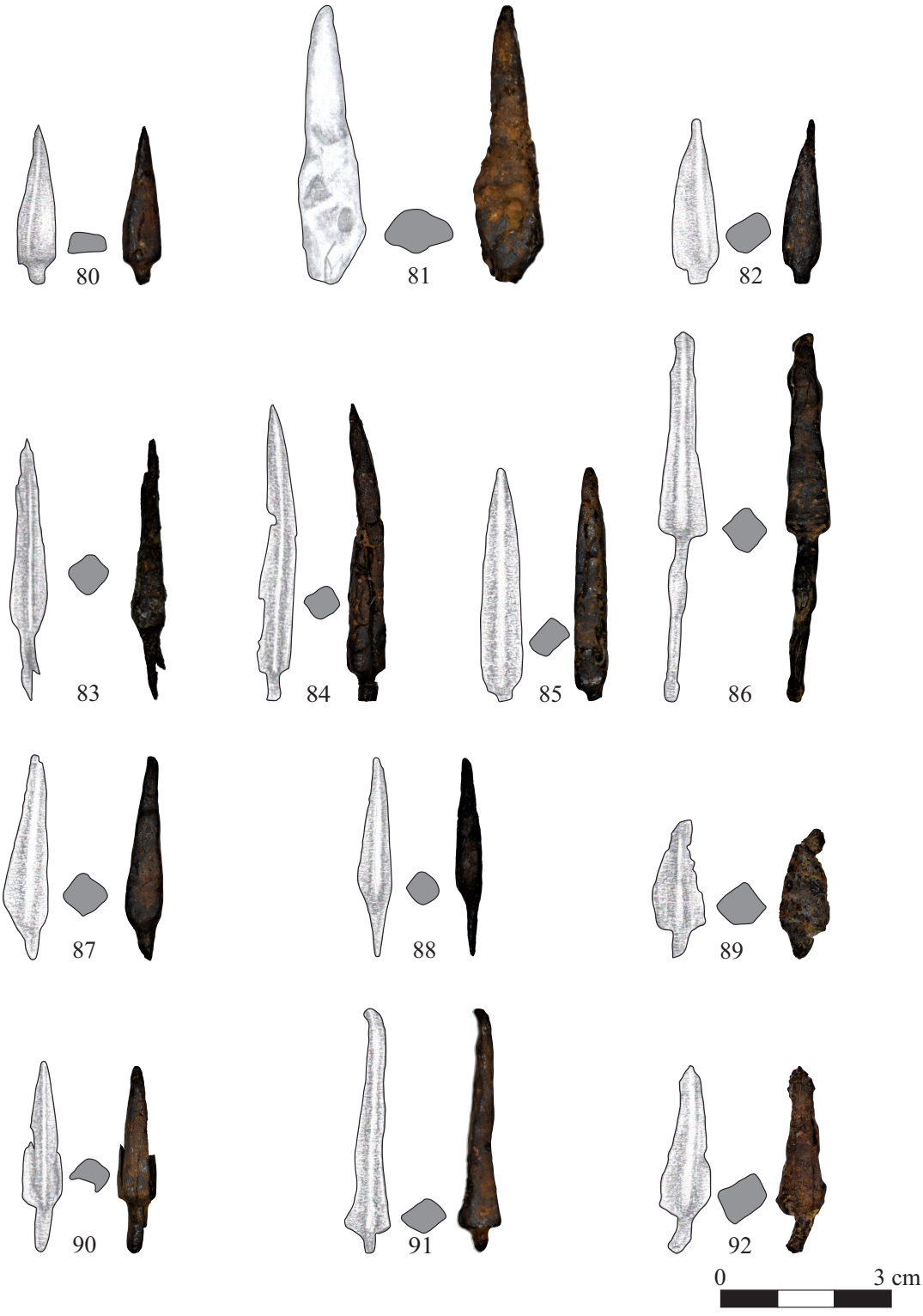
Pl. VIII. Trilobate arrowheads type Zanier 3 (Cat. 54–62).



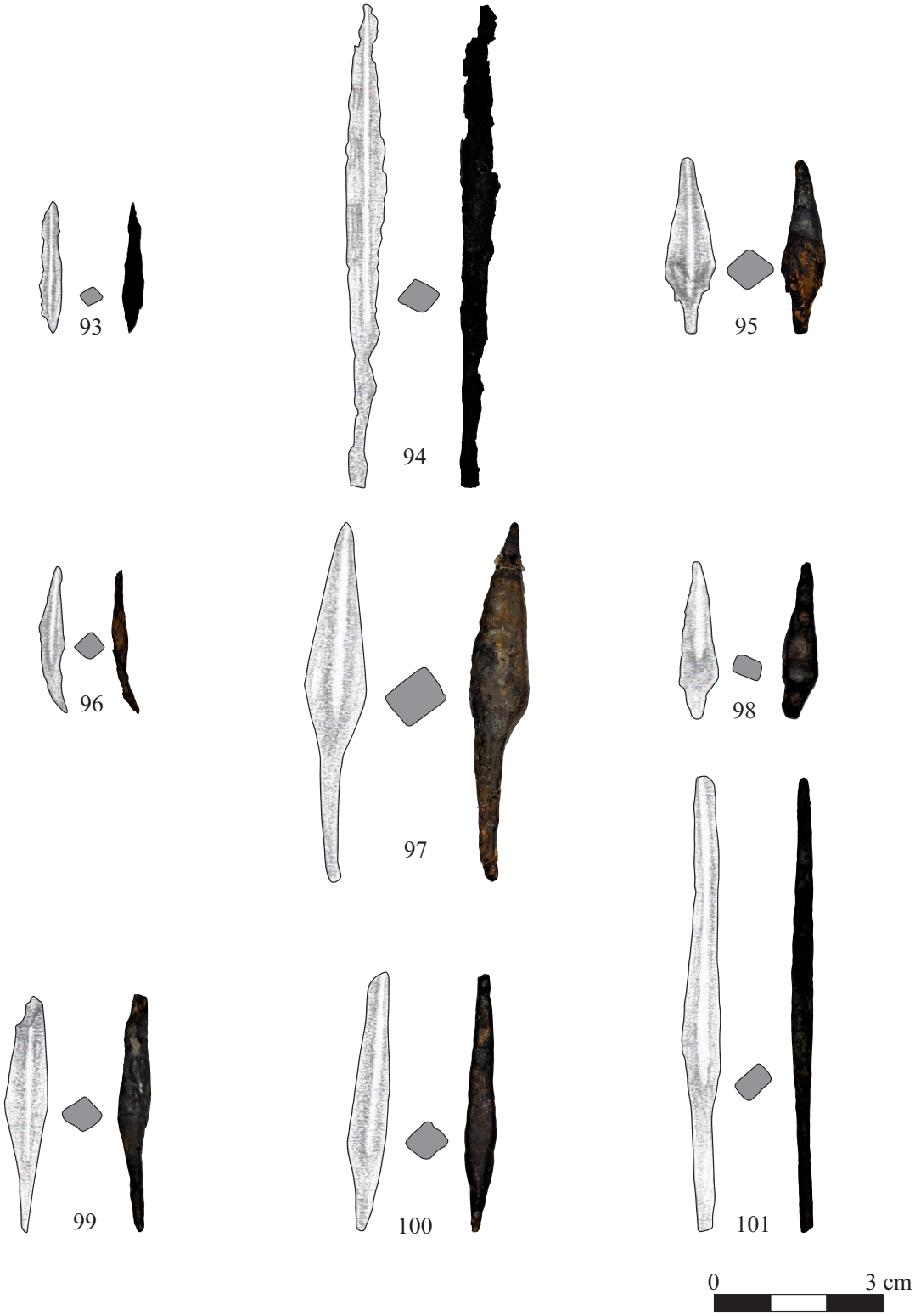
Pl. IX. Trilobate arrowheads type Zanier 3 (Cat. 63–71).



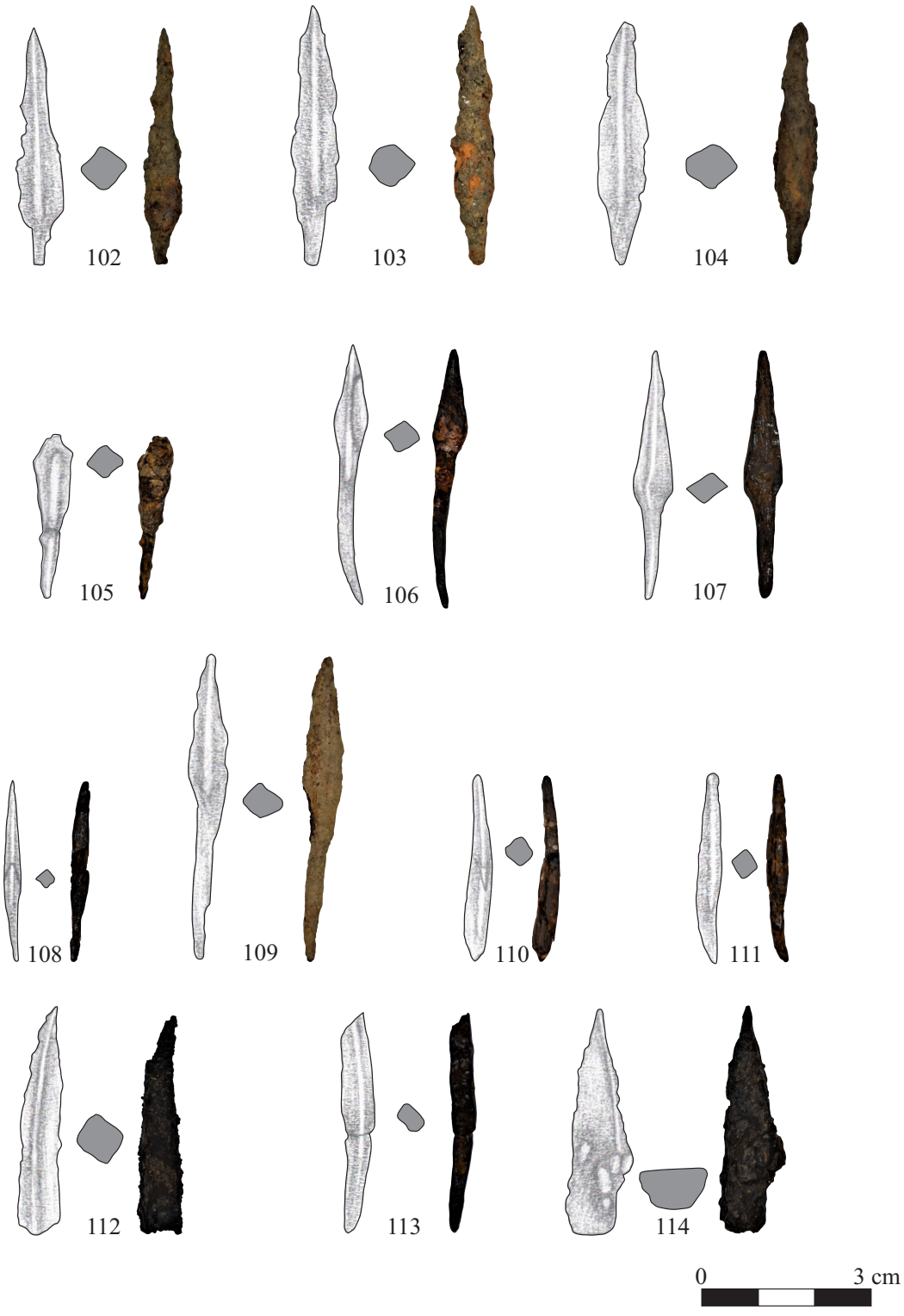
Pl. X. Trilobate arrowheads type Zanier 3 (Cat. 72–78); trilobate arrowhead (Cat. 79).



Pl. XI. Bodkin arrowheads type Gudea SAB3 (Cat. 80–82); Gudea SAB6 (Cat. 83–92).



Pl. XII. Bodkin arrowheads type Gudea SAB7 (Cat. 93–101).



Pl. XIII. Bodkin arrowheads type Gudea SAB7 (Cat. 102–111); bodkin arrowheads (Cat. 112–114).

Pl. XVI. Flat bladed arrowheads type Gudea SAA2 (Cat. 115); Gudea SAA3 (Cat. 116–119).

ABBREVIATIONS

ActaAntHung	Acta Antiqua Academiae Scientiarum Hungaricae, Budapest
ActaArchHung	Acta Archaeologica Academiae Scientiarum Hungaricae, Budapest
ActaMilMed	Acta Militaria Mediaevalia
ActaMN	Acta Musei Napocensis, Cluj-Napoca
ActaMP	Acta Musei Porolissensis, Zalău
ActaPraehist*A*	Acta Praehistorica et Archaeologica
AnB	Analele Banatului
Angustia	Angustia. Muzeul Carpaţilor Răsăriteni, Sfântu Gheorghe
Antiquity	Antiquity. A Quarterly Review of Archaeology
Apulum	Apulum. Acta Musei Apulensis, Alba Iulia
ArchÉrt	Archaeologiai Értesítő, Budapest
ArchKorr	Archäologisches Korrespondenzblatt, Römisch-Germanischen Zentralmuseum Mainz
ArhMold	Arheologia Moldovei
Banatica	Banatica, Muzeul Banatului Montan, Reşiţa
BAR (I.S./B.S.)	British Archaeological Reports, International Series / British Series, Oxford
BayVgBl	Bayerische Vorgeschichtsblätter
BerRGK	Bericht der Römisch-Germanischen Kommission
BHAUT	Bibliotheca Historica et Archaeologica Universitatis Timisiensis
BMA	Bibliotheca Musei Apulensis
BMusBrux	Bulletin des Musées Royaux d'Art et d'Histoire, Bruxelles
CA	Cercetări Arheologice
CommArchHung	Communicationes Archaeologicae Hungariae, Budapest
Complutum	Complutum. Publicaciones del Departamento de prehistoria de la Universidad complutense de Madrid
Crisia	Crisia. Muzeul Ţării Crişurilor, Oradea
Dacia (N. S.)	Dacia. Recherches et découvertes archéologiques en Roumanie, I–XII (1924–1948), Bucureşti; Nouvelle série (N. S.): Dacia. Revue d'archéologie et d'histoire ancienne, Bucureşti
DissArch	Dissertationes Archaelogicae ex Instituto Archaeologico Universitatis de Rolando Eötvös Nominatae, Budapest
EphemNap	Ephemeris Napocensis, Cluj-Napoca
EurAnt	Eurasia Antiqua
FI	File de Istorie. Muzeul de Istorie al Judeţului Bistriţa-Năsăud, Bistriţa
FolArch	Folia Archaeologica, Budapest
Germania	Germania. Anzeiger der Römisch-Germanischen Kommission des Deutschen Archäologischen Instituts
HOMÉ	A Herman Ottó Múzeum Évkönyve, Miskolc
JAHA	Journal of Ancient History and Archaeology
JAMÉ	A Nyíregyházi Jósa András Múzeum Évkönyve, Nyíregyháza
JASc	Journal of Archaeological Science
JbRGZM	Jahrbuch des Römisch-Germanischen Zentralmuseums, Mainz
JRA	Journal of Roman Archaeology

JRomMilSt	Journal of Roman Military Equipment Studies
JRS	The Journal of Roman Studies
KuBA	Kölner und Bonner Archaeologica
Marisia	Marisia (V–), Studii şi Materiale, Târgu Mureş
Marisia-AHP	Marisia: Archaeologia, Historia, Patrimonium, Târgu Mureș
MCA	Materiale şi Cercetări Arheologice, Bucureşti
MFMÉ	A Móra Ferenc Múzeum Évkönyve, Szeged
Oltenia	Oltenia. Studii și comunicări. Istorie-Arheologie
OxfJA	Oxford Journal of Archaeology
PBF	Prähistorische Bronzefunde, Stuttgart
ProcPrehistSoc	Proceedings of the Prehistoric Society
PZ	Praehistorische Zeitschrift
RA	Revue archéologique
RadMV	Rad vojvođanskih muzeja (1994- Rad Muzeja Vojvodine)
ReiCretActa	Rei Cretariae Romanae Fautorum Acta, Tongeren
RevBis	Revista Bistriţei, Complexul Judeţean Muzeal Bistriţa-Năsăud
SaalbJb	Saalburg-Jahrbuch. Bericht des Saalburg-Museums
Sargetia (S.N.)	Sargetia. Acta Musei Devensis, Deva
SCIV(A)	Studii şi Cercetări de Istorie Veche (şi Arheologie 1974–), Bucureşti
SlovArch	Slovenská Archeológia, Bratislava
SMIM	Studii și Materiale de Istorie Medie
StComBrukenthal	Studii şi comunicări – Muzeul Brukenthal
SUBB-Historia	Studia Universitatis Babeş–Bolyai, series Historia, Cluj-Napoca
Századok	Századok, A Magyar Történelmi Társulat Folyóírata, Budapest
Tibiscum	Tibiscum. Studii și comunicări. Muzeul Județean Caransebeș
Tisicum	A Jász-Nagykun-Szolnok Megyei Múzeumok Évkönyve
Tyragetia	Tyragetia. The National Museum of History of Moldova, Chișinău
UPA	Universitätsforschungen zur Prähistorischen Archäologie, Bonn
Ziridava	Ziridava (–2012 Studia Archaologica)
ZMúz	Zalai Múzeum. Közlemények Zala Megye Múzeumaiból
ZPE	Zeitschrift für Papyrologie und Epigraphik

MARISIA. ARCHAEOLOGIA, HISTORIA, PATRIMONIUM

With a publishing tradition since 1965, in 2019 the annual of the Mureş County Museum initiated a new series entitled: *Marisia. Archaeologia, Historia, Patrimonium*. The publication provides a panel for new research results in archeology, architecture and material heritage of the history of arts and culture. The studies mainly focus on the inner Transylvanian region that encompasses also Mureş County. Beyond local valuable contributions, the annual aims at a regional and global concern that is relevant for the whole of Transylvania. Among the annual's missions is to provide mutual interpretation of the research results produced by the Romanian and Hungarian scientific workshops. Therefore, the annual articles are mainly in English but based on the field of research and the approached topic studies in German, Romanian or Hungarian are also accepted.

Cu o tradiție din anul 1965, anuarul Muzeului Județean Mureș s-a relansat în 2019 sub titlul *Marisia. Archaeologia, Historia, Patrimonium*. Această publicație se descrie ca o platformă științifică care cuprinde rezultatele cercetărilor în domenii precum: arheologia, arhitectura și patrimoniul material din zona istoriei artelor și a culturii, studii localizate în regiunea centrală a Transilvaniei, din care face parte județul Mureș. In extenso, anuarul își propune să ofere un spațiu unitar contribuțiilor științifice valoroase, relevante din perspectiva geografică a ceea ce înseamnă întreaga regiune a Transilvaniei. Una dintre misiunile publicației este aceea de a oferi tuturor celor interesați spațiul de schimb pentru cele mai noi rezultate din atelierele științifice românești și maghiare. Articolele anuarului sunt scrise în general în limba engleză, existând totodată articole scrise în germană, română și maghiară, în funcție de specificul domeniului și a temei abordate.

A Maros Megyei Múzeum 1965 óta megjelenő évkönyvének 2019-ben útjára bocsátott új sorozata, a *Marisia. Archaeologia, Historia, Patrimonium* elsősorban a mai Maros megyét is magába foglaló belső-erdélyi régió régészeti, épített és tárgyi örökségére, nemkülönben az ezekhez kapcsolódó művészettörténeti, művelődéstörténeti kérdésekre vonatkozó újabb kutatások tudományos fóruma. A lokális perspektíván túl igyekszik kitekinteni a regionális és univerzális összefüggésekre, így a tágan értelmezett Erdély területére nézve is közöl kiemelkedő értékkel bíró tanulmányokat. Küldetésének tekinti a hazai román és magyar tudományos műhelyekben született eredmények kölcsönös tolmácsolását. A dolgozatok nyelve főként az angol, de szakterülettől és témától függően német, román vagy magyar nyelven is közöl írásokat.