A jeweller toolkit discovered at Sarmizegetusa Regia (Grădiștea de Munte, Hunedoara county)[1]

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Abstract. The jeweller toolkit object herein was discovered on a small terrace, conventionally termed terrace VIII A located just nearby the fortress and sanctuary at Sarmizegetusa Regia. It is a deposit of iron artefacts, lying in a pit lined with stones. The items in its composition represent most likely the toolkit of a jeweller. The deposit contains 48 complete or fragmentary artifacts, as follows: 30 iron tools (an anvil, a hammer, a pair of tongs, a calliper, ten files, nine chisels, two punches, a drawknife, a rake, a small spoon-like tool, a drill bit and a small knife), three crampons and one iron link, a whetstone and a knob/bead made of glass, four nails (complete and fragmentary), six fragments of pieces, difficult to identify, and two plates, one of iron and the other of bronze. Their diversity makes the toolkit unique among the finds in Dacia and, also, one of the most complex finds of the type in the ancient world. The jeweller toolkit dates back to the second half of the 1st century AD and early 2nd century AD.

Keywords: Sarmizegetusa Regia, jeweller toolkit, goldsmithing, the Dacians, La Tène.

Rezumat. O trusă de bijutier descoperită la Sarmizegetusa Regia (Grădiștea de Munte, jud. Hunedoara). Trusa de bijutier care face obiectul studiului de față a fost descoperită pe o terasă de mici dimensiuni, denumită convențional Terasa VIII A, aflată în imediata vecinătate a fortificației și a sanctuarului de la Sarmizegetusa Regia. Este vorba de un depozit de piese de fier, aflat într-o groapă căptușită cu pietre. Piesele care compun depozitul constituie, după toate probabilitățile, instrumentarul unui meşter orfevrar. Depozitul conține 48 de piese întregi sau fragmentare, după cum urmează : 30 de

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unelte de fier (o nicovală, un ciocan, un cleşte, un compas cu funcţie de şubler, zece pile, nouă dălţi, două punctatoare, o cuțitoaie, un răzuitor, o linguriță, un sfredel şi un cuțitaş), trei crampoane și o verigă din fier, o cute de piatră şi un buton / mărgea din pastă de sticlă, patru cuie (întregi şi fragmentare), șase fragmente de piese, greu de identificat şi două plăcuțe, una de fier şi cealaltă de bronz. Diversitatea pieselor face ca trusa să fie unică între descoperirile din Dacia şi, totodată să fie una dintre cele mai complexe descoperiri de acest tip pentru lumea antică. Trusa de bijutier se datează în intervalul cronologic cuprins între a doua jumătate a secolului I e.n. și începutul secolului al II-lea e.n.

Cuvinte cheie: Sarmizegetusa Regia, trusă de bijutier, orfevărie, daci, La Tène.

One of the specificities of the Dacian capital of Sarmizegetusa Regia (Grădiştea de Munte), consists in the quality, quantity and diversity of the artifacts discovered during the archaeological excavations carried out there. Many, were locally produced (tools and iron weapons, pottery, precious metal objects and glass etc.).

Numerous workshops functioned at Sarmizegetusa Regia before the wars with the Romans by early 2nd century AD, built on the terraces of the civilian quarters or just nearby the fortress. Smithing workshops were archaeologically investigated in the civilian settlement, like the one in the place called *Căprăreața,*[2] but also the "bronze and iron working" workshop discovered in the western quarter of the settlement.[3] A group of workshops performing various types of activities functioned near the fortress and the sacred area, namely on terrace VIII.[4]

The jeweller toolkit object herein was discovered on a small terrace, conventionally named terrace VIII A, located just nearby the workshop on terrace VIII, from which it is separated only by a slight

[2] Glodariu 1975, 107-134.

[3] Daicoviciu et al. 1955, 208-209.

[4] Daicoviciu et al.1952, 297-302; Glodariu et al. 1997, 50; Glodariu et al. 1996,103-104; Glodariu/ Iaroslavschi 1979, 39; Iaroslavschi 1997, 100-101; Gheorghiu 2005, 148, 155, 174; on the terraces of the civil settlement at Grădiştea de Munte, in the recent years were discovered hundreds of iron objects. How numerous were the workshops making such objects is hard to say. Should we keep in mind that over 30 anvils were found insofar, it may be assumed their number was rather high. Iaroslavschi 2006, 260. Beside the smithing and goldsmithing workshops, in the settlement there functioned at least one coin workshop and a glass workshop.

land dislevelment. The terrace was archaeologically investigated during the campaigns conducted in 1995 – 1997, by a few parallel trenches (S IV/1995, SII/1996, S IV/1996). The stratigraphy in the three trenches (from up downwards) is as follows: 1. modern humus; 2. Dacian level II (marked by a pit and a limestone block); 3. the terrace levelling and filling level (for level II); 4. Dacian level I; 5. the terrace filling. Towards the valley, the terrace filling was supported by a small "wall" made of rock-cut or of mica-shist slabs bound with earth.[5] It is believed that a workshop functioned there, built in timber placed on a limestone block base, without wall plastering. The building was burnt down, which made any layout restoration impossible.

The artefacts discovered in the three trenches consist of iron objects,[6] pottery[7] and glass.[8] The most interesting find comes from S IV/ 1996. It is a deposit of iron items, found in a pit lined with stones. The archaeological feature belongs to the second Dacian level on terrace VIII A (it is the latest level, dated based on the partly above mentioned finds, to the second half of the 1st century AD – early 2nd century AD). Several small nails (most likely from a wooden box containing the tools) were found together with the pieces composing the deposit. An iron crampon, with mobile extremities, was also found placed on the top of the tools in the deposit.

The objects that compose the deposit mainly belong to a kit of a goldsmith. It contains a total of 48 pieces: 30 iron tools (an anvil, a hammer, a pair of iron-tongs, a calliper, ten files, nine chisels, two pin-punchers, a drawknife, a rake, a spoon-like tool, a drill-bit and a small knife), three crampons and an iron link, a fine whetstone and a knob / bead made of glass paste (pl. I). To these also add four nails (complete and fragmentary), six fragments of various pieces, difficult to identify and two fragments of metal sheets, one of iron and the other of bronze. The diversity of its contents makes the kit unique among the finds in

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[5] Glodariu et al. 1997, 50.

[6] Amongst we mention an axe, a deposit of hoes and adzes (found near a limestone block, likely from the timber structure base, set in such a manner to occupy as little space as possible), a massive punch, a large fragmentary knife etc.

[7] The pottery fragments come from large vessels (storage vessels), bowls with pedestals or with foot rings etc. To these add two pottery fragments with incised sings after firing (*graffiti*), a fragment of a Roman lamp and so on.

[8] For instance, a fragment of a bottle base and a glass lump.

Dacia and also one of the most complex finds of the type in the ancient world. The kit inventory, which we shall present below, includes almost all types of metal tools necessary for activities related to goldsmithing.[9] The artefacts are held in the collections of the National Museum of Transylvanian History, in Cluj-Napoca (Romania).

Of various shapes and sizes, jewellery making anvils are usually made of iron or bronze.[10] The jeweller toolkit from Sarmizegetusa comprised only a small **anvil,** square and four-legged (*VD 2450;* pl. II/1, pl. VII/1). The working surface is slightly bulging midway, being wider compared to the anvil body. It is 9.1 cm tall and has an upper part of 8 x 7.9 cm, copying at a smaller scale anvils frequently discovered in the blacksmith workshops at Sarmizegetusa Regia.[11]

The hammer having two faces and an eye (*VD 2451;* pl. II/3, pl. VII/2). Part of its body has a circular cross-section, while the active face is also circular, slightly larger than the body. The other face has a quasi-rectangular cross-section (with rounded corners) and a rectangular active part, being wider and flatter towards the tip.

Sizes: length 16.3 cm, max. width (in the handle orifice area) 2.7 cm, circular extremity diameter 2.2 cm, sizes rectangular extremity 2.6 x 0.6 cm, d. handle orifice 1.5 cm.

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[9] For metal tools used in goldsmithing on the territory of Dacia see Glodariu/Iaroslavschi 1979, 96-103; Iaroslavschi 1997,67-71; Rustoiu 1996, 66-88; Rustoiu 2002, 83-90. Amongst the tools mentioned by the authors above, the jeweller toolkit from Sarmizegetusa Regia lacks the chisels with handle and drawplates. On the other hand, among the tools that the archaeological investigation of the smithing workshop on terrace VIII yielded also counts a drawplate, a tool used for making wires of soft metals (silver or gold) and which, at least theoretically, is a piece which belongs to the goldmsmith rather than the smith. The association between smithing workshops and those making other metal pieces is in fact common in the ancient world. This seems to be the case of the jeweller toolkit found just nearby the smithing workshop at Grădiştea de Munte, unless it was part of the inventory of precisely this workshop, hidden most likely in a time of crises.

[10] A. Rustoiu identifies at least 7 anvil types that might have been used in jewellery making workshops. Rustoiu, 1996, 68-70.

[11] Glodariu/Iaroslavschi 1979, 44-45, fig. 9/3; Iaroslavschi 1997, pl. XXIX/3. Anvils of the type, yet of much larger sizes, were used in metal processing workshops in the Roman world (from where the Dacians likely assumed them), ocassionaly depicted in the reliefs of the Roman environment like those at Rome (Reddé 1978, 56, fig.2), Gorzegno or Aquileia (Pleiner 2006, 95, fig 43/2-3; Tran 2011, fig 74).

Similar specimens (however of other sizes) come still from Sarmizegetusa Regia, some even from the workshop on terrace VIII, lying just nearby the spot where the jeweller toolkit was found.[12]

A special item in the kit inventory is the **tongs with locking bar** (*VD 2452;* pl. II/2, pl. VII/3). The tongs jaw has a simple grip, made of two overlapping flat parts, rather wide and thick. In the junction area of the two sides of the tongs, the body of each part widens in the shape of a rhomb, tapering towards the jaw. The two sides are attached by a rivet. The handles are rectangular in cross-section in the junction area and circular towards the extremities. One of the handles is ending with a ring where a locking bar was attached (with another ring). The other handle tapers towards the tip (hence the nail appearance), for it was inserted in one of the orifices of the locking bar thus ensuring, during operations, a certain span of the tongs jaw. The locking bar was provided with 8 orifices (the eighth survived fragmentarily, the item being broken in that spot) of various sizes, set at unequal distances one from the other.

Sizes: length 21.5 cm, handle length 15 cm, opening width 1 cm, locking bar length (attachment ring included) 8.5 cm, width 1.4 cm, thickness 0.2 cm, orifices diameter between 0.3 and 0.5 cm.

Jeweller tongs are rather rare among finds, a few specimens coming from Sarmizegetusa Regia.[13] Until present, two specimens with locking bar are known, one found in the fortress at Căpâlna (the locking bar of these tongs was provided with three orifices)[14] and the second in the settlement at Răcătău (in this case, the locking bar was provided with four indentations instead of orifices).[15]

Another piece in the tools kit inventory, unparallel in Dacia until now, is a **calliper** (*VD 2438;* pl. III/1, pl. XI/6). The piece, preserved complete, has its legs strongly curved, widened in the form of a ring in the upper part and attached by a rivet. The arms are made of a bar, rectangular in cross-section; they are wider in the upper part and taper in the lower part.

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[12] Glodariu/Iaroslavschi 1979, 97-98, fig. 53/13-16; Rustoiu 1996, fig.22/2-7.

[13] Glodariu/Iaroslavschi 1979, 101.

[14] Glodariu/Iaroslavschi 1979, 101; http://dacit.utcluj.ro/scandb/?page?=scandb#/model/223/ro.

[15] Căpitanu 1985, 48, fig. 6/a.b.c. The piece was interpreted by the author as a pair of vine scissors. The accurate interpreting (that of a pair of tongs with locking bar) belongs to Rustoiu 1996, 72.

Sizes: height 10 cm, max. thickness arm 0.6 x 0.45 cm, ring diameter 1.4 cm.

Originally identified, when found, as a compass, of a special type among the Dacian objects in the Orăştie Mountains area, the piece is rather a calliper, enabling the measurements and sizing of certain objects.[16] Other pieces of the kind were not further identified in the Dacian world, being instead rather frequent in the Roman world,[17] similar tools being discovered at Rome[18] or Pompeii.[19] Sometimes, callipers of the type are depicted on Roman funerary reliefs.[20]

The tools kit also includes ten **files of various shapes and sizes**, of which eight survived complete and two only fragmentarily (pl.IV/2 partial).

1. File of semi-round section, average sizes, with handle tang (*VD 2463;* pl. VIII/1). The teeth are well preserved (in the form of squares of very small sizes) on both sides of the file. The handle tang is triangular and separated from the file body by a necking. The file point was broken as early as the Antiquity. Sizes: total length 20.6 cm, body length 14.7, max. width 1.9 cm, thickness between 0.7 cm by the base and 0.3 by the tip.
2. File of rectangular section and average sizes (*VD 2469;* pl. VIII/2). Preserving teeth traces (in the form of parallel, horizontal lines) on all four sides of the piece. The tool body is divided from the tang allowing the handle attachment by a barely visible necking. The file has a slightly rectangular shape, which it preserves midway the body, from where it starts to slightly taper towards the point (it lacks only a small part). The handle has a triangular shape and a rectangular cross-section.

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[16] In general, it is believed that the objects of the type were used in sculpture to measure thicknesses and inner diameters. http://archeoroma.beniculturali.it/ParoleDiPietra/archeologia_01bottega.htm

[17] Hanemann 2014, 456, fig. 376/3.

[18] http://archeoroma.beniculturali.it/ParoleDiPietra/archeologia_01bottega.htm

[19] Most specimens from Pompeii are made of bronze. Di Pasquale 1994, 642, fig. 10; Di Pasquale 1999, 288, 308, fig. 388. A bronze callipers with silver inlays on both legs in the collection of the University College of London was published by W.M.F.Petrie - Petrie 1917, 60, pl. LXXII/ 223.

[20] An example to this effect is the funerary relief of a family of *agrimensores* at Rome - Di Pasquale 1994, 642, fig 7.

Sizes: total length 20 cm. Body length 15 cm, max width 1.2 cm, thickness 0.25-0.60 cm.

3. File of rectangular cross-section, slightly thicker than the preceding (*VD 2467;* pl. VIII/3). Preserving teeth marks on all four sides (in the form of parallel, horizontal lines). The file body is separated from the handle tang by a small necking and tapers very little towards the tip. The handle tang is triangular and has a rectangular section, being damaged by the end. The item preserves its thickness almost on the entire length tapering only towards the tips (of the body, respectively the handle). Sizes: total length 23.2 cm, body length 17 cm, max. width 1.5 cm, thickness 0.7 cm.
4. File of rectangular cross-section, similar with the preceding, yet without damaged handle (*VD 2466;* pl. VIII/4). Sizes: total length 23 cm, body length 16.6 cm, max. width 1.3 cm, max. thickness 0.6 cm.
5. File with rectangular cross-section similar to the preceding (*VD 2468;* pl. VIII/5). The necking between the body and handle is slightly better marked. Sizes: total length 20.7 cm, body length 16.3 cm, max. width 1.3 cm, max. thickness 0.7 cm.
6. File similar to the preceding, yet more massive (*VD 2464;* pl. VIII/6). Sizes: total length 24.5 cm, body length 19 cm, max. width 1.4 cm, max. thickness 0.9 cm.
7. File similar to the preceding, has the tip broken from Antiquity (*VD 2465;* pl. VIII/7). Sizes: surviving length 20 cm, body length 13.5 cm, max. width 1.3 cm, max. thickness 0.6 cm.
8. Iron file of rectangular cross-section, somewhat smaller, broken tip (*VD 2445;* pl. VIII/8). Preserving teeth marks on two sides (in the form of parallel lines). The file body tapers towards the handle forming a triangular tang, with a rectangular cross-section. Sizes: length 11 cm, max. width 0.8 cm, max. thickness 0.4 cm.
9. Fragment of iron file (*VD 2471;* pl. VIII/9). The item, with approximately circular cross-section, is broken by the tip from Antiquity. The body file still exhibits visible the teeth marks. The attachment tang is triangular and sharpened by the tip. The differentiation between the file body and the attachment tang is made only by a change to the cross-section of the item. Sizes: total surviving length 9.6 cm, max. body diameter 0.8 cm.

10. Iron file fragment (*VD 2442;* pl. VIII/10). The item had a triangular cross-section and still preserves the teeth marks (perpendicular to the body, in the form of parallel grooves). Sizes: surviving length 8.5 cm, max. width 1 cm.

Noticeably, the toolkit contains several file types, which vary according to sizes, the cross-sections of the active parts or the teeth types present on the tool body. Small-teeth iron files were auxiliary tools used in smithing and goldsmithing workshops in order to remove the metal surplus and finish certain items.[21] The teeth cut and their sizes were often used to divide these tools in fine or coarse files. They were produced and used depending on the material type which they were supposed to be used on. Thus, coarse files were used on soft materials, while the fine files were used on somewhat harder materials.[22] Most of the files in the toolkit inventory (6 specimens) have a rectangular section and teeth made in the form of parallel and horizontal lines, present on all four sides of the piece body (pl. V/2).[23] Also, the slight semicircular notch on both sides of the item marks the difference between the file body and the handle tang.[24] The sizes of the pieces in this category vary between 20 and 24.5 cm. In Dacia, files were also discovered in the workshops found in the settlement at Sarmizegetusa Regia and in the fortress at Costeşti,[25] yet the specimens in the jeweller toolkit are of a special shape. This type of file with a necking between the handle and the proper body of the piece is infrequent in the Roman world. For instance, two similar artifacts come from the site at Avenches, one of the items dating, due to the find context, to the end of the 1st c. AD – early 2nd c. AD.[26] The other four specimens in the jeweller tools kit are

[21] Iaroslavschi 1997, 74.

[22] Duvauchelle 2005, 28.

[23] The files of rectangular cross-section (also termed flat files) are frequent also in the Roman world where they represent ca. 40% of the total of found pieces. In addition, the horizontal setting of the teeth, even though less practical, is frequent on these tools, the transversal setting of the teeth (which appears in the 1st c. AD) spreading rather difficult. Files of the type are commonly used for finishing certain flat pieces. Duvauchelle 2005, 28; Gaitzsch 1980, 54.

[24] Most likely, these semicircular spots marked the place where the thumb was placed when handling the tool. Duvauchelle 2005, 28.

[25] Glodariu/Iaroslavschi 1979, 55.

[26] Namely, two pieces with a length of 27 cm, respectively 33.5 cm, provided with semicircular notches between the body and handle, one with a rectangular cross-section and the other with an almond-shaped section. The latter was found

different, each with their own section type (semi-round, circular,[27] triangular), sizes or teeth making. The piece with semi-round section, semicircular notches and teeth likely made with the aid of a stamp (Pl. V/1) is also paralleled in the site at Avenches.[28] In the respective case, the piece was interpreted as file used in woodworking, bone or even stone processing activities.[29]

Another category of auxiliary tools present by nine specimens in the jeweller toolkit from Grădiștea de Munte is represented by **chisels** (pl. IV/1). The items, of relatively small sizes, may be divided into two categories: massive chisels of rectangular shape, straight blade and bevel flattened due to use (3 specimens) and chisels with a slender body with an either rectangular or circular section (or a mixture of both) (6 specimens). The blade of the latter is either straight, or oblique and usually, very sharp.

1. Massive iron-made chisel of rectangular cross-section, slightly bulging midway, tapering towards the point (*VD 2456;* pl. IX/1). Slightly narrowed and sharpened head, in the form of a blade (partially damaged). The bevel, flattened by repeated blows, has an approximately circular shape. Sizes: length 11.8 cm, max. width 1.4 cm, thickness 1.1 cm.
2. Massive chisel similar to the above, yet with an almost square cross-section (*VD 2461;* pl. IX/2). It has a chipped point and the bevel is strongly "splayed" due to use. Sizes: length 15.1 cm, max. width 1.5 cm, thickness 1.2 cm.
3. Chisel similar to the above, the piece body has a polygonal cross-section and the active part is in the shape of a sharp blade (*VD 2460;* pl. IX/3). Sizes: length 12 cm, max. width 1.7 cm, thickness 1.4 cm.
4. Iron chisel with a straight-cut sharp point (*VD 2441;* pl. IX/4). Broken from Antiquity, it has a circular body in the upper third, rectangular towards the blade. Sizes: length 11.7 cm, body diameter 1 cm, blade width 0.9 cm.

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in a demolition layer related to a casting pit used for making a bronze statue, beside a chisel. Duvauchelle 2005, 26, cat 48-49, pl.7/48-49.

[27] The files with circular or semi-round section were mainly used for mouldings and orifices. Duvauchelle 2005, 28.

[28] Duvauchelle 2005, cat 143, pl.227/143, with the note that the specimen at Avenches is much longer, namely 38.5 cm.

[29] Duvauchelle 2005, 56.

5. Iron chisel with sharp edge, cut obliquely and slightly wider than the body (*VD 2457;* pl. IX/5). It has a circular cross-section in the upper body half, rectangular in the lower. Sizes: length 12.1 cm, body diameter 0.9 cm, blade width 0.9 cm.
6. Chisel of rectangular cross-section, broken in the point area, slightly widened in the bevel area (*VD 2453;* pl. IX/6). Similarly to the preceding chisels, the upper part has an approximately circular cross-section. Sizes: length 15.5 cm, max. width 0.8 cm, maximum diameter (in the bevel area) 1.3 cm.
7. Chisel with straight blade, sharp and chipped from Antiquity. The piece body is rectangular in cross-section and wider towards the tip (*VD 2454;* pl. IX/7). Sizes: length 10.5 cm, max. width 0.9 cm.
8. Chisel with an oblique-cut tip and rectangular cross-section body (*VD 2455;* pl. IX/8). Sizes: length 16.3 cm, max. width 0.8 cm.
9. Iron chisel fragment (*VD 2472 ;* pl. IX/9). The tool's body has a round cross-section, in the lower third changing into a rectangular one tapering towards the tip forming a blade. It may be a chisel, according to the present blade, but also a round cross-section file (although the teeth are no longer visible on the body). Both ends of the piece are damaged. Sizes: surviving length 10.4 cm, max. diameter 0.8 cm, blade width 0.6 cm.

Chisels are tools mainly used for cutting metal or for making incisions on metal items. In the case of the jeweller toolkit, chisels may be divided into two categories: cutting tools (the pieces with massive body, wide and straight blade) and decorating tools (the specimens with slender elongated body and fine, narrow blade). The chisels in the first category might have been used for cutting metal pieces, either hot or cold.[30] In the case of the three tools in the jeweller toolkit, they were very likely used to punching out metals when cold, hence their massiveness, their

[30] Duvauchelle 2005, 25. When used for punching out already heated metals, they have a somewhat elongated body to prevent hands burns, while the area of the hammer blows is almost not deformed (since the metal was soft, the necessary force applied for its cutting was not very high).

relatively short body and strongly battered head by hard usage. The chisels used for metal cutting were discovered in several Dacian sites,[31] with parallels in numerous sites in the ancient European space.[32] A specimen similar with those in the jeweller toolkit, yet of somewhat smaller sizes (7.6 cm), was discovered in the site at Avenches, dating back to the last half of the 1st c. AD/first half of the 2nd c. AD – end of the 2nd c. AD.[33]

The chisels in the second category, commonly used by goldsmiths or bronze artisans, may be of various sizes, depending on the operations they were used for;[34] they are rather frequent finds both in Dacia and in the Celtic or Roman worlds. The closest analogy for the items at Grădiştea de Munte are the chisels discovered in the workshop at Pecica (in this case, they are made of bronze and not iron like at Sarmizegetusa Regia),[35] those found in the hoard at Ošanići[36] or those discovered at Galjub.[37]

Still for marking, tracing, decorating or piercing small orifices in metal **punches**[38] were also used. The toolkit contains two such items:

1. Punch of a rectangular cross-section (almost square), sharpened by the tip (*VD 2458;* pl. X/1). The part hammered during operations is bevelled and damaged. Sizes: length 9.6 cm, max. width 0.6 cm.
2. Punch of a rectangular cross-section (square in the upper side, rectangular in the rest) sharpened by the point (*VD 2459;* pl.

[31] Glodariu/Iaroslavschi 1979, 54.
[32] Manning 1985, pl 5; Pietsch 1983, pl. 11/230-234.
[33] Duvachelle 2005, cat 23, pl. 4/23. According to the author, the piece might be dated even more accurately, between AD 70 and 120.
[34] The items might have been used to make decorations on plates, to make incised/engraved motifs on various metal objects, for finishing cast pieces etc. In some cases, chisels might have been used for making wax models necessary for bronze casting by lost-wax. Ippel 1922, 82.
[35] Crişan 1969, 96, pl.V, 1-4, 10-11.
[36] The chisels at Ošanići have their sizes between 7 and 10.4 cm, being slightly smaller than those at Grădiştea de Munte; Marić 1978, 31, fig. XXIX/103-112; Gebhard 1991, 7, fig. 6.
[37] Ippel 1922, 81-82, tafel X/109-113. They are also made of bronze.
[38] The items are also called stamps. Due to their very slender shape and sizes which hinder its handling only by fingers instead of a full hand, M. Pietsch believed that punches were used for decorating not so hard materials (for instance metal sheet). Pietsch 1983, 39.

X/2). The other end is bevelled and splayed. Sizes: length 7.8 cm, width 0.4-0.5 cm, thickness 0.1- 0.6 cm.

The two punches are very similar in shape with the bolts or massive iron nails. The rectangular shape, the flattened and damaged end (due to repeated blows) and the very sharp tip, as well as their association with the other items in the toolkit suggest they were used as tools rather than building materials. Punches, of other types than the ones already described, are known for now only in the Dacian sites at Costeşti and Sarmizegetusa Regia,[39] being though rather frequent in the Roman world.[40]

Interestingly, among the items composing the jeweller toolkit, tools known rather for their use in wood processing than metal were also found: **a drawknife, a rake, a small spoon-like tool, a drill-bit and a small knife**. Nevertheless, compared to the tools of the same type frequently used in carpentry-masonry, the ones found in the kit are of much smaller sizes.

1. Small drawknife with curved blade and perpendicular handles onto the blade (*VD 2437;* pl. X/3). The active part of the piece (the blade) is thicker in the upper part, tapering towards the point and is strongly curved. The drawknife had two handles, of which only one is complete, including the end part, sharp and bent at 90 degrees. The other handle, preserved partially, is slightly deformed. The handles are of rectangular shape, wider towards the blade and thinner towards the end. Sizes: total length 18.5 cm, max. width 13.1 cm, blade length 11.2 cm, blade width 1.9 cm, blade thickness 0.1- 0.4 cm.
2. Small rake (*VD 2439;* pl. VI/1, pl. X/4). The blade survived fragmentarily, being in the shape of a trapezoid plate with a sharp cutting edge, and slightly inverted. The item is provided with a rectangular rod, sharpened towards the end, bent at almost straight angle towards the body of the tool. Sizes: total length 14 cm, max. width (in the surviving active part) 3.6 cm, blade thickness 0.1 cm.
3. Spoon (?) (*VD 2446;* pl. III/2, pl. X/5). It is slightly concave, with raised edges ending straight. The active side is slightly sharpened, curved in cross-section and cut straight. The spoon

[39] Glodariu/Iaroslavschi 1979, 54-55.

[40] Pietsch 1983, 38-39, taf. 12/258-274; Manning 1985, 9-11.

scoop extends by a rectangular section rod, bent in relation to the piece body and sharpened by the end. Sizes: total length 8.9 cm, max. width 1.8 cm.

4. Drill-bit (?) (*VD 2470;* pl. XI/1). The piece is made of an iron rod having two distinct parts: the upper part, in four edges is sharpened by the tip (likely to allow the attachment of the handle) while in the lower part (of smaller sizes and mixed cross-section, rectangular and circular) is provided with a sharp blade, slightly curved. The blade is damaged from Antiquity. Sizes: total length 20.4 cm, max. width 1 cm, blade width 0.9 cm.
5. Small knife (*VD 2443;* pl. XI/2). The item is provided with a handle of rectangular section, narrower and thinner by the end. The blade, surviving fragmentarily, has a triangular cross-section, wider and slightly curved. Sizes: total length 15 cm, max. width (in blade area) 1.6 cm, blade thickness 0.1- 0.3 cm.

All five items presented above might have been used for both wood processing as well as for other types of materials (skins, bone, horns etc.). Thus, the drawknife was mainly used for polishing or finishing wooden surfaces (either flat or curve). The discussed specimen is part of the category of curved blade drawknives with analogies in the area of the fortresses in the Orăştie Mountains, but also in other sites from Dacia, specifying that the item is much smaller than all known specimens insofar.[41] Similar tools are found in both the Celtic milieu[42] as well as the Roman.[43] Drill-bits were also used for wood working. Employed for making orifices in wood or removing part of the wood mass, drill-bits are rather frequent in the finds specific to the settlements of Dacia,[44] but also in the Roman world.[45] Regarding the rake and the spoon-like tool, they might have been used for making wood cut-outs or finishing small, possibly hollowed areas. If in case of the drawknife and drill-bit, their use in wood working is more than likely, while the rake and spoon-like tool might have been used for other purposes as well. For instance, the rake might have been used in skin working, while the spoon-like tool might have been also used for casting small quantities of

[41] Type I in the classification of Glodariu/Iaroslavschi 1979, 92.
[42] Jacobi 1974, pl 16.
[43] Manning 1985, 19. A small specimen was discovered at Hod Hill, Dorset (15.2 cm) - Manning 1985, 18, pl 9/B18.
[44] Glodariu/Iaroslavschi 1979, 92-93, fig. 51/1-11.
[45] Pietsch 1983, 42-45, taf. 13/326-342; Manning 1985, 25-26.

metal. Similar rakes with the one discussed herein were discovered only at Sarmizegetusa Regia.[46] On the other hand, this type of "spoon" is for now unique among the Dacian tools.[47] Iron spoons for metal casting were discovered until present in several Dacian sites,[48] yet their shapes and sizes are entirely different than the specimen part of the jeweller tools kit from Sarmizegetusa Regia. A similar spoon comes from the Dacian fortress at Piatra Roşie, yet it is worked of bronze sheet and seems more like a medical or make-up instrument.[49] Still for cutting, scraping or finishing varied materials might have been also used the small knife present among the tools of the artisan jeweller.

The presence of these tools in the tools kit of a goldsmith may be explained either by their use in the making of wooden "standard moulds" necessary for casting pieces by "lost wax"[50] or maybe for carving reliefs on wooden "dies" used for the repoussé decoration or drawing of bronze, silver or gold sheets. It is also possible that the goldsmith had been making pieces whose parts also contained other materials (wooden, bone or horn/antler handles, leather belts, glass etc.), such tools being necessary to obtain a finished product. The small sizes of these tools, suggest their use for processing small pieces.

Another object present in the inventory of the analysed kit is a small, **fine whetstone**, with an approximately rectangular shape and an orifice pierced close to one of the ends. It is 10 cm long, has a maximum width of 2 cm and a thickness of 1 cm (pl. VI/2, pl. XI/3). Commonly used for sharpening tool blades or finishing the surfaces of metal pieces, whetstones are frequent in the Dacian sites.

The inventory of the jeweller toolkit also contained a glass knob/bead, a link and three iron crampons.

The knob flat in the lower side and bulging in the upper side has the appearance of a shell, the glass paste being cast in concentric spirals (*VD 2743;* pl. XI/4). The piece had a central orifice, being made of

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[46] Glodariu/Iaroslavschi 1979, 94.

[47] A small "shovel" (l. 10 cm) made of an iron bar with flattened end and edges slightly raised is mentioned by I. Glodariu and E. Iaroslavschi as coming from Căţelu Nou. Since it is not illustrated and has no bibliographical references, we are not sure if it is similar with that herein. Glodariu/Iaroslavschi 1979, 110.

[48] For a complete list of finds see Rustoiu 2002, 86.

[49] Daicoviciu 1954, 88, pl. XV, fig.16.

[50] Rustoiu 2002, 86-87.

a yellow glass on the bulging surface, dark brown in the flat area. Sizes: diameter 2.3 cm, orifice diameter 0.4 cm, height 1.9 cm.[51]

The link is made of a flattened iron bar, obtained by hammering, with 0.4 cm thickness and 5.7 cm diameter (*VD 2440;* pl. XI/5). The piece may come from the wooden box which contained the tools.

In what the **crampons** are concerned, each belongs to another type (at least one seems to be, until present, unique in Dacia).

1. "Cross"-shaped iron crampon (*VD2447;* pl. XII/1). The piece survived almost complete, missing both ends. They were mobile and were attached to the body with the aid of hinges, of which one survived complete and the other fragmentary. The short side has rounded extremities. On the outer surface the piece has four pyramidal teeth, well preserved. Sizes: total length 10.3, width 6.7 cm, sheet thickness 0.3 cm, total height 3.2 cm.
2. Iron crampon (*VD 2448;* pl. XII/2). The piece is almost complete, with only a small part of its edge damaged. The crampon has the edges raised at an obtuse angle to the piece body; the ends are provided with an open-work orifice of a triangular shape. On the outer surface, the piece has three teeth in the shape of a pyramid (distance between the teeth is unequal). Sizes: total length 10 cm, width 2.2 cm, sheet thickness 0.4 cm, total height 3.8 cm.
3. Iron crampon with mobile handles (*VD 2449;* pl. XII/3). The piece is rectangular, with bend edges and exhibits on the exterior surface three teeth in shape of a pyramid. The crampon is provided with two mobile endings, attached to the body by hinges. It is rather well preserved, lacking only a few fragments of the mobile parts. Sizes: total length 11.4 cm, width 2.3 cm, sheet thickness 0.4 cm, piece height (without mobile handles) 3.2 cm, surviving handle height 2 cm.

With few exceptions, iron crampons were discovered until present only in the Dacian settlements from the Orăştie Mountains. In

[51] A similar piece, in shape and sizes, yet of other colour (white and indigo), was discovered in level II of the open Dacian settlement at Brad - Ursachi 1995, 242, pl.209/ 22.

terms of their use, it was believed they were attached to the footwear to ease ice walking or on timber runners used in lumbering.[52]

Together with the tools which compose the jeweller toolkit were also discovered four nails and nail fragments (likely from the wooden box where the tools were kept). The iron nails, of rectangular section and round head, are of relatively small sizes (the largest survives on a 4.8 cm length). Such a nail (*VD 2444*), 4.4 cm long and ca. 0.4 cm thick, is presented on pl.XI/7.

The deposit also contains a series of pieces which survived in a rather fragmentary state, their identification being challenging.

1. File fragment or small chisel fragment, missing both ends. The piece body is slender and has a circular cross-section (length 8.2 cm, diameter 0.6 cm) (pl. XI/8).
2. Iron piece fragment. The piece, rather damaged, seems to have had a rectangular cross-section, sharpened by one end and bent to the other. The total surviving length is of 9.8 cm (pl. XI/9).
3. Fragment of slightly curved blade, surviving on a length of 6.2 cm.
4. Three fragments of a piece or from different iron pieces, preserved in the form of rectangular cross-section bars. A fragment survived on a 4.1 cm length, the other is slightly narrowed towards the tip, 6 cm long, and the third fragment, widened towards one of the ends, is 6.7 cm long.
5. Iron plate in the shape of a trapezoid sized 3.5 cm.
6. Small bronze plate, slightly arched, preserved on a length of 1.5 cm, 0.9 cm wide and 0.1 cm thick. It likely comes from a circular piece made of bronze sheet.

The jeweller toolkit from Sarmizegetusa Regia comprises the most diversified range of tools known insofar in Dacia. If separate pieces necessary for goldsmithing were rather frequently discovered in the sites of Dacia,[53] this is not the case with the discovery of tools associated in kits or which might have composed the inventory of a goldsmithing workshop. Until present, such finds come from the sites at Grădiştea (Brăila county), where in a pit were identified a few objects used in a bronze processing workshop (a round anvil, a bronze small chisel and

[52] Glodariu/Iaroslavschi 1979, 122.

[53] See to this effect Rustoiu 1996, 58-61; Rustoiu 2002, 65-66; Florea 1992, 40 sqq.

five crucibles),[54] Radovanu (near the workshop hearth were discovered a chisel, a few punches, a spoon for metal casting, a mould and a few crucibles)[55] and Pecica, where were found three moulds, three crucibles, a stamp, two anvils, eight bronze chisels, two vices, beside a series of small finished or half-finished pieces.[56] Lastly, as mentioned above, in the western quarter of the civil settlement at Grădiştea de Munte, was discovered a workshop designed for iron and bronze processing and which had in inventory, beside finished or half-finished pieces, also a few punches, chisels, an anvil in the shape of a bolt and a few crucibles.[57] Noticeably, jeweller toolkits are very rare in the settlements of Dacia. Circumstances are also similar for other spaces of ancient Europe. Isolate pieces are frequent in the Celtic, Dalmatian or Roman sites, while the association of some tools in kits is rather rare. One of the richest "kits" of the kind is represented by the deposit found in 1977 at Ošanići (Daors), in fact an accumulation over several generations of moulds, stamps, finished or half-finished pieces.[58] The toolkit of a goldsmith workshop (chisels, punches and tongs) and a series of bronze figured pieces were discovered at Galjub (in Egypt).[59]

Most often, toolkits of goldsmithing workshops also contain other types of objects (crucibles, moulds, matrices). Such items are missing from the inventory of the analysed jeweller toolkit. One should though bear in mind at Sarmizegetusa Regia was discovered one of the most spectacular matrices identified insofar in ancient Europe, found in secondary position, brought from somewhere else once with the earth

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[54] Sîrbu 1996, 41, fig. 56-57.

[55] Trohani/Şerbănescu 1975, 281; Rustoiu 1996, 56.

[56] Crişan 1985, 93-96.

[57] Daicoviciu et al. 1955, 209.

[58] The deposit contains 245 bronze and iron pieces of which some were used in goldsmithing: matrices for bronze ornaments, for metal sheets decorated in relief and for reliefs made of silver sheet; anvils, chisels, hammers, punches, compasses, scales and drawplates. To these also add smithing tools (tongs, hammers, massive metal cutters, clamps, adzes, pick-axes), woodworking tools (chisels, knives and callipers) as well as matrixes for making bronze vessels. The deposit was buried in the 2nd c. BC yet the pieces composing it were hoarded starting with the 4th c. BC. Wilkes 1995, 194. See supra note 36.

[59] Namely, 32 pieces of which 2 are modelling tools (a round bronze *stylus* and a puncher), 2 complete chisels (of 10.6 cm respectively 13.05 cm) and 26 fragmentary and two pairs of tongs. Ippel 1922, 81 -82, tafel X; for such workshops see Treister 1996, 294 -298, Treister 2001, 169, 253-296.

used for filling the area nearby the Southern Gate of the fortress. It is not excluded that it originates still from terrace VIII.[60]

The pieces part of the jeweller toolkit might have been used to obtain objects by hammering or for decorating metal surfaces in techniques like the repoussé, stamping, punching, engraving etc. An analysis made by D. Spânu proves that many pieces made of precious metal from pre-Roman Dacia were obtained mainly by hammering not by casting metal into moulds or drawing wires, being often decorated by using one of the above mentioned techniques.[61] The presence of certain auxiliary tools (for instance, for wood processing) might suggest that the jeweller made a wooden matrix or relief matrix onto which metal sheets were then hammered or for making wax models, both matrices and wax models being necessary in the jewellery-making process or of certain decorated metal pieces. It is possible that the artisan who used the toolkit presented above had also worked/decorated/repaired, beside precious metal objects, other types of items (for instance iron artefacts).[62]

The find's context, the variety of the pieces and their quality, but also the parallels with specimens identified in other sites from Dacia or the Roman world chronologically place the jeweller toolkit into the second half of the 1st century AD – early 2nd century AD.

Its presence in the settlement at Sarmizegetusa Regia, in an area where several types of crafts were carried out, further evidences the preponderant crafting nature of a part of the settlement, the scale which the metal production reached there around the Daco-Roman wars not being found in other areas of Dacia. Some of the pieces composing it, are of local tradition, others adopted by the local artisans from the Roman world only to become common items in the Dacian milieu. There are also unique pieces insofar among the known Dacian tools. Altogether they witness not only the artisans' skills to assume and use higher

[60] Florea et al. 2015, 25.

[61] Spânu 2012, 95-96.

[62] To this effect, the large number of decorated iron pieces discovered in the settlements of Orăştie Mountains is noteworthy. Amongst, the most spectacular are the iron disks with zoomorphic designs discovered in the Dacian fortress at Piatra Roşie, the decorated tacks and tongs found in the settlement at Grădiştea de Munte. Daicoviciu 1954, 119-121, fig. 39-40; Glodariu/Iaroslavschi 1979, 131; Mândruțău 2015, 9-17. It is not excluded, for instance, that the presence of the three iron crampons in this iron deposit be explained precisely by their making or repair with part of the analysed tools.

quality tools but also the relations they established with artisans or traders coming from the Mediterranean space.

Illustrations[63]

Pl. I The jeweller toolkit from Sarmizegetusa Regia.
Pl. II 1. Anvil; 2. Tongs with locking bar; 3. Hammer.
Pl. III 1. Calliper; 2. Small spoon-like tool.
Pl. IV 1. Chisels; 2. Files, chisel and drill bit.
Pl. V 1-2 Types of teeth present on the files in the jeweller toolkit (detail).
Pl. VI 1. Rake; 2. Whetstone.
Pl. VII 1. Anvil; 2. Hammer; 3. Tongs with locking bar.
Pl. VIII 1-10 Files.
Pl. IX 1-9 Chisels.
Pl. X 1-2 Punches; 3. Drawknives; 4. Rake; 5. Spoon.
Pl. XI 1. Drill bit; 2. Knife; 3. Whetstone; 4. Knob/Bead; 5. Link; 6. Calliper; 7. Nail; 8-9 Iron fragmentary pieces.
Pl. XII 1-3 Crampons.

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Pl. I

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Pl. II

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Pl. III

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Pl. IV

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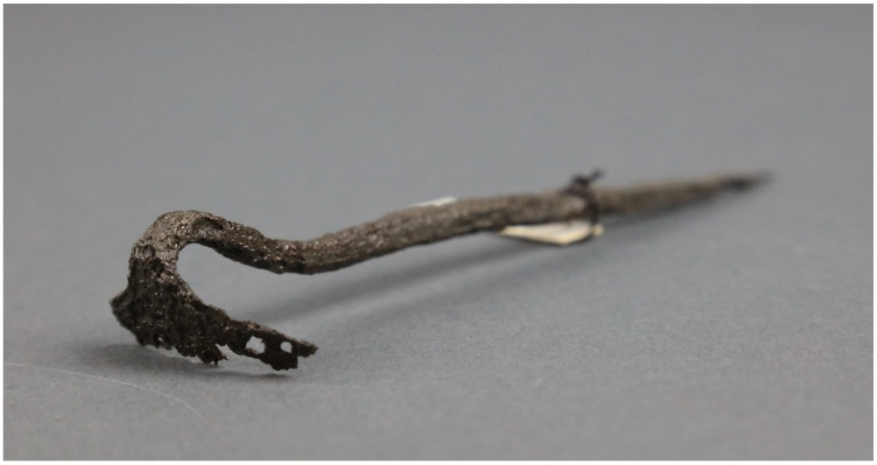
Pl. V



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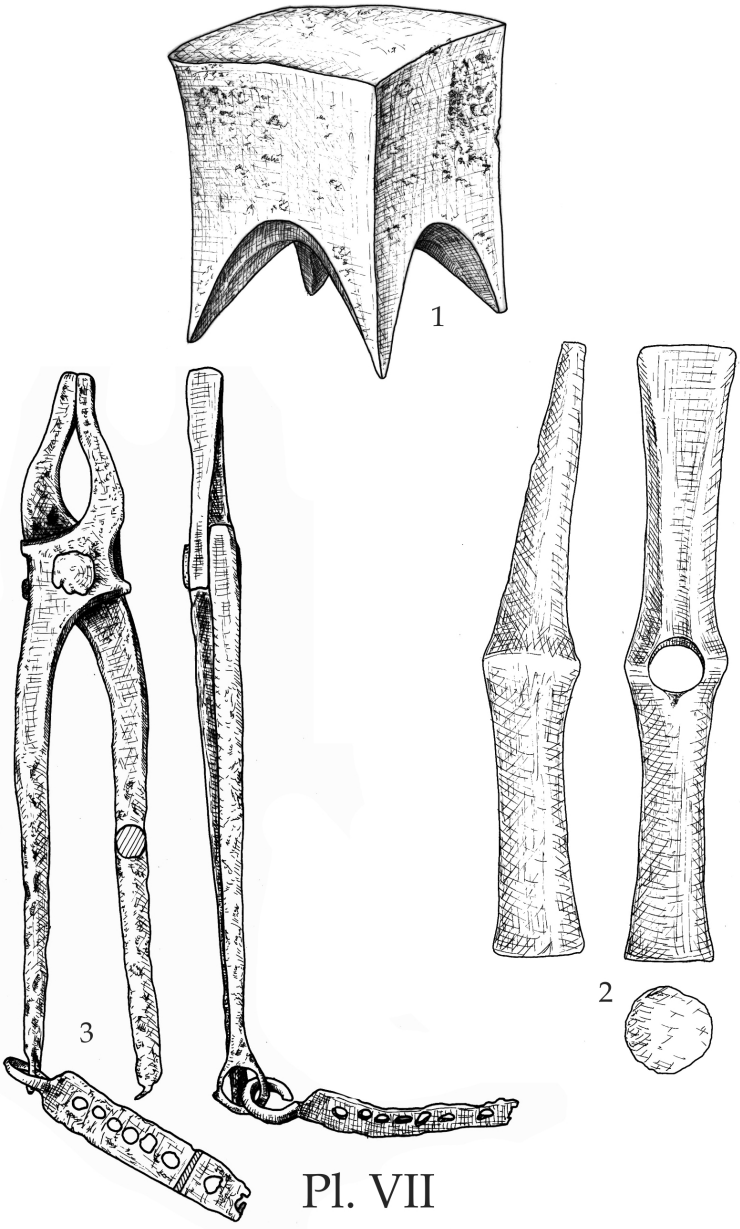
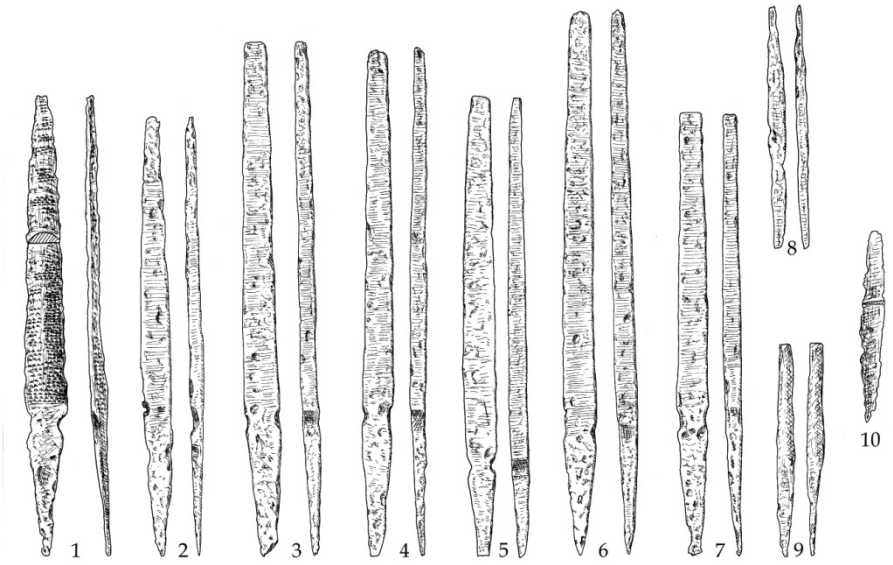
Pl. VI



Pl. VII



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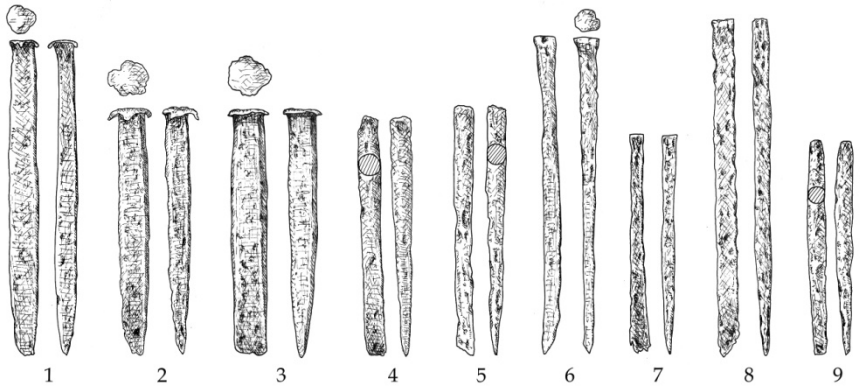
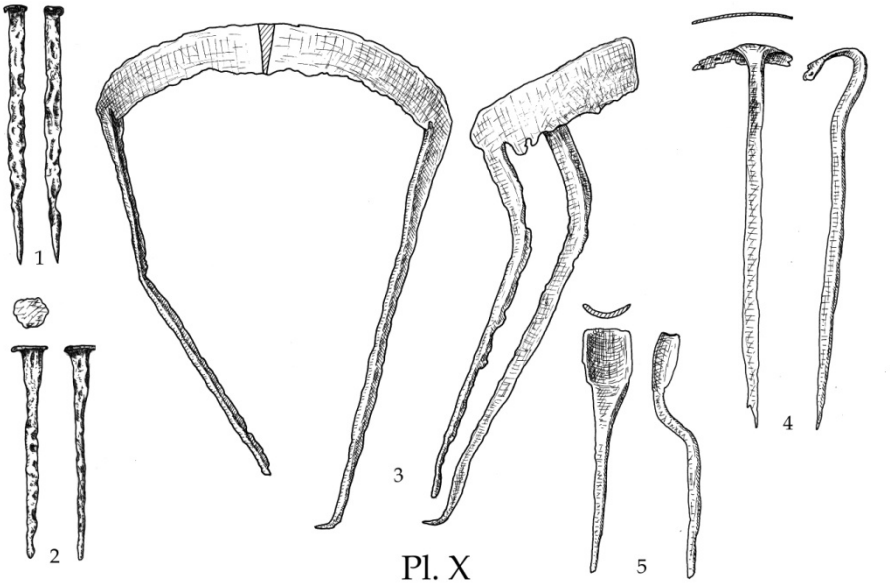
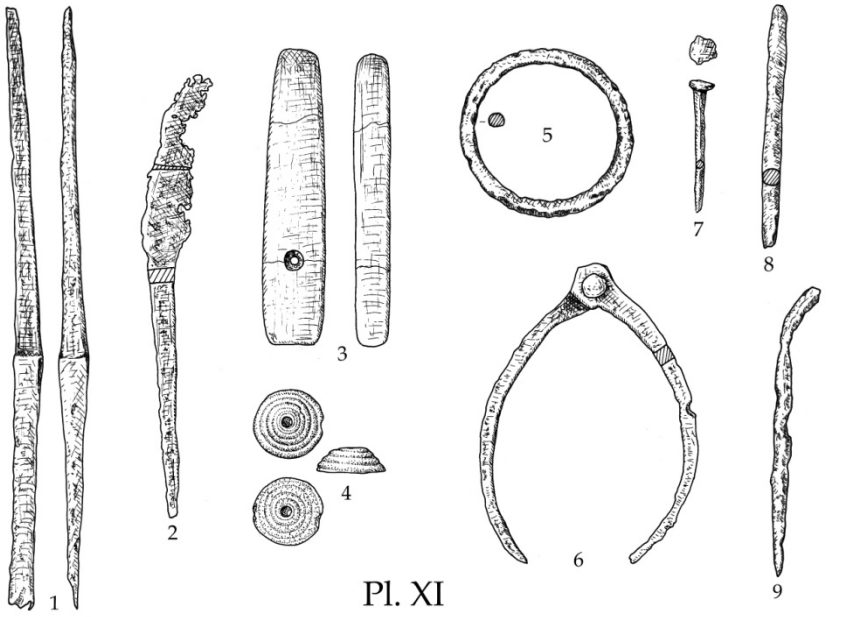


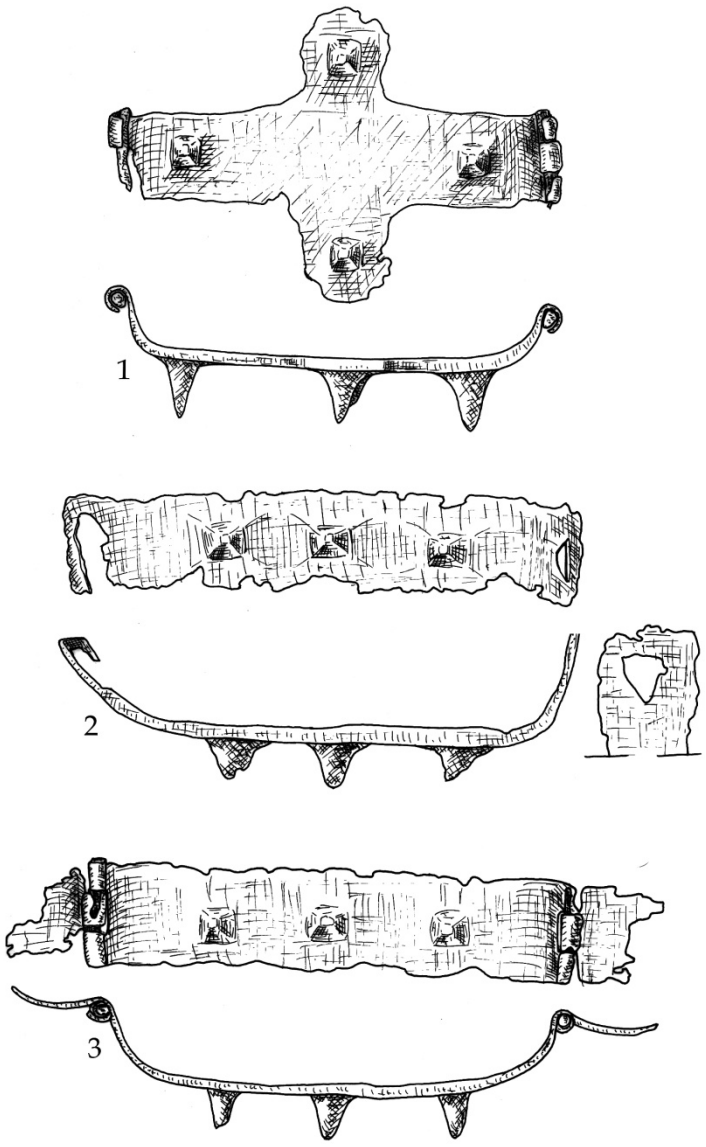
Pl. IX



Pl. X



Pl. XI



Pl. XII