A Roman Age Brooch Workshop from Philippopolis

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Abstract
A workshop for strongly profiled brooches was discovered in the eastern part of the ancient city of *Philippopolis* (the modern city of Plovdiv, Bulgaria). The workshop was located in a building with rectangular plan and stone and mud bricks walls. Inside the room furnaces, a worktop, a working pad, small pits, places for storing hot ash and an anvil were identified. In the southeastern part of the room trash layers with about 1500 fragments of clay moulds, 150 fragments of crucibles, bronze spilths and residues were studied. Iron tools (an anvil, a shovel, a hammer, a knife and probably a file), defective items, and bronze ingots were also found inside the room. The *fibulae* type is a derivative of Almgren 84 Type. The variations of the moulds and the defective items define that several variants of this type were produced in the workshop. A whole exemplar is found in the area close to the room. According to the stratigraphic position of the workshop, together with the artefact, found in it, including two bronze coins (an imitation of an Emperor Octavian Augustus' as with a countermark and a *dupondius* of Emperor Vespasian) the brooch manufacturing dates to the last decades of the 1st century. The *fibula* workshop excavated in *Philippopolis* is the only one found in the city and in the territory of Bulgaria dated to the Roman period and provides important information about organization of brooch manufacturing.
Keywords: *fibulae, workshop, Philippopolis, strong-profiled brooches, bronze casting*

1. Introduction

A brooch workshop that functioned during the late 1st – early 2nd century was excavated in the modern city of Plovdiv, Bulgaria which now occupies the territory of the ancient *Philippopolis*. It was studied during rescue excavations lead by archaeologists from the Regional Archaeological Museum of Plovdiv in 2010-2011 (Божинова, 2011: 347-348; Божинова, Славкова, 2013: 619-620)[1].

Philippopolis, located in the central part of the Province of Thrace, was incorporated as an important part of the Roman Empire within the first half of the 1st century and after a short period it became the biggest city of the province. As a significant urban centre, situated on the route of *Via Diagonalis*, it had its economical functions with large scale trade and production activities. Nevertheless, published archaeological data for workshops, local products, imported goods etc. is still limited in number. Luxury ceramics such as Pontic and Eastern *terra sigillata* (ESC, ESB), fine vessels from Cnidus and North Africa and foods as olive oil and wine are among the studied imports (Димитрова-Милчева, 2008: 119-154; Бориславова, 2018: 11-35; Harizanov, 2020a: 82-89). Concerning local production there are only four pottery workshops excavated by now that are considered to have served the local market (Harizanov, 2020b: 119-120). At the same time artefacts such as unfinished products, production waste, crucibles and features as furnace found in the territory of the city, together with number of the epigraphic evidences are proof for the manufacture of bone, glass, stone, ceramic and metal products (Чернева-Тилкиян, 2008). Concerning *fibulae* production, a workshop dated to a later period in the 3rd – 4th century, is detected in the central part of the city on the basis of the presence of a kiln and ceramic moulds.[2] Since the situation remains unpublished nothing more could be said about it. Thus the recently studied brooch workshop contributes to the knowledge of the economic functions of *Philippopolis* but also in general for the process of *fibulae* making and its specific details due to the chance of a very well preserved archaeological situation.

The excavation site is situated in the lower eastern part of ancient *Philippopolis* (Fig. 1). This area has been inhabited from the 4th BC until nowadays with few periods of abandonment. The first desolation of this location is for about 2 centuries between the Early Hellenistic and the Roman period, evidenced by a 30 cm thick hiatus layer (Fig. 15: 1; Fig. 16 and 22: 2). The reoccupation of the terrain marks a new appearance of the settlement as a Roman city, but not much is known about the city plan here during the early Roman period. This area, together with the whole territory in the plain remains unfortified until 172 AD when the *Marcus Aurelius* fortification wall was built (IGBulg. III 1, 878; Топалилов, 2016: 9). Namely here in the late 4th century the main gate of the city, known in archaeological publications as the Eastern gate, was established as an imposing architectural complex (Topalilov, 2016: 1855; Топалилов, 2016: 11). Two workshops, one for brooches and another for iron working were located next to a side street.[3] The last reconstruction of this street dates to the 4th century, but it most

[1] Some small parts of the site, including the area just to the east of the workshop are awaiting for a final stage of the excavations before the construction activities for the modern building, but after 12 years, the building project is still in progress.
[2] Excavations by L. Botusharova. We own the information thanks to Dr. S. Cherneva-Tilkyan who has gathered it in the archived field documentation of the excavations in the city during her research for her PhD thesis (Чернева-Тилкиян, 2008).
[3] The iron workshop was studied at the neighboring plot to the west during rescue excavations led by Ass. prof. Dr. I. Topalilov, which are a part of the

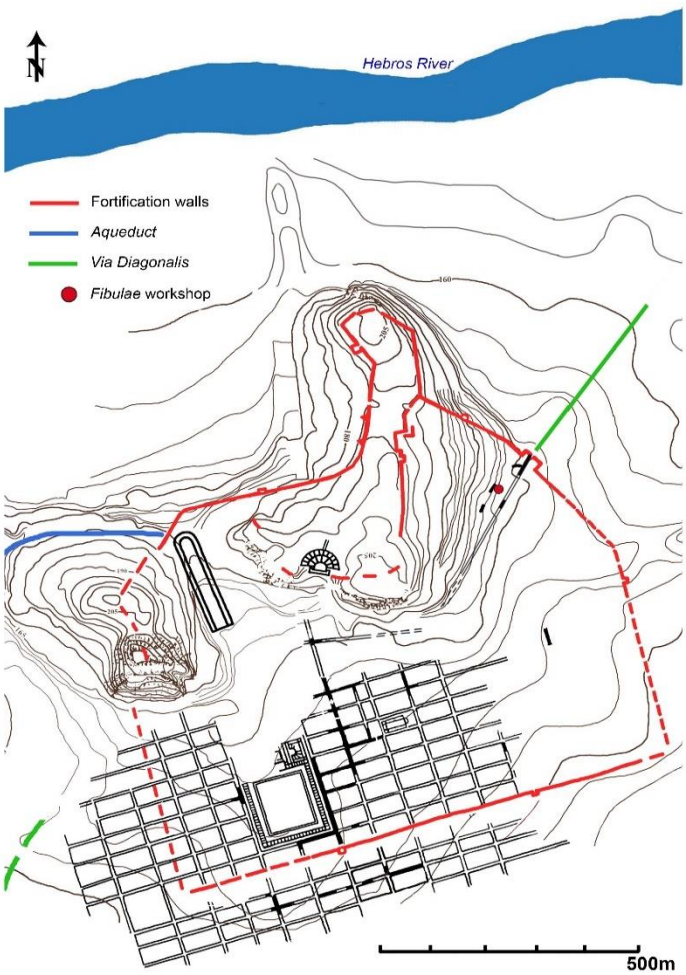

Figure 1. Plan of Philippopolis

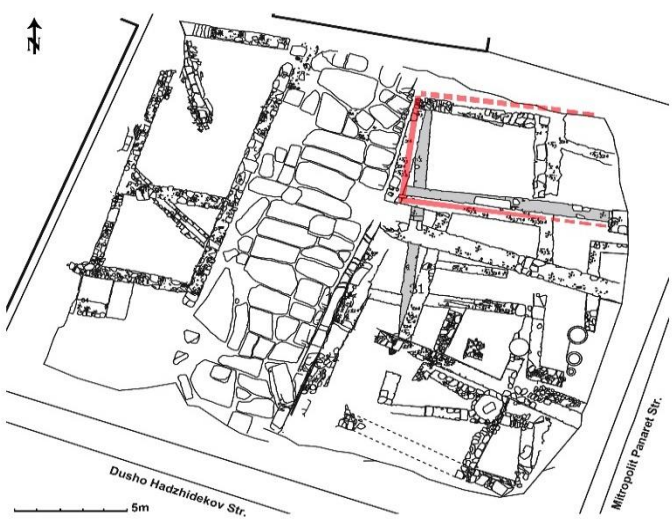

Figure 2. The excavation site (27 "Mitropolit Panaret" Str., Plovdiv), plan of the revealed architectural features with the workshop location

probably repeats the route of an earlier one that could be contemporary to the workshops (Топалилов, Станев, 2010: 386-388).

With the beginning of the reoccupation of the terrain during the 1st century a multi-storey building was erected. Most of the rooms were only partially studied because of the monumental architectural remains from succeeding periods, preserved to be displayed in situ. The artefacts found in these rooms do not allow determining their function. Better conditions for archaeological investigation were available in the northernmost room because of the current owner's illegal digging activities here, preceding the excavations, during which the upper layers were removed(Fig 2). Thus we had the chance to study archaeologically a larger area from the Early Roman and the Hellenistic periods.[4] Namely a room with features and artefacts that lead to its interpretation as a brooch workshop (Fig. 3).

Figure 3. A general view to the workshop, first building phase

Architecture

The room has a rectangular plan, with the west and south walls revealed. Its entrance is not determined. Thus the room measures approximately more than 4.60 m east-west and 5 m north-south. The walls are 0,60 m width, built on the ground without a substruction. They had stone bases with mud mortar to a height of about 0,50 m (Fig. 4; 18) and mud brick construction in the upper parts (Fig. 5). Three post holes (A)[5] with diameters of 0,26 and 0,30 m are registered that mark the places of massive vertical pylons for sustaining the roof (Fig. 6; 7). The roof was covered with tiles as judged from the limited number of tile pieces found within the room, but also by the situation with the other contemporary rooms of the building. The floor was made of compacted clay with 6 recorded consecutive levels within 60 cm difference between the highest and the lowest one (Fig. 22: 1).[6] These repairs and a repeatability of the production facilities as will be shown later, together with two reconstructions of the area by inner walls, testify for a relatively long use of the room for which at least two building phases are to be distinguished.

same building project (Topalilov, Stanev 2009, 387-388).

[4] About the archaeological features from the Hellenistic period and the hiatus layer here see Божинова, Христева, 2016: 164, обр. 2.

[5] For convenience the architectural structures and the production facilities are marked with letters from A to P, that are one and the same in the presented drawings, pictures and the text.

[6] The highest level is at 163,25 m altitude, the lowest one at 162,64 m.

Figure 4. The inner face of the south wall's stone base

Figure 5. Mud-bricks construction of the south wall

Figure 6. A posthole for sustaining the roof, a section (A)

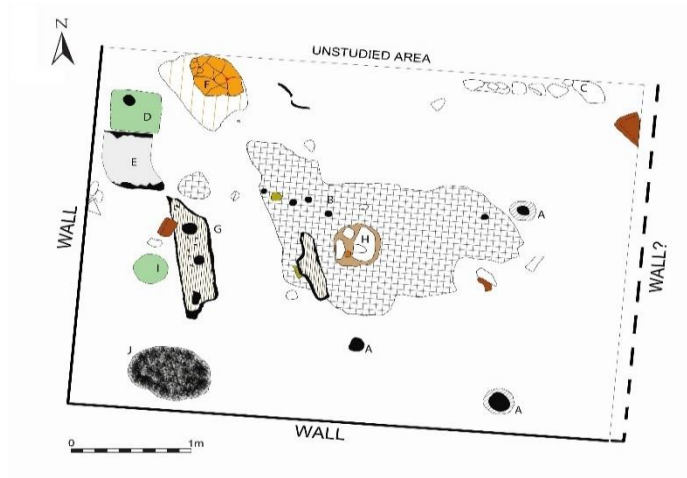

Figure 7. The first building phase of the workshop with the facilities, a drawing of the archaeological situation.

Figure 8. A hearth (E), a working pad (D) and destructions of a furnace/kiln (F)

Figure 9. The hearth (E) and the working platform (D)

Figure 10. A section of the hearth (E) and the bronze working platform (D)

Figure 11. Two logs mounted in the floor, probably the base of a tabletop (G); in the background mud-brick destructions and postholes of the inner wall (B) and the pit with a stone (H)

Figure 12. Section of the situation with the two mounted logs (G)

Figure 13. A small pit with a flat stone mounted, with traces of molten bronze (H); to the left – one of the logs (G) and postholes of the inner wall (B)

Figure 14. The bottom of the pit (H)

Figure 15. A small pit in the south-west corner with traces of molten bronze (I); 1 – hiatus layer and 2 – Early Hellenistic period layer; in the background – the inner face of the western wall

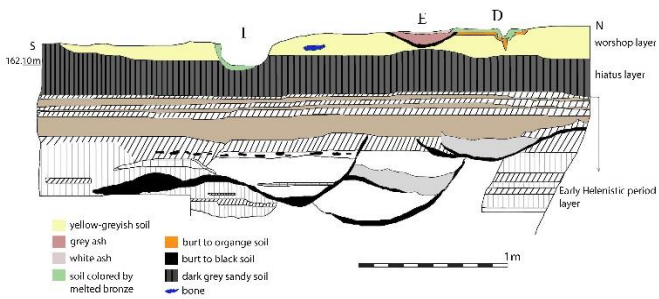

Figure 16. A section drawing of the pit (I), the hearth (E) and the working pad (D) with a stratigraphic profile next to the western wall of the room

Figure 17. A general view to the workshop, first building phase, upper level, with a hearth in the south-west corner (J), the inner wall (B), the small pit with the stone (H) and other devices in the process of revealing

Figure 18. A general view to the workshop, second building phase, a lower level: a furnace/kiln (L), a wall's destructions (K) and the production residues deposits area (P)

Figure 19. A general view to the workshop, second building phase, an upper level: hearts (M and N) with a wall's destructions (K)

Figure 20. A furnace/kiln (12)

Figure 21. A hearth, fenced from the south and with traces of bronze-working (M)

Figure 22. Northern profile of the room, with a pit (O), a stone wall (C), the layers of the workshop (1), the hiatus layer (2) and a hearth from the Early Hellenistic period (3)

The lowest layer is the one best preserved and studied (Fig. 3 and 7). The room was divided partially by an inner wall made most probably with wattle-and-daub construction. 11 post holes were found in a strip that is 20 cm wide and 2,20 m long (B). The soil around them consists of yellowish clay that is similar to the floor but is thicker and not so compact, thus we suggest it is the destructions of this wall(Fig. 3). This wall starts from the north massive roof pylon, goes to the west just to end at about 1 m before the west wall of the room. A small part of a stone wall (C) was partially revealed in the north profile, which is probably the north wall of the room during this early phase, but it could also be another dividing wall as in the later period the floor continues to the north (Fig. 22).

Production facilities

A number of production facilities were documented on the lowest floor level, which is determined as a first building phase of the workshop.

Most of the features were situated in the west part of the room. In the northwest part, on the floor level, a square pad was made by well compacted clay (D). Its sides are 38 cm long, the angles are rounded and it has a slightly concave profile (Fig. 8-10 and 16). Its surface is impregnated with bronze to a depth of 1 cm. A hole for a vertical strake, with a diameter of 7 cm, is placed symmetrically in its north part. The hole has rounded outer edges and its sides are also impregnated with bronze in its upper part.

Just next to this pad is located another concave feature, deeper than the first one, that we will name a hearth (E). The rectangular bronze-working pad has a superposition to this feature that shows a sequence in their making, but the detection situation reflects the last stage of their use when both facilities were operating simultaneously. The hearth has a round plan with a diameter of 0,50 m and a depth of 0,10 m (Fig. 8-10 and 16). Its border is marked by a burnt black strip. It is covered to the top with grayish ash. The lack of orange coloring of the soil below testifies for the lack of intensive firing. This in turn suggests that the function of this feature was for storing the hot embers or ash, rather than as a real hearth. The assumption is also confirmed by the presence of a heating device on the other side of the bronze-working platform. It is situated just to its northeast but is badly damaged and its exact type cannot be determined (F). Pieces of burnt plaster were found, some of which with coating. The soil around had turned orange thus proving this was the original place of the device (Fig. 8). No traces of postholes or any padding were recorded. The reconstructed diameter of the feature is about 0,55 m. Judging from the number of found pieces and the heavily burnt soil it must have been a small furnace or kiln, but still its function is open to discussion. It could be a furnace used for melting the bronze (Sey, 2013: 254), or a kiln for firing the ceramic moulds for the brooches, or even just for ensuring coals, which were carried hot to the hearth where to melt the metal.

Another feature located southwest from the bronze-working pad and the hearth consists of two logs, with a width of 0,30 m, that are built in the floor parallel, at a distance of 1 m, to each other (G). Both are split logs placed flat side up and at the level of the floor, with strakes driven vertically into them (Fig. 11-12). An amorphous piece of iron found in one of the logs could be a connecting metal element of the structure. We interpret these features as the bases of a wooden table used for the production process – a tabletop. Its length, reconstructed by the larger log, is 1,25 m and the width – 1,20 m or more.

A small pit (H) is located east of this worktop and just to the south of the inner wall. The pit has a diameter of 0,26 m and a depth of 0,06 m. A flat stone (0,17 x 0,27 m) is placed horizontally in its centre, in the uppermost part. It has a small rectangular basin, 6,5 x 11 cm, about 1,5 cm deep, that seems to be artificially carved on its upper part. Two stones are placedvertically just next to one side of the pit, probably to strengthen it by preventing from collapsing (Fig. 13). The bottom of the pit is impregnated with bronze to a depth of 2 cm. The soil around the stone and the flat stone itself are partially colored in green too (Fig. 14).

A similar pit, again impregnated with bronze, was found just to the west of the workbench (I). Its diameter is 0,32 m and depth – 0,15 m (Fig. 15-16). Its opening is situated at a slightly lower level,

than the one with the stone and the other features, which could indicate it is one of the earliest studied facilities.

These small pits must have been related to the metal melting process, as evidenced by the traces of melted bronze in their sides and bottoms. A research devoted to metalworking in the Bronze Age and supported with ethnographic parallels, reconstructs a process of melting the metal with crucibles filled with metal pieces and charcoals, placed in shallow pit and heated from above (Yahalom-Mack, 2019: 64, Fig.1). The function of the small pits from the *Philippopolis* workshop seems to be identical.

A round hearth (J), very similar to the first one and full with coals is situated in the southwestern most part (Fig. 17). Its diameter is 0,70 m. Opposite to the previously described pit, it is situated at a higher level. These two last facilities, being located at different levels than the others, suggest that they are asynchronous. Furthermore, the repetition of similar structures leads to such an assumption. The superposition of some features towards others proves their asynchronization, such are the pit with the stone and the workbench that had been dug in the suggested destructions of the inner wall; and the bronze-working platform stepping partially over the hearth next to it. Therefore, we have to assume that the first construction phase lasted a period long enough for certain facilities to get out of use and others to be made so as to replace them and the production process to continue.

The features that refer to the second building phase, as being found on the latest one or two floor levels, are less in number and are not that well preserved (Fig. 18-19).[7]

In this second phase the room is again divided by an inner wall, but this one is situated in the opposite direction than the one from the first phase. The wall (K) is reconstructed by a line of stones that starts from the south wall and continues to the north towards a length of 3,00 m, thus dividing the room into two parts again (Fig. 18-19). The character of the two separated parts of the room is different. The east one is filled with production residues, while the west part has features that show production activities. In addition to two facilities examined in the southeast corner - a furnace and a hearth, scattered stones and fragments of bricks and tiles, as well as spots of spilled bronze, were found in the rest of the room.

A small furnace (L) is situated at 1 m west from the inner wall. It has a round plan with a diameter of 0,60 m; its border is formed by vertically placed tile sherds and bricks (Fig. 20). The firing had been concentrated in the centre, judging from the heavily burnt soil in a small area, which was probably concavely formed. The furnace was partially dug under the floor level.

A badly preserved large hearth (M) is found to the south-east, between the inner wall and the kiln. It is fenced from the west by a row of vertically placed four pieces of bricks, and its bottom is made of tamped clay and horizontally placed pieces of bricks and tiles (Fig. 21). Its diameter is about 0,90 m. A round green spot with a diameter of 0,20 m is an imprint of molten bronze. A small piece of scorched soil at 10 cm below the base of the hearth indicates it was reconstructed at least once. Two other such fencings by vertical lines of sherds are found one in the south-east part of the area above the residues layers (Fig. 19: N) and another one in the central west part, in a lower level, but above the lowest one with the facilities of the first construction phase.

Figure 23. Production residues layers (P)

All these repeatable features are again guidance towards a long-term use of the workshop with reconstruction of the necessary equipment and indicate that the layer between these two levels is formed as a result of a continuous occupation of the room than as a single act of raising the level by an embankment layer.

A pit in the north part (O), situated partially outside of the excavated area, is another feature that belongs to the second phase of the workshop. The pit has an elongated form with a diameter of 1,06 m (Fig. 22). Its filling is very similar to the one of the layers between the floor levels, slightly darker. Only few pottery sherds (Fig. 32: 1) are found. No coating or other specific features were registered in the pit so its function remains unclear.

A thick layer with production residues (P) belongs also to this second phase of the workshop. It is deposited in a large negative spot of the floor in the south-east part of the room, east of the dividing wall. Consecutive layers of waste and soil indicate a long process of its formation (Fig. 23). The residues consist of pieces of clay moulds, melting pots, bronze melts, bronze ingots, sheet fragments and bronze waste (Fig. 24).

Figure 24. Production residuesin situ, detail

[7]The excavations process at that stage was further complicated by a number of side circumstances as we were working in late autumn in rainy conditions, with reduced team and misunderstanding with the investor. All that negatively affected the quality of the research and documentation work. The level is also partially destroyed by the illegal diggings of the owner before the start of the excavations.

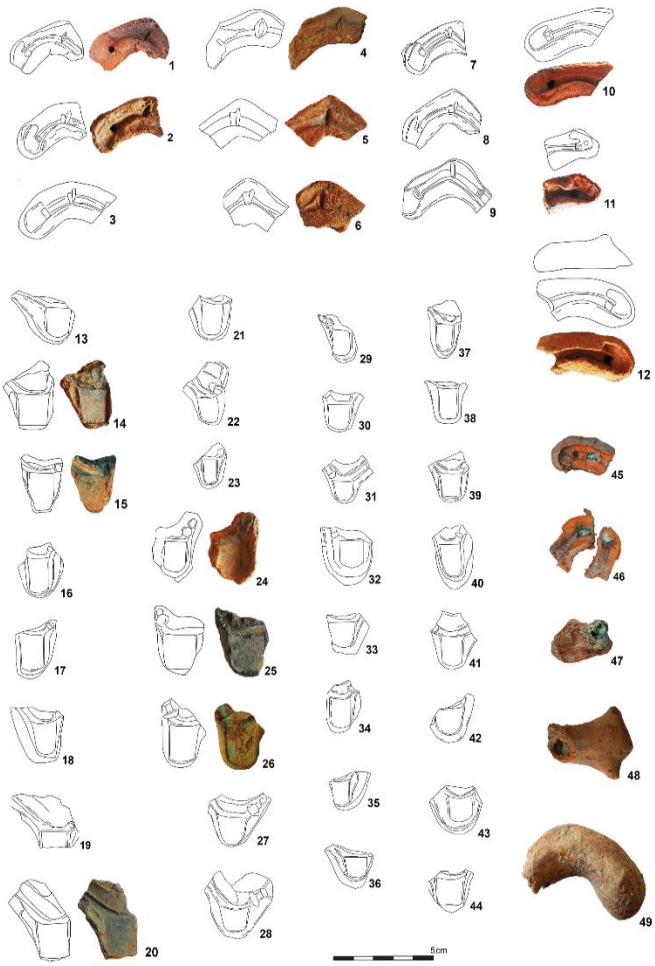

Figure 25. Pieces of moulds

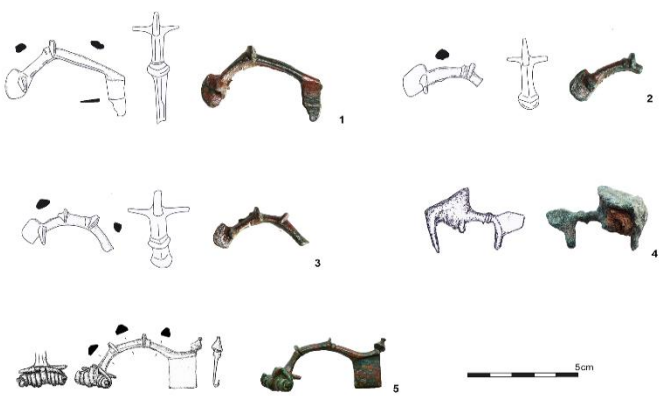

Figure 26. The fibulae, produced in the workshop: 1-4 – defective specimen; 5 – a fibula, found outside of the workshop

Moulds

More than 1000 pieces of two-parted clay moulds were found (Fig. 25). Calculations based on the weight of one mould (50 gr) related to the weight of all found fragments (13,657 kg) determines approximately the number of the discarded moulds to be about 273 pieces. The molds are from porous pottery. The clay is mixed with coarse sand, the surface is roughly smoothed.

Strongly profiled brooches with broad rectangular catch-plate were casted in the clay moulds, using the method of the "lost wax process" (Sey, 2013: 254). Such moulds for *fibulae* are known from Brigetio, Pannonia (Saro, 2020: 118, fig.1, fig. 4, cat. 1), Napoca, Dacia (Cociş, 2019: 21-22, pl.47), Durostorum-Ostrov, Moesia Inferior (Nuţu, Elefterescu, 2018: 31, fig. 7). Variants are differentiated based on their dimensions, size of the catch-plate and number of dividing knobs of the bow. Some moulds were used for casting two brooches together. We do not have evidence for production of moulds at the site, but it could have been in the neighboring rooms or unstudied areas. An indication for this is the fact that on part of the moulds the front plate (hook), where the axis for the spring passes, is pierced. Such examples are known from Brigetio (Saro, 2020: 119, fig. 1), where the author concludes that a semi-finished product was used to make the mould. This supports the assumption that the *fibulae* and the moulds were made in one and the same place. Even more, in Napoca both *fibulae* and moulds are found at the same place (Cociş, 2019: 23).

***Fibulae* / Brooches**

The *fibulae* were cast of copper alloy, probably bronze, as seen in the metal residues in some of the moulds.[8] Five defective items were found on the upper floor level (Fig. 26: 1-4).[9] They belong to two different variants. A whole specimen was found in a neighboring context, outside of the workshop, but it had been most probably produced here and had been in use (Fig. 26: 5). The *fibulae* found in *Philippopolis* have the following specifics. The bow has a triangular shape decorated with one or two dividing knobs. The upper part of the bow is reduced and has two horizontal protrusions. The catch-plate has a rectangular shape. The foot ends with one or two biconical knobs. The hook for the spring is casted in a mould together with the brooch. Springs and pins were not found so we have no data about their production. According to the information from the moulds we judge that the spring had been winded on an axis and kept by a hook.

Although in a highly fragmentary state, the variations in the numerous fragments of moulds and the four defective *fibulae* indicate that several variants of a single type of *fibula* were produced at the workshop. Three variants of the bow form are distinguished: 1) arc bow and triangular cross-section with two rings on the bow (Fig. 25: 1-5; Fig. 26: 2-3); 2); bow with triangular shape and a trapezoidal cross-section with one ring on the bow (Fig. 25: 6-8; Fig. 26: 1); bow with triangular shape and a trapezoidal cross-section with two rings on the bow (Fig. 25: 9).

On the basis of preserved fragments of the bow foot, two main variants can be distinguished: 1) *fibulae* whose foot ends with one biconical ball (Fig. 25: 14-23) and 2) with two biconical balls at the end of the foot (Fig. 25: 24-29). All of the mould fragments show that the *fibulae* had a tall, rectangular catch plate, which slightly varies in measures and height/width ratio. The front part of the bow ends with a hook for the axis of the spring, which hook is made completely finished in the mould or it is formed by secondarily piercing (Fig. 25: 11).

The *fibulae* type is a derivative of Almgren 84 Type. The production and distribution of this type could be dated in the period from the last quarter of the 1st till the end of the 2nd century. Several opinions are available in the literature about their chronology. W. Jobst dates the type to the second half of the 2nd - early 3rd century (Jobst, 1875: 40-41). In the study of the *fibulae* from August and

[8] The exact composition of the alloy will be known after impending analyses.

[9] One of the specimens is not presented illustratively here as considered being uninformative because of its small size and having the same characteristics as the others.

Kaiseraugst E. Riha suggests an earlier dating – from the last quarter of the 1st century till the second half of the 2nd century (Riha, 1979, 80). The production and distribution of Almgren type 84 *fibulae* in *Dacia* can be attributed to the end of the 1st/beginning of the 2nd – the end of the 2nd century (Nuţu, Elefterescu, 2018: 31, Cociş, 2019: 24). In *Pannonia* this *fibulae* type occurs in the 2nd - beginning of the 3rd century (Saro, 2020: 119). The distribution area of the type is very large but prevailed in the Middle Danube area, although many items are also found in the Lower Danube region (Cociş, 2004:65, Nuţu, Elefterescu, 2018: 29-33, Cociş, 2019: 24). The production of the Almgren 84 type is registered in Brigetio, Carnuntum, Savaria,[10] Pannonia (Cociş, 2019: 51-52, pl. 118.12, 54-55, pl. 124.39, Saro, 2020: 118-119, fig. 1, cat. 1), Napoca, Dacia (Cociş, 2019: 24, pl.47-87) and Durostorum-Ostrov (Nuţu, Elefterescu, 2018: 29, pl. 2.9,10,12, pl. 3.18).

As a derivative of Almgren 84, the *fibulae* from the workshop fall into type 12b of E. Gencheva's typology, created specifically for the Roman *fibulae* from Bulgaria, Gencheva dates them in the period from the middle of the 2nd until the beginning of the 3rd century (Генчева, 2004: 37, T. VIII 7-9). A close parallel to the *fibulae* produced in *Philippopolis* is found in cremation grave No 18 from *tumulus* No 5 of the necropolis near the town of Straldzha, Southeastern Bulgaria, whose chronology is between the beginning of the 2nd and the first decades of the 3rd century (Пеева, Чолаков, 2016: 131; T.38, 330). Unfortunately, the materials from the grave do not contribute to its more accurate dating.

In *Philippopolis*, eight *fibulae* of the type are kept in the depot of the Regional Archaeological Museum of Plovdiv. Four of them come from excavations in the city but are still unpublished.

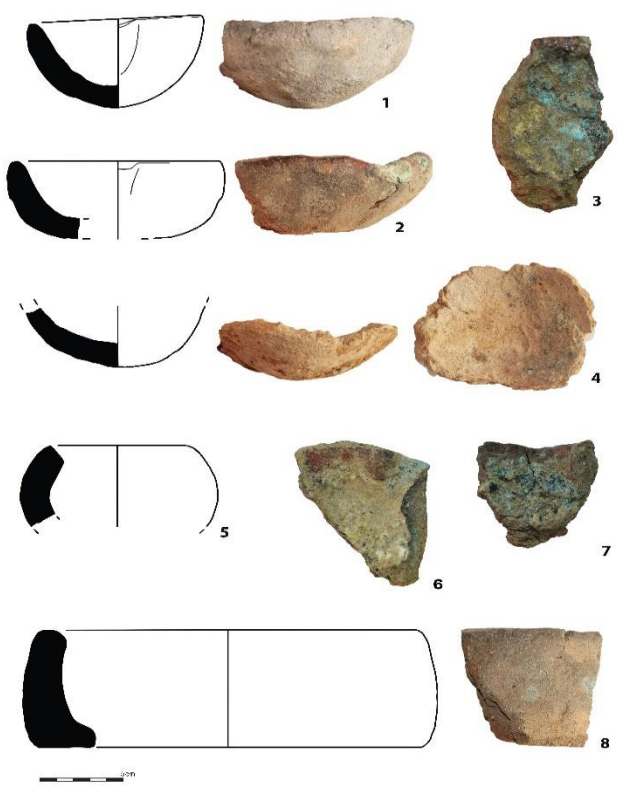

Figure 27. Pieces of crucibles (1-8) and a portable hearth? (9)

Crucibles

The metal alloy for the *fibulae* production was melted in crucibles heated in furnaces. About 150 pieces of these crucibles were found in the production residue layers (Fig. 27: 1-7). They were all made of clay, that is very similar as the clay of the molds. Only one specimen is fully preserved (Fig. 27: 1). Most of them have a hemispherical shape. The better preserved pieces have a slight spout. Their walls are thick, porous with vitrification and traces of bronze inside, and in one of them – of charcoal (Fig. 27: 4). The porosity of clay made crucibles resistant to high temperature. This type of crucibles is common over large area and for a long period and everywhere it has the same characteristics of the pieces found in Plovdiv (Katincharova, 2002: 235-254; Furger, 2018: Abb.19 15, Abb. 43 15, Abb. 20 5, Abb. 39 11; Cociş, 2019: Pl. 15 71,73, Pl. 16,79; Yahalom-Mack, 2019: 65-66, Type Cr2). Few crucibles have a more spherical shape (Fig. 27: 5). One is with larger diameter, shallower and with thinner walls (Fig. 27: 4). We have no data about the production place of the crucibles, but it is already discussed that they are most probably made separately in pottery workshops (Furger, 2018: 161-166; Cociş, 2019: 21).

Tools

Few iron tools come from the floor levels or in the layers between them, among which an anvil, a shovel, a hammer, a knife and probably a file.

The anvil is small in size and is used for reshaping the *fibulae* (Fig. 28: 5). The anvil falls into type I according to I. Cholakov's classification of the Roman age tools from Bulgaria (Чолаков, 2010: 142, обр. 239). They are L-shaped and fixed by driving their lower pointed part into a wooden base. The one from the workshop is heavily corroded and the lower part is chipped off. Its preserved height is 5,4 cm; the work base has a rectangular profile and a square section, 7,4 cm long and 3,3 cm wide. The preserved part of the lower part has also a square section, 1,5 x 1,5 cm.

A small shovel (*spatula*) has a completely preserved working part with rectangular shape and an arcuate section, which at the back is screwed as a tube to hold a probably wooden handle (Fig. 28: 3). In a metal working process such a tool is known to be used for cleaning the slag and stuck metal pieces in the crucibles (Andonova, 2013: 239, Fig. 2, 5-6).

A piece of an iron artefact with an asymmetrical triangular plate could be recognized, albeit conditionally, as a piece of a hearth and furnace rake (Fig. 28: 6). Similarly, to the shovel, such a tool is used to clean the metal residues, but the ones from the furnace or the place where the melted metal was poured (Andonova, 2013: 239, Fig. 2, 4).

The hammer is again a small specimen with a length of 6,3 cm, maximum width of 1,4 cm and thickness between 0,5 and 0,8 cm (Fig. 28: 2). It has a diamond shape and rectangular sections, which is a popular form of hammers with different sizes for use in various fields (Чолаков, 2010: 108-112, обр. 139а, 176-181). In the case of the workshop it could have also been used in different stages of the process of *fibulae* making, like breaking the moulds to remove the finished product, removal of redundant parts, etc.

Two much corroded pieces are recognized as the working part and the handle of a file (Fig. 28: 4). The working part is 4 cm long, with trapezoid cross-section, 0,9 x 0,9/1 cm. Such files are used for smoothing the edges of a product that result from its casting in the mould (Стоянов, Михайлова, 1993: 36, fig. 7 30-33), which interpretation fits well for a *fibulae*-making process.

[10] The end of manufacturing in Savaria is dated in the first two decades of the 2nd c. AD (Cociş, 2019: 55).

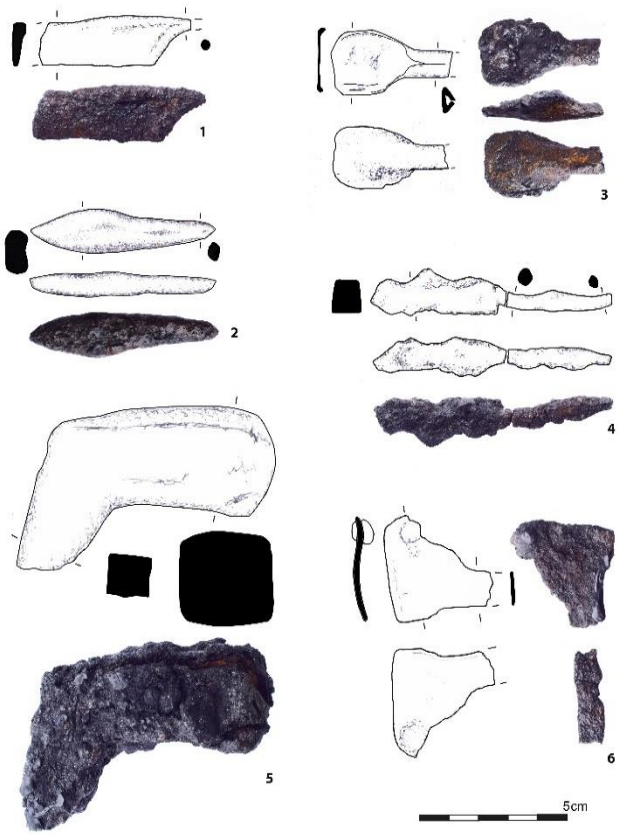

Figure 28. Iron tools: 1 – a knife; 2 – a hammer; 3– a shovel; 4– a file; 5 – an anvil (?); 6 – a furnace rake

The knife (Fig. 28: 1), a piece of which is found in the workshop, has a common shape for very long period and is a tool, that could be understood as part of the toolkit of the brooch workshop, but could be used also in the daily life of the workers in any other aspect.

Ingots and spilth

The only data on the raw material used in production are thin and well-shaped elongated pieces with a rectangular cross-section, in the forms of a parallelepiped, trapezoid or stick, which we interpret as ingots (Fig. 29: 1-8; Fig. 30: 1-2). Some of the thinnest specimens were probably used to produce bronze wire for the *fibulae* needles or spirals. Such items were found in ancient Dierna, *Dacia*, where they are considered to be an intermediate form of brooch pins and springs (Cociş, 2019: 49, pl. 111.39-68). There is no clear data for recycling bronze objects, which is common for Roman period workshops (Cociş, 2019: 21). Still some sheet fragments and pieces of different products than brooches could be an indication for recycling (Fig. 29: 9-10; Fig. 30: 3-7).

Sufficient amounts of spilths, smelts and dross are considered as waste of the production process (Fig. 30: 8-48). Bronze residue is often found in some of the moulds (Fig. 25: 45-47).

The largest amount of these pieces, the billets, the sheet fragments and the waste, is found in the layer with the production residues (Fig. 24), though some fragments also appeared in the layers among or on the floor levels.

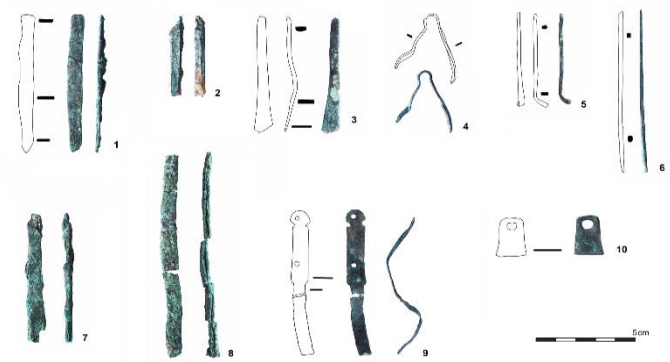

Figure 29. Ingots (1-8) and scrap? (8-10)

Other artefacts

Few other artefacts found in the layers of the workshop are to be added, though their reference to the brooches production process is uncertain.

A piece of a ceramic round object, found in the production residue layers, is similar to a small ledge and is probably a kind of the so-called portable hearths popular during the Bronze and the Iron Age (Fig. 27: 8). Its surface is heavily burnt which refers to its function as part of a firing process and was probably facilitating the work of melting the bronze. It is made of clay with the same characteristics as the one used for the crucibles. It is smaller than a typical portable hearth, with a diameter of 13 cm and a height of 4,6 cm. Still, the preserved fragment is very small and does not allow a reconstruction of its original form and thus suggesting its function.

Two round ceramic items similar to weights but very massive come from the latest floor level (Fig. 31: 1-2). Their cross-section is asymmetrical – rounded upper part and flat lower one. One of them is very much similar to a lid, but with its large measures, a diameter of 16 cm and a height of 3 cm, it cannot be recognized as a cover for any of the workshop items. Furthermore, the other nearly identical such artefact, with a diameter of 10,6 cm and a height of 3,4 cm, has a hole in the middle with a diameter of 1 cm. The hole is specifically made, with a recessed on one side for wedging a handle. The function, if it is the same for the two items, remains unclear.

Figure 30. Ingots (1-2) and waste pieces of the production process (3-48)

Pottery

The pottery found in the layers of the workshop includes domestic vessels of types that are typical for the late 1st and 2nd century (Fig. 32). Nearly all of the sherds have traces of secondary burning. Two pieces of *pitoi* with stamps on the rim are also included in the assemblage (Fig. 31: 3).

Two thin-walled imported cups are decisive for the date of the complex. One of the rim-sherds belongs to the so-called Kalathos cups (Harizanov, 2020a:83, fig.5). The clay has beige color; the surface is covered with red gloss slip. The cup has a vertical rim and bell-shaped body (Fig. 32: 3). This form is very similar to Italian *sigillata* form Consp. 17. Such cups were produced in Eastern *sigillata* during the second half of the 1st century until the first quarter of 2nd century (Harizanov, 2020a: 83). The form is reproduced in *Pontic sigillata* too, dated in the last quarter of the 1st to 2nd century (Журавлев, 2010: 59, pl. 27, cat. No 193). Two sherds of "Kalathos" cups are found during rescue excavation in Plovdiv, 20 m south of the workshop presented here. They are found in a context dated in the *Flavian* time (Славкова, 2015: 137, fig. 1.5-6). A cup with a hemispherical shape of the body and with a short foot is found in the workshop too (Fig. 32: 4). Its form is similar to the Consp. 36 form, produced in North Italian workshops during the 1st century. The clay is beige in color. Its surface is partly covered with red gloss slip. A similar cup from Pre-Roman *Dacia* is dated in the middle/end of the 2nd century BC – end of the 1st century (Popescu, 2013: 120, pl. 9. 147, cat. No 147).

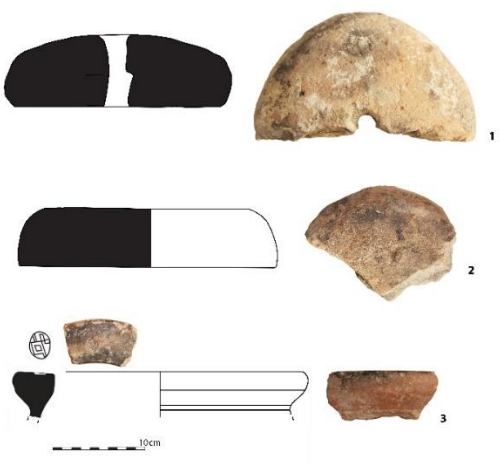

Figure 31. Ceramic round objects (1-2) and a stamped pithos (3)

Coins[11]

Two coins are found among the uppermost floor levels.

The first coin is an imitation of an Emperor Octavian Augustus' as with a countermark (Fig. 33: 1). The original coin (the prototype of imitation) is an as of *Sextus Nonius Quinctilianus* the *Triumvir monetalis*, with obverse: CAESAR.AVGVSTPONTMAXTRIBVNICPOT, head to the right; and reverse: SEXNONIVSQVINCTILIAN-IIIVIRAAAFF, sign around SC (RIC I, 76, № 439, Roma, 6 AD.). The original coin is not a widespread type.

The imitation is with obverse: [CAESARAV]GVSTPONTMAXTRIB-[VNICPOT], head to the right; and reverse: NIVSQVINCTIIIAN-[IIIVI]RIIIANIII, sign around SC. It is a well preserved specimen that had been in circulation. The countermark is on the reverse, a Pannonian type – AVG in *ligatura* and a mirror-image. The countermarking of this type was made during Emperor *Claudius* I, most probably after 45-46 AD and before 54-60 AD. The countermarked coins were withdrawn from circulation during the reign of Emperor Vespasian, 69-79 AD (Martini, Paunov 2004).

The second coin is a *dupondius* of Emperor Vespasian, 76 AD (Fig. 33: 2). The coin is well preserved and it has not been in circulation for a long time. On the obverse: TCAESARIMPCOSV, head with sun crown to the right; the reverse: FELICITA/S-/PVBLICA, *Felicitas* straight to the left, holding a caduceus in the right hand and with a *cornucopia* in the left one (RIC II/I[2], 124, № 909, Roma, 76 AD)

The two coins most probably reflect the coin circulation in *Philippopolis* during the last quarter of the 1st century.

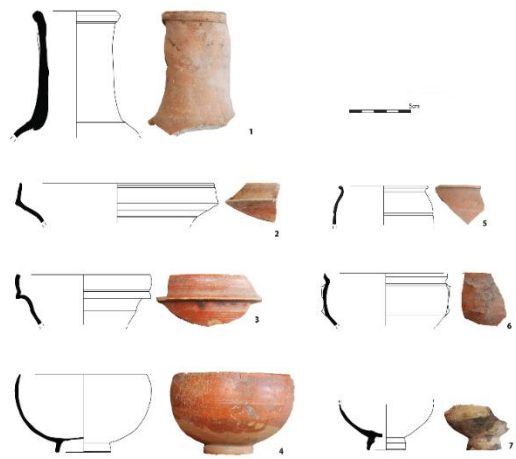

Figure 32. Ceramic vessels

Chronology

The thickness of the workshop's layers is about 80 cm, which, together with the repairs of the floor, the reorganisation of the area and the reconstruction of the equipment refers to a relatively long period of the workshop's functioning, which could be determined between one and few decades. The stratigraphic position of the building with the workshop, together with the date of the chronologically sensitive artefacts as the two coins and part of the ceramic vessels, allows us to date the functioning of the workshop between the last decades of the 1st century and the beginning of the 2nd century.

Reconstruction of the production process

The general archaeological situation, with repeatable features and the artefacts allows reconstructing the workshop area arrangement and individual stages in the process on producing *fibulae* (Fig. 34).

In the two distinguished building phases, inner walls divide the area and the production process is concentrated in a part of the room.

Metal ingots are molted in already available crucibles produced elsewhere. The process of smelting is done in small pits (H and I) where the crucibles are placed in together with hot charcoals taken from a furnace (F and L). The molten metal is poured into the moulds over specially arranged platform, a working pad (D). A

[11]The coins analysis is made by Dr. Varbin Varbanov.

hearth next to it (E) served probably to keep the metal in molted condition by placing the full crucibles over hot charcoals while working with consecutive moulds. While during the earlier phase these two facilities, the hearth and the working pad, are clearly distinguished (D and E), they seem to be combined in one structure (J) in the later period. It is to be noted that during the second phase, small pits are lacking and thus the metal is probably melted in this same hearth. A shovel is helping to pour the molten metal into the moulds, while a furnace fake is used to scrape the spilled material from the working pad.

After the metal has cooled, the mould is broken and its pieces are thrown away at a particular place. A separated area is used for keeping the waste during the second phase while the location of the garbage place is unknown for the earlier period.

The semi-finished products are finished on a tabletop (G), using a fixed anvil. Excessed parts are taken out with the help of a small hammer and the file. Springs and pins are additionally added. Some of the ingots (Fig. 29: 5-6) suggest they are also made here and therefore the *fibulae* are completed at the place.

The point about the production of the moulds is open for now. They could have been produced in the furnace (F and L) and thus these features have to be recognized as kilns. Still they could have both functions, for producing charcoals needed for the metal melting process. A pit in the northern part of the room (O) could have served for keeping the clay for the moulds if not elsewhere outside the room.

Thus, the proposed reconstruction of the production process in the workshop is hypothetical and should be considered that part of the facilities and the tools could have had different functions and/or use in more than one activity.

Figure 33. Coins: 1 – an as of Emperor Octavian Augustus with a countermarking during Emperor Claudius I, 45-60 AD; 2 - a dupondius of Emperor Vespasian, 76 AD

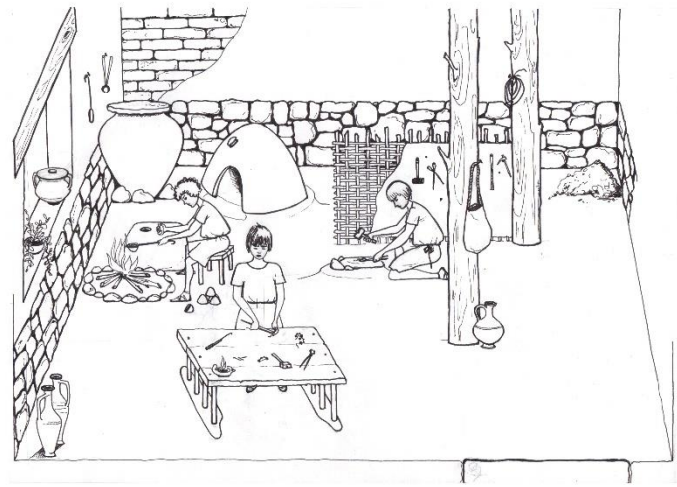

Figure 34. An artistic reconstruction of the excavated brooch workshop (by Veronika Petrovska)

2. Conclusion

Unlike other provinces such as *Pannonia* and *Dacia*, where a large number of fibula-making workshops are found (Sey, 3013: 251-258, Cociș, 2019), so far we have no such data for the Province of Thrace. The workshop studied in *Philippopolis* is the first one found in this part of the Roman Empire. The chance of being well preserved with number of production facilities, repeatability of the features in consecutive construction phases and large number of artefacts that refer to the production process as scrapped products, tools, moulds, crucibles, ingots, smelts and dross, the brooch workshop from *Philippopolis* contributes for the knowledge of making *fibulae* during the Roman period in the Province of Thrace and beyond.

The *Philippopolis* workshop contributes also for the chronological distribution of the Almgren 84 Type derivative *fibulae* in the Province of Thrace. With the beginning of its recognition here this type is dated from the middle of the 2nd until the beginning of the 3rdcentury. Considered as chronologically sensitive artefacts, the *fibulae* are further used to date the complexes they are found in when no other finds with precise date are available. The archaeological situation in Plovdiv allows specifying an occurrence date for the type in this region of the Roman Empire. The large amount of moulds found in the workshop is evidence for the popularity of the Almgren 84 Type in *Philippopolis* during the last decades in the1st century already. Being the largest city in the province, it played the role of a distributor of trends and fashions at least to its vicinity but most probably even further beyond it.

Résumé - Un atelier de broches de l'époque romaine de Philippopolis : Un atelier de broches fortement profilées a été découvert dans la partie orientale de l'ancienne ville de Philippopolis (la ville moderne de Plovdiv, Bulgarie). L'atelier était situé dans un bâtiment de plan rectangulaire et des murs en pierre et en briques crues. A l'intérieur de la salle des fours, un plan de travail, un plan de travail, des petites fosses, des emplacements de stockage des cendres chaudes et une enclume ont été identifiées. Dans la partie sud-est de la salle, des couches de déchets contenant environ 1 500 fragments de moules en argile, 150 fragments de creusets, déversements de bronze et résidus ont été étudiés. Des outils en fer (une enclume, une pelle, un marteau, un couteau et probablement une lime), des objets défectueux et des lingots de bronze ont également été retrouvés à l'intérieur de la pièce. Le type

fibulae est un dérivé du type Almgren 84. Les variations des moules et les articles défectueux définissent que plusieurs variantes de ce type ont été réalisées en atelier. Un exemplaire tout entier se trouve dans la zone proche du chambre. Selon la position stratigraphique de l'atelier, ainsi que les objets qui y sont trouvés, y compris deux pièces de monnaie en bronze (une imitation d'un empereur Octave Auguste avec une contremarque et un dupondius d'Empereur Vespasien), la fabrication des broches remonte aux dernières décennies du 1er siècle. L'atelier péroné fouillé à Philippopolis est le seul trouvé dans la ville et sur le territoire de la Bulgarie daté de l'époque romaine période et fournit des informations importantes sur l'organisation de la fabrication des broches.

Mots-clés : *fibules, atelier, Philippopolis, broches à profil fort, fonte du bronze.*

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