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Terra incognita? Not only on the arms and armour production
in the borderland of Silesia, Brandenburg, Greater Poland and Lusatia
in the late Middle Ages

Key words: weaponry, manufacturing, hammer-mill, forge, corporation, late Middle Ages, borderland

Słowa kluczowe: uzbrojenie, wytwórczość, kuźnica, kuźnia, cech rzemieślniczy, późne średniowiecze, pogranicze

During the Middle Ages arms and armour were considered luxury products. They were not used every day and not by everyone. Nonetheless, the circle of their buyers was relatively wide, making their prices extremely diversified. On the other hand, as weaponry was bought every several years, the demand was limited. It resulted in a relatively small number of workshops in which weapons were produced. Besides specialised production sites located in towns or at royal courts, there were also rural forges, where arms and armour were produced for the needs of less wealthy members of the medieval society. The organisation of the armament production in the Kingdom of Poland was thoroughly examined in J. Szymczak's studies.¹ The area in question, that is, the borderland of Silesia, Greater Poland, Brandenburg and Lusatia (roughly equivalent to today's Lubuskie Voivodeship), laying mostly outside the borders of medieval Poland, was not discussed in these works. Furthermore, the eastern periphery of the Holy Roman Empire has not become a subject of interest of European scholars, who mainly focused on leading centres of arms and armour production.² In the previous study on late medieval weaponry,³ its manufacture was broadly explored. An attempt to identify possible places of origin of particular products was undertaken, mainly on the basis of craftsman's marks. However, only limited conclusions on the local production could be drawn mainly because of the lack of written sources informing *expressis verbis* about the arms and armour manufacture in the region. As a result, there is no data about volume and organisation of the production, prices or standards masterpieces were to meet, which were defined by municipal authorities. Therefore, it may seem that the subject of the paper cannot be further explored. There is, however, substantial indirect evidence indicating a possibility of local production of armaments, which we examine below.⁴

The first indication of the arms and armour manufacturing in the studied borderland during the Middle Ages and the Early Modern Period can be found in written sources, which mention many small metallurgical workshops (forges and hammer-mills) (Fig. 1). Iron, in medieval times obtained mainly from bog ores, was the most important raw material for the manufacture of

¹ Szymczak J. 1989; Szymczak J. 1990, pp. 208–382.

² Reitzenstein A. 1951, pp. 179–194; Reitzenstein A. 1959, pp. 54–85; Reitzenstein A. 1960, pp. 96–100; Reitzenstein A. 1964; Reitzenstein A. 1967, pp. 20–32; Williams A. 2003; Terjanian P. 2005, pp. 23–48.

³ Michalak A. 2019.

⁴ I would like to express my gratitude to Mr Paweł Stachowiak, MA from the Archaeological Museum of the Mid-Odra Area in Zielona Góra for his help with accessing hardly available literature.



Fig. 1. Places of arms and armour production in the Silesian-Greater Poland-Brandenburg-Lusatian borderland in the 13th–16th centuries:

A — places of metallurgical production known from medieval and early modern written sources; B — places of blacksmith production known from medieval and early modern written sources; C — places of medieval blacksmith production evidenced by archaeological excavations; D — sites of arms and armour production evidenced by archaeological sources; E — places with the arms and armour production known from modern written sources; 1 — Bucze; 2 — Dobrzyń; 3 — Klików; 4 — Krosno Odrzańskie; 5 — Łoży; 6 — Międzyrzecz; 7 — Nowa Wieś; 8 — Przewóz; 9 — Sanice; 10 — Santok; 11 — Szprotawa; 12 — Świebodzin; 13 — Tamów Jezierny; 14 — Żagań (drawing by A. Michalak)

Ryc. 1. Miejsca produkcji uzbrojenia na pograniczu śląsko-wielkopolsko-brandenbursko-lużyckim w XIII–XVI w.:

A — miejsca produkcji hutniczej wymieniane w średniowiecznych i wczesnonowożytnych źródłach pisanych; B — miejsca produkcji kowalskiej wymieniane w średniowiecznych i wczesnonowożytnych źródłach pisanych; C — miejsca średniowiecznej produkcji kowalskiej znane na podstawie źródeł archeologicznych; D — miejsca produkcji uzbrojenia poświadczane źródłami archeologicznymi; E — miejsca produkcji uzbrojenia znane z nowożytnych źródeł pisanych; 1 — Bucze; 2 — Dobrzyń; 3 — Klików; 4 — Krosno Odrzańskie; 5 — Łoży; 6 — Międzyrzecz; 7 — Nowa Wieś; 8 — Przewóz; 9 — Sanice; 10 — Santok; 11 — Szprotawa; 12 — Świebodzin; 13 — Tamów Jezierny; 14 — Żagań (rys. A. Michalak)

a majority of military equipment.⁵ Centres of arms production often used local raw materials. Cologne armourers, for instance, were not allowed to purchase iron and steel outside of Cologne.⁶ Abundant shallow deposits of limonite-type bog ore found in many places on the border of Silesia and Lusatia, mainly in the Lower Silesian Forest, attracted skilled craftsmen and contributed to a significant development of metallurgical production in the area.⁷ The ore obtained by diggers-miners was smelted and then further processed in hammer-mills. There, with the help of hammers, the raw iron was forged into bars, which were sold to local craftsmen.⁸ However, the ores were not of the highest quality, because of a low iron content (16–44%) and the high amount of phosphorus (0.2–7%).⁹

The earliest mention of a forge operating in the region concerns Droskau (now Drożków near Żary) and is dated to 1200.¹⁰ However, it comes from the book of Pastor Worbs and its credibility has not been verified yet. The first reliable evidence of the metallurgical production in this area is a charter issued by Henry IV the Faithful, Duke of Żagań (Sagan) in 1337, allowing extraction of iron ore deposits located to the south of Żagań (most likely in wetlands by the

⁵ Szymczak J. 1989, p. 16.

⁶ Terjanian P. 2005, p. 24.

⁷ Rutkowska-Placińska A. 1978, p. 67; Bena W. 2012, p. 79.

⁸ Grabig H. 1937, p. 36.

⁹ Piaskowski J. 1959, pp. 7–97; Ratajczak T., Skoczylas J. 1999; Bena W. 2012, p. 79.

¹⁰ Beck L. 1895, p. 846; Czarnuch Z. 2003, p. 53.

Olsza stream).¹¹ The first documented reference to the functioning of a hammer-mill powered by a water wheel concerns “Wilhelms Hammerstatt”, which is identified as the workshop in Klikowo near Iłowa. The mention comes from a 1356 fief letter of the von Kottwitz family.¹² The book of municipal expenses of Szprotawa (Sprottau) mentions an iron forge operating in this town already in 1381.¹³ A hammer-mill in Łozy upon the Kwisa was established presumably as early as the 14th century.¹⁴ A slightly earlier piece of evidence concerning a facility in Sanice near Przewóz (Priebus) comes from 1395. According to written sources, it was in use until 1563.¹⁵ A hammer-mill in Dobrzyń was mentioned in sources as early as 1499, and later also in 1505, 1517, 1519, 1521 and 1563.¹⁶ The functioning of the workshop in Bucze near Przewóz dates back to at least 1501 and records mention its masters continuously until 1624.¹⁷ A hammer-mill is also mentioned in the 1397 charter documenting the purchase of nearby Przemków by the Rechenberg brothers. Its functioning is also confirmed by a source from 1415.¹⁸ It has to be noted, that there were other metallurgical workshops several kilometres to the south and west of Przemków.¹⁹ The scale of the use of local deposits was noticed, among others, by Georgius Agricola or Walenty Rózdzieński who mentioned the extraction of ore in the vicinity of Żagań, or by Georg Fabricius who wrote about the exploitation of iron ore deposits in Lusatia.²⁰ The metallurgical fame of these areas was also celebrated by a poem of Krzysztof Winter from Żagań, *Fabriliium Silesiae officinarum fodinarumque descriptio*, published in 1556.²¹

Hammer-mills also functioned in *Terra Transoderana* (Neumark), but those located in the studied region were predominately late modern and therefore we will not discuss them here.²² An exception being a workshop in Buszów near Gorzów as it was mentioned in 1537. Some historians even date it to the 14th century.²³ Several of copper forges operating in the northern part of the discussed area were also mentioned in medieval records.²⁴

Direct evidence confirming the functioning of another place of iron production was discovered during archaeological excavations in Podrosche (former part of Przewóz),²⁵ where slag heaps and two features of undetermined function were uncovered. Their plan was irregular with a trough-shaped cross-section. Their bottom was formed by a layer of clay containing a large amount of burnt wood. Directly above it, there was a layer of fine slag directly above it. The remaining part of the fill was dark brown humus mixed with residues and charcoals, containing also layers of fine slag.²⁶ At this stage, it is difficult to make a final interpretation of both features, due to the lack of similar structures on sites where iron-producing workshops

¹¹ Grabig H. 1937, p. 35; Bena W. 2012, p. 81.

¹² Matuszkiewicz F. 1956, p. 5.

¹³ Matuszkiewicz F. 1956, p. 5.

¹⁴ Bena W. 2012, p. 81.

¹⁵ Koschke W., Menzel S. 2007, p. 198.

¹⁶ Koschke W., Menzel S. 2007, p. 163.

¹⁷ Koschke W., Menzel S. 2007, p. 160.

¹⁸ Andrzejewski T. 2007, p. 130.

¹⁹ I should mention here medieval workshops from Bielawa (1403), Parowa (first mention in 1418), Poświętne (1422), Ruszów (1435), Kościelna Wieś (1439), Dłużyna Górna (1445), Jagodzin (1451), Świętoszów (1451), Okrąglica (1482), Stojanówki (1492) and Bronowiec (1494), Grabig H. 1937, pp. 35–36; Steller G. 1968, pp. 101–102; Koschke W., Menzel S. 2007, pp. 148–214; see also Krajniak W. 2019, p. 51.

²⁰ Mączak A., Samsonowicz H., Zientara B. 1954, p. 90.

²¹ Bena W. 2012, p. 80.

²² Kupke P. 1934, pp. 107–108; Czarnuch Z. 2003, p. 57.

²³ Czarnuch Z. 2003, p. 57.

²⁴ Czarnuch Z. 2003, pp. 62–66; Stachowiak P. 2013, pp. 22–24.

²⁵ Kałagate S., Michalak A. 2010, pp. 191–218; Stachowiak P. 2015, pp. 261–269.

²⁶ Kałagate S., Michalak A. 2010, pp. 191–196.

were found.²⁷ A feature with a comparable form and an arrangement of layers was discovered in Osetno, Góra District in Silesia. Pieces of iron slag, clay and fragments of clay tuyeres with traces of slag sinter at the outlets were excavated from its fill. Based on the surviving evidence, the feature was considered to be remains of a type of bloomery furnace with a cylindrical or conical shaft. Pottery finds allowed to broadly date the settlement to the period between the 8th and the 13th century.²⁸ We propose to interpret the feature in Przewóz as remains of a furnace and a working pit. Both are damaged to such an extent that it is impossible to separate one from the other. The pile found next to them could have been formed by hot slag removed from their fill, which resulted in compact structure of the accumulation.

Documentary evidence confirms the functioning of the hammer-mill in Podrosche (former part of Przewóz) in the end of the 16th century.²⁹ Based on the archaeological data, its origins can be traced to the 14th century, with firm proof of its use in the 15th century.³⁰ The examples indicates a great caution is needed in drawing conclusions concerning chronology of such features based solely on written sources.

The excavation of the site in Przewóz demonstrated also that alongside the metallurgical production smithing was carried out there as well. A large part of the metal finds consisted of post-production waste,³¹ which is typically excavated in vicinity of forges.³²

The archaeological evidence from Przewóz could confirm the words of J.G. Worbs, who was a pastor there in the end of 18th and at the beginning of the 19th century. Worbs reported functioning of many blacksmiths in Przewóz, noting they manufactured knives, scythes, sickles and swords. Their products were highly valued and reached the markets of Frankfurt, Wrocław and Leipzig.³³

Most scholars admit that rural smithies did not participate in the production of arms and armour on a large scale, mostly limiting their activity to horseshoeing, forging basic agricultural and carpentry tools (including axes and hatchets) as well as sharpening and repairing more elaborate artefacts.³⁴ Mass-produced arrow- and boltheads, as well as iron parts of staff weapons, could also be manufactured there, although rather only in times of war.³⁵

Remains of a probable rural smithy were recorded in Nowa Wieś, Międzyrzecz District (Fig. 2). The feature was discovered at the eastern part of the site near the Jordanka River. It was 7.0 m long, 3.0 m wide and 1.5 m deep and consisted of a rectangular clay-stone furnace with a damaged clay dome lying in the fill of the furnace; there was also an oval room situated

²⁷ Kolchin B.A. 1953, pp. 20–40; Pleiner R. 2006, pp. 109–122.

²⁸ Iwanicka-Pinkosz B. 2000, p. 89, Fig. 3:2.

²⁹ Steller G. 1968, p. 64; Koschke W., Menzel S. 2007, p. 194.

³⁰ Kałagate S., Michalak A. 2010, pp. 207–208.

³¹ Kałagate S., Michalak A. 2010, p. 206, pl. V.

³² Krajć R. 2003, Pl. 161; Biermann F. 2010, Pl. 155.

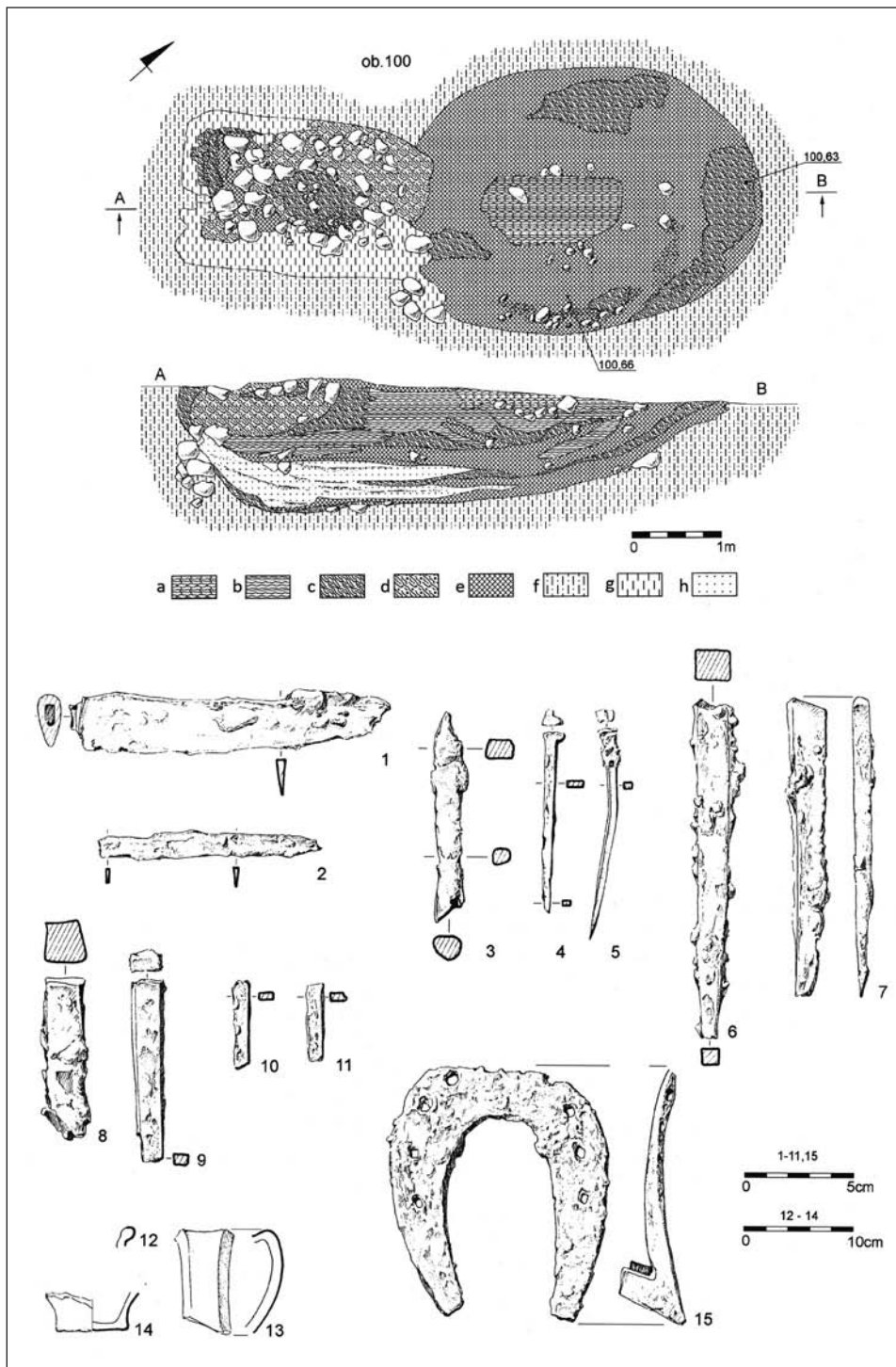
³³ Worbs J.G. 1795, p. 264; Grabig H. 1937, p. 45.

³⁴ Samsonowicz H. 1954, p. 74; Szymczak J. 1989, p. 22.

³⁵ Szymczak J. 1989, pp. 232–233.

Fig. 2. Nowa Wieś, Międzyrzecz District. Remains of the 15th-century rural forge with artefacts discovered in its fill: a — ash, light loamy sand; b — ash, light loamy sand, daub; c — daub; d — burning, ash; e — burning; f — loamy sterile earth; g — unfired clay; h — ash (after: Dzieduszycki W., Makiewicz T., Sobucki A. 1998, pp. 174–175, Figs. 38–39)

Ryc. 2. Nowa Wieś, powiat międzyrzecki. Relikty piętnastowiecznej wiejskiej kuźni wraz z przedmiotami odkrytymi w jej wnętrzu: a — popiół, lekko gliniasty piasek; b — popiół, lekko gliniasty piasek, polepa; c — polepa; d — spalenizna, popiół; e — spalenizna; f — gliniasty calec; g — niewypalona glina; h — popiół (według: Dzieduszycki W., Makiewicz T., Sobucki A. 1998, s. 174–175, ryc. 38–39)



to the east of it. A large amount of iron slag was found in the fill of the feature, along with smithing tools (a drift, smithing wedges, a punch, a polishing stone) and finished and unfinished smithing products (knives, nails, a horseshoe, a bolt head). Unearthed pottery allowed to date this feature to the second half of the 15th century.³⁶ This forge is similar to the one discovered in Mutějovice in Western Bohemia, dated to the 13th century.³⁷ Among many finds excavated from its fill, there were also arrowheads and a spur.³⁸ It cannot be ruled out that there were also other rural forges in the analysed region.³⁹ Analogous features known from other lands suggest that rural workshops also occasionally made arms and armour for castle garrisons. In Haus Rhade in North Rhine-Westphalia, remains of a blacksmith's workshop from the 14th/15th century were discovered outside the castle walls. Along with many different kinds of metal artefacts, horseshoes, knives, a dagger and a sword were found in its fill.⁴⁰

Castle forges more frequently fulfilled the needs of war, specialising not only in horseshoeing but also in manufacture and repair of individual parts of military equipment.⁴¹ Ch.-L. Salch⁴² distinguished three ways of functioning of such facilities in the Late Middle Ages: 1) itinerant forges, in which case heavier blacksmithing devices, such as anvil or larger hammers, were kept in a castle, but there was no permanent qualified blacksmith (who could be employed when necessary); 2) complete smithies, in which repairing, manufacturing or horseshoeing could take place; 3) specialised workshops producing one category of products for trade. In Poland, features located in towns and castles and interpreted as remains of smithies were recorded in Tum (from the 12th to the first half of the 14th century), Pułtusk (from the mid- and the late 13th century) and Czersk (from the third quarter of the 13th century to the first quarter of the 14th century).⁴³ Remains of blacksmith's workshops discovered in Raciąż, Siedlątków and Słozewy indicate a possibility of repairing more sophisticated elements of armament or producing less complicated ones. In the

³⁶ Dziędużycki W., Makiewicz T., Sobucki A. 1998, pp. 173–176, Figs. 38–39.

³⁷ Pleiner R. 1969, pp. 533–571.

³⁸ Pleiner R. 1969, Fig. 11:4, 8.

³⁹ Toponymic sources are also used to locate alleged places of rural metalsmith production. Such names were related to the organisation of military production in so-called servitorial settlements whose inhabitants were obliged to provide the ruler with certain products, and reflected the profession of the population. However, this method has serious drawbacks. It is practically impossible to precisely establish the chronology of the origin of individual names (see Świątosławski W. 2006, p. 43). Additionally, in the case of the territory of today's Western Poland, earlier German names should also be taken into account. The borderland discussed here is a good example. The analysis of current place names revealed four toponyms that could potentially be related to the activity of blacksmiths: Kowalów, Słubice District and Kowalewo, Wschowa District, Grotów, Żary District and Grotów, Strzelce Krajeńskie-Drezdenko District. However, a closer inspection of their German names demonstrated that there was absolutely no connection with this profession: Kowalów is German Kohlow, Kowalewo is former Kawel, Cowalewo, Kovalewo, Cowalyewo, Kavel, or Kabel, Grotów near Żary is German Gräfenhain, while the other Grotów is German Grottow.

⁴⁰ Sönnecken M. 1976, pp. 27–38, Figs. 7–16.

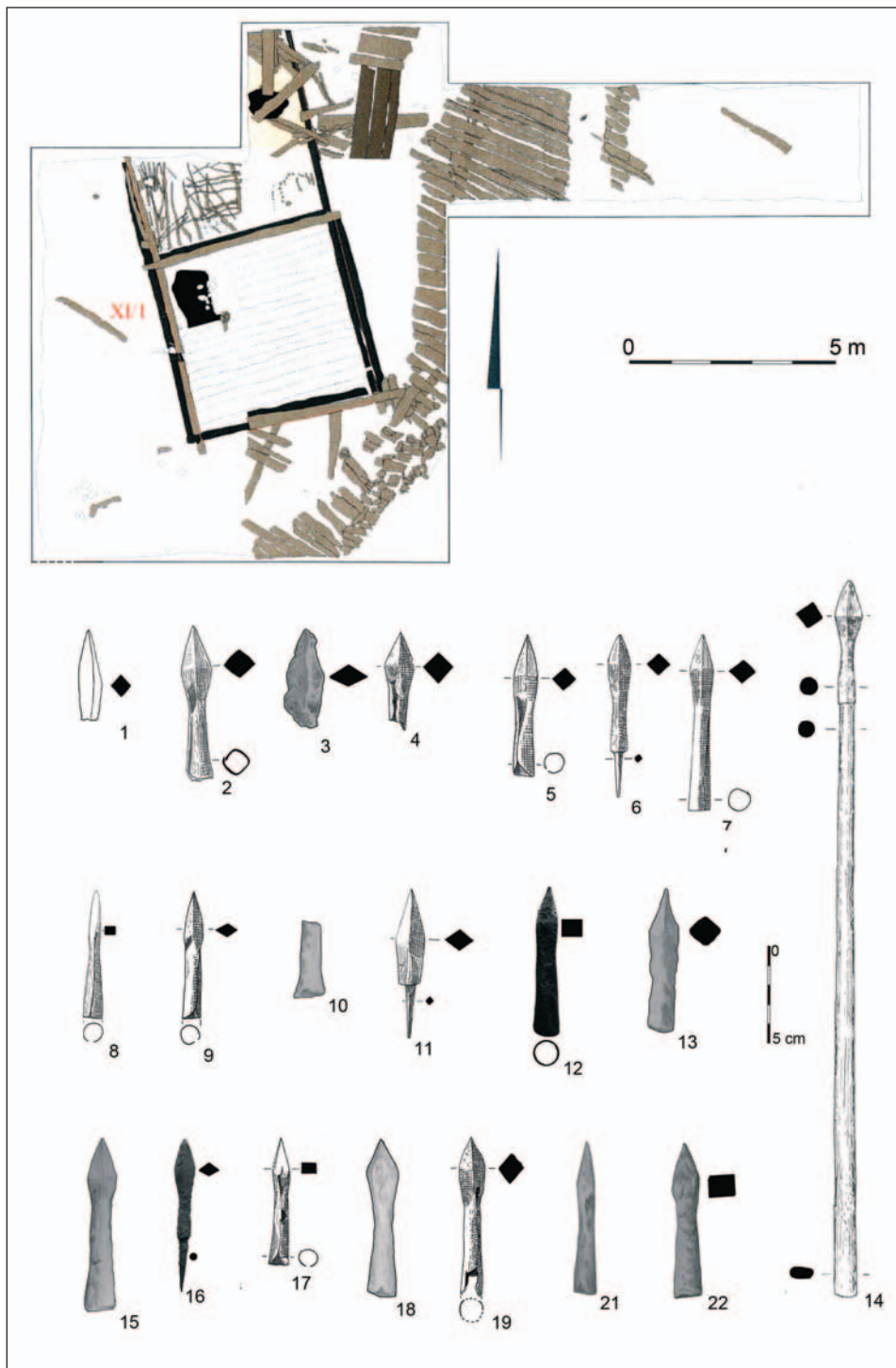
⁴¹ Głosek M. 2002, p. 64.

⁴² Salch Ch.-L. 2002, pp. 18–19.

⁴³ Polak Z. 1988, p. 136; Głosek M. 2002, pp. 59–60.

Fig. 3. Międzyrzecz, Międzyrzecz District. Remains of the 14th century castle forge with bolt heads discovered in its fill (after: Kurnatowski S. 2015, p. 230, Fig. 81; Michalak A. 2019, pp. 407–414, Figs. 98–105)

Ryc. 3. Międzyrzecz, powiat międzyrzecki. Relikty czternastowiecznej kuźni zamkowej z grotami beltów odkrytymi w jej wnętrzu (według: Kurnatowski S. 2015, s. 230, ryc. 81; Michalak A. 2019, s. 407–414, ryc. 98–105)



relics of a forge from the second half of the 13th century in Raciąż in Central Pomerania, remnants of a mail armour were discovered.⁴⁴ Excavations conducted in the area of the 14th-century motte stronghold in Siedlątków upon the Warta River in Central Poland revealed parts of armour that were repaired in a forge at the site.⁴⁵ In the area of a stronghold in Słozewy in the Chełmno Land, dating back to the turn of the 15th century, remains of a workshop that mass-produced bolt heads were discovered.⁴⁶ We have archaeological evidence of blacksmith's workshops in strongholds in Międzyrzecz, Santok and Tarnów Jezierny. These facilities operated in the second half of the 13th century and can serve as yet another argument to support our assumption.

The feature in the Międzyrzecz stronghold was discovered in the central part of its courtyard (Fig. 3). The forge was constructed after the destruction of the stronghold by a fire during the invasion in 1269. It functioned until the end of the first quarter of the 14th century, when it was demolished.⁴⁷ The structure consisted of two buildings: the forge itself and a log house adjacent from the south, which is interpreted as a storage room. They were surrounded by a wood-coated road, widening at the eastern part of the forge into a small square. The warehouse was placed on very solid foundations, made of a three-layer grate constructed of beams. Corners of the grate were additionally reinforced with posts. Timber framed walls of the building were 4.5 m long. The floor was lined with half-round logs placed on joists. In its north-west corner, there was a high gutter-shaped hearth. The entrance to the forge was in the northern wall of the warehouse. The forge building had a form of a shed, 5 m in length, with its eastern side opening onto a timber paved yard. Its walls had a log structure with beams overlapping at corners. As a result of regular laying of new clay flooring, the level of the interior surface was constantly rising. In the centre of the smithy, there was a blacksmith's hearth, next to which numerous horseshoe nails, nails and pieces of nail-drawing iron were discovered. The original floor was partially damaged by a fire, and covered with an additional layer of laths, increasing its level. In the second phase, the hearth was most likely not placed inside the building, even though there was still a cutout for it in the floor. The research showed that the damaged walls of the forge building were repaired by replacing damaged beams.⁴⁸ At least 30 boltheads, several spurs and horse shoes were excavated from the fill of these two features.⁴⁹

During the excavations in the second segment of the transitional type ducal castle in Tarnów Jezierny near Sława, remains of a wattle-and-daub building (6.0 × 7.0 m) were discovered in the north-eastern part of the mound/castle hill. Inside, by the southern wall, remains of a ceramic hearth were recorded. Artefacts found in the fill (several bolt heads, horse shoes, bronze and iron ferrules, bronze waste and small anvil) indicate a smithing function of the discovered feature.⁵⁰

Little is known about the remains in Santok near Gorzów Wielkopolski, either (Fig. 4). It was discovered during the excavations of the Polish "millennium" expedition in 1958–1965 in the eastern part of the Stronghold 10.⁵¹ It was located in the place of a former rampart (more

⁴⁴ Kowalczyk M. 1986, pp. 68–72; Świątkiewicz P. 2010, pp. 57–58.

⁴⁵ Kamińska J. 1968, pp. 42–43; Nosek E. 1968, pp. 95–132; Nadolski A. 1968, pp. 89–93; Nadolski A. 1969, pp. 5–23.

⁴⁶ Kola A., Wilke G. 1975, pp. 161–180.

⁴⁷ Kurnatowski S. 2015, pp. 234–242.

⁴⁸ Kurnatowski S. 1961, pp. 141–143.

⁴⁹ Michalak 2019, Cat. Nos.: 307, 310, 286, 400–401, 408–411, 413–414, 416, 419–421, 423–425, 427–431, 433, 435–436, 440, 450. Inventory Nos.: Z54/438, Z54/588, Z55/841, Z55/913, Z55/702, Z55/705, Z56/53, Z55/803, Z56/208, Z58/361.

⁵⁰ Nowakowski D. 2008, pp. 404, 410; Nowakowski D. 2017, p. 446.

⁵¹ I owe this information to Mrs Kinga Zamelska-Monczak PhD from the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, Department for Prehistoric and Medieval Studies in Poznań.

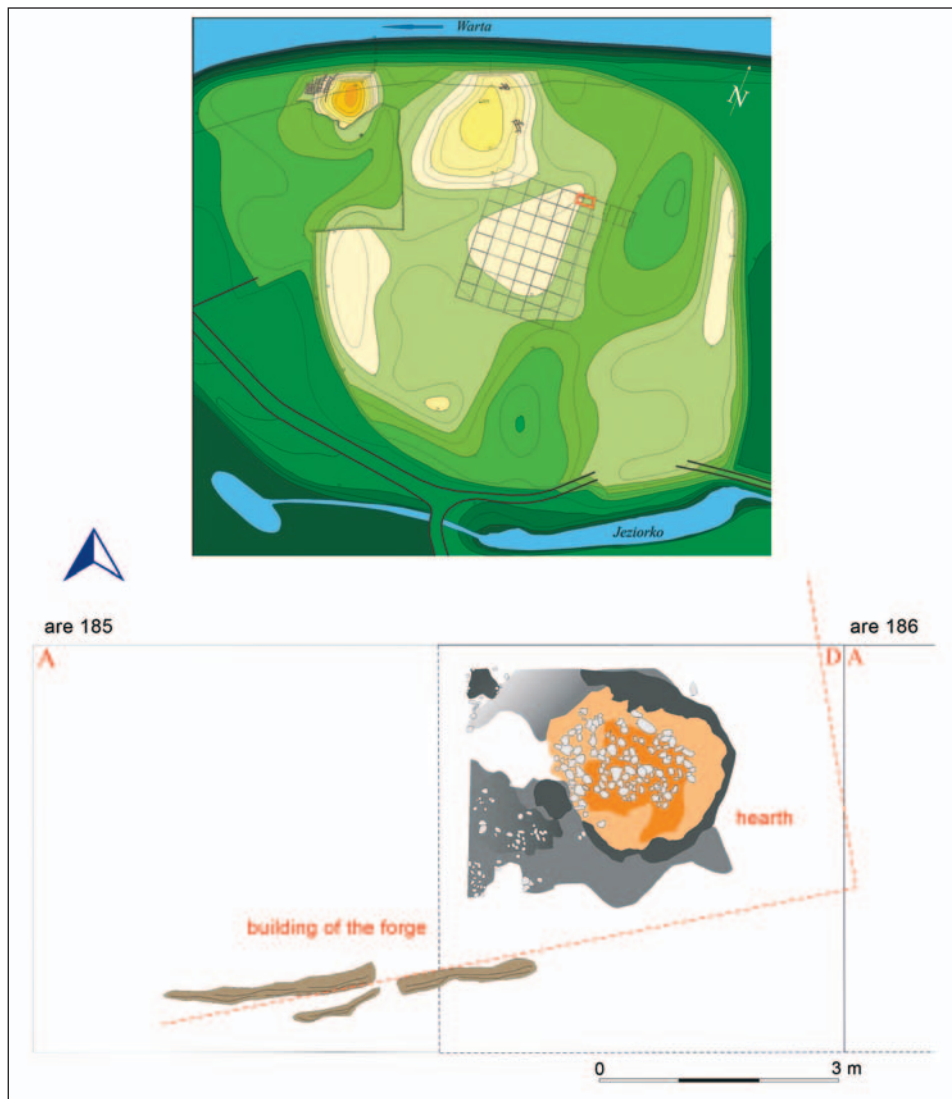


Fig. 4. Santok, Gorzów Wielkopolski District. Remains of the 14th century castle forge, against the plan of the stronghold (after: Ignatowicz I., Pytlak M. 2019, p. 370, Fig. VIII.2)

Ryc. 4. Santok, powiat gorzowski. Relikty czternastowiecznej kuźni zamkowej na planie grodziska (według: Ignatowicz I., Pytlak M. 2019, s. 370, ryc. VIII.2)

precisely on a levelled top of the rampart), the so-called internal wall, separating the stronghold and the *suburbium*.⁵² It was recorded just below the top soil. The top soil with a large amount of burnt clay, charcoals, slag and ore (probably also of slag cakes), numerous small iron artefacts of unspecified function, cakes of baked and burnt clay and a clay tuyere were preserved. The remains of the alleged forge building consisted of only two beams. The remnants of the

⁵² Hensel W., Hilczer-Kurnatowska Z. 1987, p. 20; Ignatowicz I., Pytlak M. 2019, p. 379.

furnace were also recorded. The entire building is preliminary dated to the first quarter of the 14th century.⁵³

We should also mention the probable workshop in Radzyń, where an assemblage of iron artefacts was accidentally discovered during groundworks. It included, among others, finds of arms and armour: a javelin head,⁵⁴ a stirrup, a bit, and a hand hammer.⁵⁵ According to D. Nowakowski,⁵⁶ this may indicate that there was an armament workshop and a storage room in the lowest, partially sunken part of a timber tower of the motte stronghold. This hypothesis seems plausible.

Features of a similar form are known from many strongholds throughout Central and Western Europe, proving a great importance of smithing production for their functioning.⁵⁷ The characteristics of the features from the region allows us to conclude that these forges were rather workshops in which predominately ad hoc repairs were carried out or perhaps less advanced arms and armour were made. It is not likely that these facilities were involved in the production of armament on a larger scale. The technological development at the end of the Middle Ages and related improvements in the production of arms and armour, among other factors, diminished the importance of the production of local castle workshops financed by poorer knights. They could not meet the demand for armament of castle garrisons in the expected time, nor were they able to provide arms of good quality and in sufficient quantities. A more rational solution was to purchase necessary weapons on the free market. This does not mean, however, that the castle forges ceased to function. Huge amounts of military equipment still needed to be serviced and repaired — and that was one of the purposes of the castle smithies.⁵⁸

In the late Middle Ages, more sophisticated armaments were made by craftsmen concentrated in urban blacksmith guilds. Their origins in larger centres date back to the end of the 12th century. A source from this period mentions two blacksmiths operating in the “On the Sand” (“Na Piasku”) monastery in Wrocław. It is assumed that the guild was established there around 1273⁵⁹ and the sword-, mail- and armour makers worked there already in the second half of the 13th century.⁶⁰ With increasing specialisation of crafts during the 13th and the 14th centuries,⁶¹ better organised corporations of manufacturers gathered specialists from various fields of metal craftsmanship (blacksmiths, locksmiths, cutlers, goldsmiths, armourers, sword- and spur makers). This allowed to manufacture very complex elements of military equipment which were made by craftsmen of even several different fields of expertise. It was, however, not the universal practice. Formed in the 14th century, the blacksmith guild in Poznań functioned as one collective until the end of the 15th century, when, in 1486, swordmakers and cutlers separated from it and in 1497 established their own corporation.⁶² As guilds supervised quality of manufactured items, they presented a higher level of workmanship. The quality was often examined by a commission before products were sold. Only those accepted by aldermen of the guild were provided with a mark proving they were meeting the standards determined by corporation.⁶³

⁵³ Hensel W., Hilczer-Kurnatowska Z. 1987, p. 20.

⁵⁴ Michalak A. 2019, Cat. No. 106.

⁵⁵ Kałagate S. 1995, pp. 234–235.

⁵⁶ Nowakowski D. 2008, p. 242.

⁵⁷ Slivka M. 1979, pp. 244–246; Hanuliak V. 1983, pp. 479–490; Unger J., Mihok L., Pribulová A. 1998, pp. 391–393; Fevre D. 2002, pp. 47–57; Pleiner R. 2006, pp. 175–177; Krauskopf Ch. 2013, pp. 104–105.

⁵⁸ Salch Ch.-L. 2002, pp. 16–17.

⁵⁹ Haisig M. 1962, pp. 26–27.

⁶⁰ Szymczak J. 1989, p. 206.

⁶¹ Haisig M. 1962, p. 27.

⁶² Mika M., Mika Z. 1958, p. 38; Wiesiołowski J. 1982, pp. 64–65, 74, 77–78, 171. Due to a small number of members it was however quite quickly (already in 1504) dissolved.

⁶³ Kiryk F. 1972, p. 35.

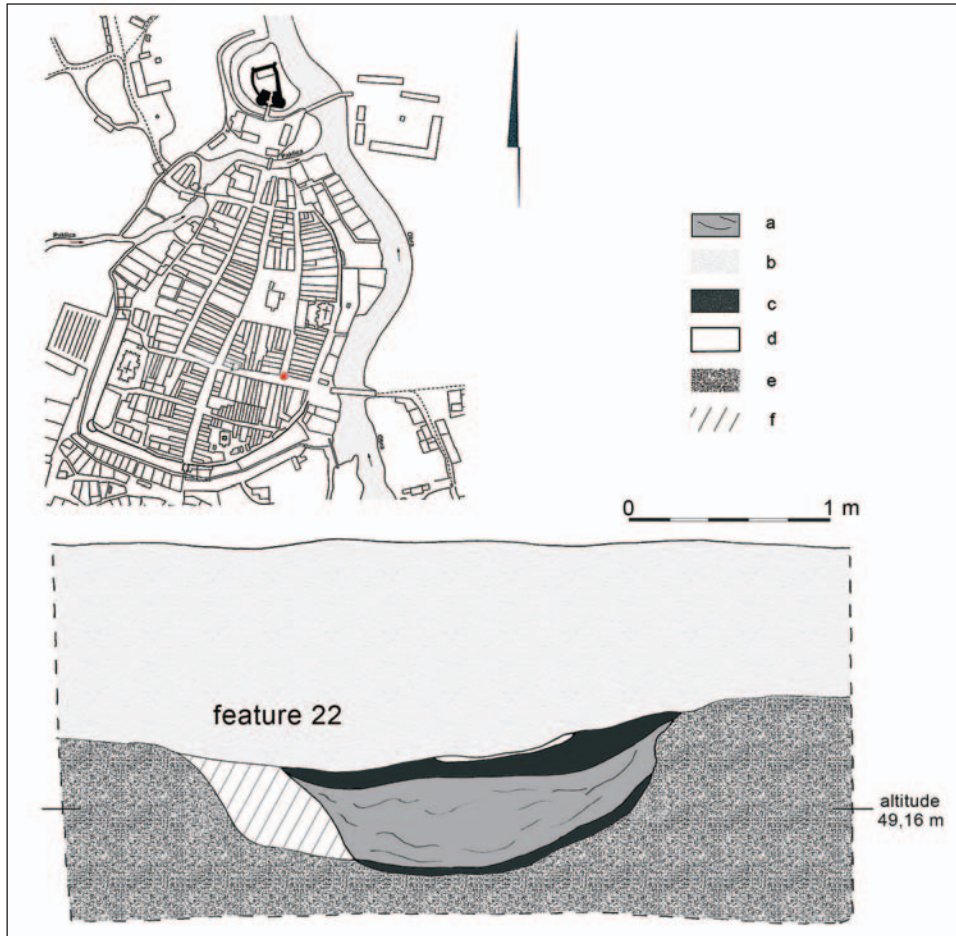


Fig. 5. Międzyrzecz, Międzyrzecz district. Section of the remains of 13th-century smith's hearth discovered in Waszkiewicza street; against the city plan from 1780 (marked with red dot): a — slag; b — grey humus (occupational layer); c — burning; d — yellow clay; e — yellow-orange clay (sterile earth); f — grey loamy humus (occupational layer) (after: Łaskiewicz T., Michalak A. 2007, p. 100, Fig. 1; drawing by A. Michalak; elaborated by M. Kaczmarek, A. Michalak)

Ryc. 5. Międzyrzecz, powiat międzyrzecki. Przekrój przez relikty trzynastowiecznego paleniska kowalskiego odkrytego przy ul. Waszkiewicza; lokalizacja na planie miasta z 1780 r. (czerwony punkt): a — żużel; b — szara próchnica (warstwa kulturowa); c — spalenizna; d — żółta glina; e — pomarańczowo-żółta glina (calec); f — szara gliniasta próchnica (warstwa kulturowa) (według: Łaskiewicz T., Michalak A. 2007, s. 100, ryc. 1; rys. A. Michalak; oprac. M. Kaczmarek, A. Michalak)

Little is known about metal crafts' organisation in the borderland of Silesia, Greater Poland, Brandenburg and Lusatia, as written sources provide almost no information. There is no doubt that blacksmith guilds existed in larger towns of the area, as it was typical for medieval urban centres of Central and Western Europe. Mentions in written material are, however, relatively

late and contain little information on the guilds' functioning. It should be noted that records supposedly confirming existence of the guild of cutlers in Czerwieńsk near Zielona Góra about 1400,⁶⁴ in fact concern Upper Lusatian Rothenburg, located on the western side of the Nysa Łużycka in today's Germany.⁶⁵ Probably due to the developed metallurgical activity in the Duchy of Żagań, two blacksmith masters from Żagań Niclos Pfcuczczinsmed and Niclos Tewir were already mentioned in Żagań's urban charter dated to April 4th, 1420.⁶⁶ Another blacksmith master, Mattis Wildaw, was noted in testaments from March 7th, 1485.⁶⁷ The guild of blacksmiths from Świebodzin, which also included locksmiths, cauldron-, pewter- and swordmakers, goldsmiths, gunsmiths and watchmakers, already had its statute in 1528, which, was approved with some amendments by the town council in 1591.⁶⁸ The statute of the blacksmiths from Międzyrzecz was not approved by the municipal authorities until 1560.⁶⁹ However, it can be assumed that their activity can be dated back to the Middle Ages (Fig. 5).⁷⁰ The guild of metal crafts in Strzelce Krajeńskie is mentioned in 1568. The guild of blacksmiths, including swordmakers and gunsmiths, was not mentioned in the records of Koźuchów until 1630.⁷¹ Even later (not before 1710), a founding privilege was granted to the blacksmith guild from Zielona Góra. In Kostrzyn, no blacksmith was recorded until 1746.⁷² On the basis of the aforementioned documents, a general tendency towards late sanctioning of blacksmiths' activity in the area is noticeable. Let us note that swordmakers and gunsmiths in the region are mentioned in not earlier than sixteenth-century documents. However, this does not exclude the possibility they operated outside a guild organisation in the earlier period. The late establishment of metal craft guilds was not an overall trend in Silesia or Greater Poland. An organised blacksmiths' guild already existed in nearby Legnica in 1349, but mentions about arms and armour being manufactured by its members are later. They concern locksmiths, cutlers and spur makers, who received a separate organisation and a statute in 1587, joining manufacturers of crossbows and firearms in the 17th century.⁷³ In contrast, in medieval Poznań, there were many craftsmen involved in manufacture of weapons, including bladesmiths, ten swordmakers, eleven crossbow manufacturers, four nail makers, seven armourers, a shield maker, bridle- and stirrup makers and fourteen saddlers.⁷⁴ In medieval Kościan, which was similar in size to Międzyrzecz, there was one swordmaker, one crossbow manufacturer, two firearms makers; in Kalisz, there were two swordmakers, four crossbow manufacturers, one armourer and five saddlers.⁷⁵

It cannot be ruled out that this late organisation of craftsmen in the studied area could have been related to the very nature of guilds as a compulsory organisation of craftsmen, pursuing interests of wealthy merchants, defending masters against competition and dealing with their

⁶⁴ Haisig M. 1962, p. 31.

⁶⁵ Czerwieńsk near Zielona Góra (Rothenburg an der Oder) was founded in 1690. Earlier, but not before 1550, the nearby village of Nowy Nietków was founded around the hunting palace of the von Rothenburg family.

⁶⁶ RFS. 2011, p. 63.

⁶⁷ Grabig H. 1937, p. 47; RFS. 2011, p. 179.

⁶⁸ Kałuski T. 2007, p. 135.

⁶⁹ Tureczek M. 2009, p. 151.

⁷⁰ A feature from the 13th century, discovered during the author's archaeological excavations in Waszkiewiczza Street in Międzyrzecz, was filled with iron slags and also contained a clay tuyere. It may most likely be interpreted as a hearth. It was situated inside the town walls near the so-called "Skwierzyńska Gate", in the northern part of Międzyrzecz. Blacksmiths, apart from the production and repair of tools and weaponry, were mainly involved in services for road transport, so their workshops were often located in streets leading to town gates, Nowakowski A. 2011, pp. 149–150.

⁷¹ RFF. 2014, p. 221.

⁷² Matysek K. 2012, pp. 55–56.

⁷³ Haisig M. 1962, p. 34.

⁷⁴ Szymczak J. 1989, pp. 215–216.

⁷⁵ Szymczak J. 1989, p. 216.

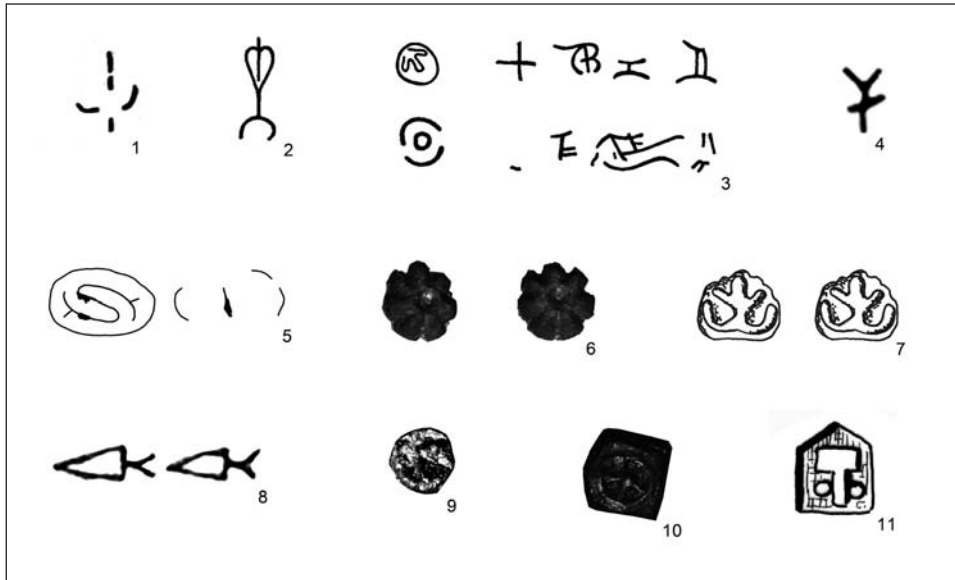


Fig. 6. Craftsman marks struck on the weaponry found at the borderland of Silesia, Greater Poland, Brandenburg and Lusatia (after: Michalak A. 2019, pp. 344–347, 356–358, 382, Figs. 35–38, 47–49, 73)

Ryc. 6. Marki rzemieślnicze na elementach uzbrojenia znalezionych na pograniczu Śląska, Wielkopolski, Brandenburgii i Łużyc (według: Michalak A. 2019, s. 344–347, 356–358, 382, ryc. 35–38, 47–49, 73)

own apprentices and other hired workers.⁷⁶ Effects of the guild activity were both positive and negative. The former included: product quality control, education of craftsmen, securing supplies and counteracting speculation in raw materials. Among negative effects, there were: rationing of production volume, limiting the number of workshops and people employed in them, maintaining favourable prices and wages as well as suppressing other than corporate production.⁷⁷

Because of the lack of written sources from the region, we need to direct our attention to finds of weaponry (Fig. 6). Some of them are signed with marks, whose identification may help to identify a place of manufacture of a particular artefact. Craft marks struck on swords,⁷⁸ falchions,⁷⁹ *Hauswehrs*,⁸⁰ an axe,⁸¹ a halberd⁸² and a horse shoe⁸³ are known from the borderland. We still know relatively little about craft marks as such and it is very difficult to relate them to a specific master. The marks on swords from this area indicate that most of the blades were forged in workshops in Western Europe, mainly in Germany. Two swords most likely came from a workshop in Passau⁸⁴ (Fig. 6:3) and one is attributed to south German centres⁸⁵ (Fig. 6:5). Records of

⁷⁶ Tandecki J. 1987, pp. 12–15.

⁷⁷ Nowakowski A. 2011, p. 146.

⁷⁸ Michalak A. 2019, Cat. Nos. 9, 40, 43.

⁷⁹ Michalak A. 2019, Cat. No. 44.

⁸⁰ Michalak A. 2019, Cat. No. 59.

⁸¹ Michalak A. 2019, Cat. No. 136.

⁸² Michalak A. 2019, Cat. No. 114.

⁸³ Łaskiewicz T., Michalak A. 2007, p. 140, Figs. 17:1, 25:5.

⁸⁴ Michalak A. 2019, Cat. Nos. 9, 40.

⁸⁵ Michalak A. 2007, pp. 205–206; Michalak A., Wawrzyniak P. 2009; Michalak A. 2019, p. 90, Cat. No. 43.

the activity of swordmakers from Poland indicate that they mainly dealt with polishing and sharpening of blades and they also provided hilted blades⁸⁶. It should be, however, remembered that a *Klingelhütte* operated in nearby Wrocław, and in 1403 five bladesmiths worked there.⁸⁷

Similar marks resembling a five-pointed star/flower/rosette were stamped on a *Hauswehr* and a falchion found in Henryków. In case of the latter, they were repeated⁸⁸ (Fig. 6:6). The mark from the Kostrzyn falchion (Fig. 6:7) undoubtedly refers to the sign from a blade of a falchion from the collection of the Moravské Zemské Museum in Brno (Czech Republic), although the second sign has a base pointing downwards.⁸⁹ A similar mark also appears on one of knives excavated in London.⁹⁰ This would confirm the practice of making falchion blades by cutlers, which is often mentioned in written sources.⁹¹ This form of a knife mark, however, can be found on artefacts from various production centres, throughout Europe.⁹² Unfortunately, little information may be obtained from analysis of marks stamped on “civilian” knives discovered in the area, because we have only one specimen bearing a manufacturer’s sign. It, however, has such broad parallels that it is impossible to draw decisive conclusions about the object’s origin.⁹³ It should be remembered that from the 14th century onwards, there were strong trade links with Nuremberg, where the cutlery craft flourished. According to written sources, the import of knives from this centre even threatened local production. Cutlers from both Wrocław and Poznań often complained about it.⁹⁴

It is difficult to determine the place of manufacture of a *Hauswehr* studied from Międzyrzecz⁹⁵ (Fig. 6:9), which is marked with a downwards pointing crescent with a cross between its ends. Such a knife mark clearly refers to the brand used by Szymon Chaydasiewicz, a knifemaker from Kraków. The Kraków mark, however, is much later, as it comes from the 18th century.⁹⁶ Inconclusive data is also provided by the analysis of signs from a falchion found in Lubniewice⁹⁷ (Fig. 6:8), which was most likely hilted somewhere in Moravia. Nonetheless, analogies to the marks on this artefact suggest a German workshop.⁹⁸ A craft mark in the form of a five-spoke wheel within a hexagonal concave field punched on a late fifteenth-century halberd from the collection of the Municipal Museum in Nowa Sól⁹⁹ (Fig. 6:10) indicates that it may have been manufactured in a South German workshop. A similar sign was struck on a cranequin from the Odescalchi collection, dated to the first half of the 16th century.¹⁰⁰ The mark in the form of a six-spoke wheel on a heraldic shield was used by Klaus Wagner, a craftsman associated with the workshop in Innsbruck, who was active in 1484–1489.¹⁰¹ Unfortunately, a hardly legible form of the mark from the Trzciel axe¹⁰² does not allow for its in-depth analysis.

⁸⁶ Szymczak J. 1989, p. 39.

⁸⁷ Szymczak J. 1989, p. 39.

⁸⁸ Michalak A. 2019, Cat. Nos. 45 and 59.

⁸⁹ Michalak A., Socha K. 2019, p. 143.

⁹⁰ Cowgill J., de Neergaard M., Griffiths N. 2003, Cat. No. 148.

⁹¹ Szymczak J. 1989, pp. 50–53.

⁹² Holtmann G. 1993, pp. 453–454; Cowgill J., Neergaard M., Griffiths N. 2003, p. 86, Cat. No. 51; Marek L., Mucha B. 2006, pp. 218–219.

⁹³ Knorr H. 1971, Abb. 12:2; Dziejcz P., Kałagate S., Magda-Nawrocka M. 2004, pl. XIX:10.

⁹⁴ Szymczak J. 1989, p. 391.

⁹⁵ Michalak A. 2019, Cat. No. 67.

⁹⁶ Chmiel A. 1899, p. 107.

⁹⁷ Michalak A. 2019, Cat. No. 46.

⁹⁸ Holtman G. 1993, Fig. 189:38.

⁹⁹ Michalak A. 2019, Cat. No. 114.

¹⁰⁰ di Carpegna N. 1969, p. 72.

¹⁰¹ Gyngell D.S.H. 1959, p. 3.

¹⁰² Michalak A. 2019, Cat. No. 144.



Fig. 7. Unfinished arms and armour parts found at the borderland of Silesia, Greater Poland, Brandenburg and Lusatia (after: Michalak A. 2019, pp. 334, 343, 396–397, 400, 416, Figs. 25, 34, 87–88, 91, 107)

Ryc. 7. Półwytwory elementów uzbrojenia znalezione na pograniczu Śląska, Wielkopolski, Brandenburgii i Łużyc (według: Michalak A. 2019, s. 334, 343, 396–397, 400, 416, ryc. 25, 34, 87–88, 91, 107)

The analysed finds also include artefacts which themselves may indicate manufacture of arms and armour in the places where they were discovered (Fig. 7). The first artefact of this kind is a crossbow nut discovered in the castle in Krosno Odrzańskie.¹⁰³ The lack of characteristic bolt cutout suggests that this artefact is an intermediate product, that is, an unfinished nut. This could indicate local manufacture of this type of items in the castle, which may have also included production of crossbows. It is, indeed, certain that crossbows were locally repaired. Horn appliqué of a crossbow stock are another element that could be easily destroyed or damaged. An unfinished product of such a bolt rest, without a channel for the bolt, was discovered in the castle in Międzyrzecz,¹⁰⁴ which may also suggest local manufacture there. A crossbow, due to the presence of elements made of different organic materials, required constant renovation.¹⁰⁵ From numerous castles in Central Europe, manufacturing sites of crossbows' horn elements are known, in which such components could be produced or repaired.¹⁰⁶ Also crossbow bolts were most likely made in the castle in Międzyrzecz. A large number of wooden bolts (without bolt heads) discovered in its area are lacking notches for fletching, which may suggest that they were unfinished products¹⁰⁷ and needed further work by fletchers. A bolt head with an unfinished lower part as well as bars with a quadrilateral cross-section, which could be used to make bolts and arrows were also excavated in the castle in Międzyrzecz.¹⁰⁸ The activity of castle blacksmiths was probably not limited to crossbows. In view of the finds of unconnected mail rings discovered in the Międzyrzecz castle,¹⁰⁹ it is also possible that mail armour was being repaired there. Similar elements were discovered in a mail maker's atelier in Nowy Targ in Wrocław, which is dated to the period of the second half of the 12th century and the first half of the 13th century.¹¹⁰ Let us also pay attention to the discovery of two sword pommels in the castle in Międzyrzecz.¹¹¹ These do not bear any traces of use (no tang remains or other traces of hilding were found). This may suggest that blades were hilted in the castle's forge. Furthermore, damaged hilt parts may have also been repaired or replaced there.

Some data on the local production of weaponry may also be provided by analyses of the chemical composition of artefacts, however it requires very complex examinations and a good comparative base.¹¹² Testing of phosphorus content, which was employed in old research as a key marker of used ore's origin,¹¹³ does not give satisfactory and unambiguous results from today's perspective. Moreover, it is difficult to do such tests on highly-processed iron artefacts. This is because the number of smelting slag inclusions, which can be helpful in provenance identification, may be very low as compared to low-processed material like blooms or bars.¹¹⁴ For the area in question, the number of analyses that have been conducted so far is still not high enough to allow drawing any firm conclusions.¹¹⁵

¹⁰³ Michalak A. 2019, Cat. No. 158.

¹⁰⁴ Michalak A. 2019, Cat. No. 155.

¹⁰⁵ Szymczak J. 1989, p. 87. Most German towns contracted crossbow manufacturers who were obliged to supply a certain number of crossbows each year. In 1364, Görlitz employed such a craftsman, Alm J. 1998, p. 29.

¹⁰⁶ Booth A.H. 1998, pp. 31–38; Cnotliwy E. 1999, Fig. 7:11–12; Rackevičius G. 1999, pp. 175–183; Rackevičius G. 2007, pp. 61–64; Haak A., Rannamäe E., Luik H., Maldre L. 2012, pp. 311–313.

¹⁰⁷ Michalak A. 2019, Cat. Nos. 167–168.

¹⁰⁸ Michalak A. 2019, Cat. No. 385.

¹⁰⁹ Michalak A. 2019, Cat. Nos. 5–6, 12.

¹¹⁰ Marek L. 2018, p. 645, Figs. 504–505.

¹¹¹ Michalak A. 2019, Cat. Nos. 32–33.

¹¹² Żabiński G. et al. 2020, pp. 2–14.

¹¹³ Tylecote R.F. 1970, pp. 21–23; Buchwald V.F. 1998, pp. 73–75.

¹¹⁴ Imiołczyk E. et al. 2020, p. 18.

¹¹⁵ Michalak A. 2011, p. 377.

Finally, let us mention one more written source that supports the assumption of local manufacture of gunpowder and bullets for firearms in Teutonic castles located in the region. The inventory of the castle in Kostrzyn (Küstrin), dated to 1443, informs us about the storage of individual ingredients of the gunpowder recipe: saltpetre and sulphur, which may indicate the production of this substance in this centre.¹¹⁶ Lead recorded in the armoury of the château in Drezdenko may indicate the local production of projectiles. Most of the gunpowder weapons stored in the arsenals of Teutonic castles in the area probably came from the manufactory in Malbork.¹¹⁷

The aforementioned premises demonstrate an approximate scale of arms and armour production in the area in question. Objectively we must admit that it was not a large-scale manufactory, and we are dealing with production for the needs of both combatants from the lower and upper strata of medieval society. This could be due to the fact that demand for weaponry in the region could be met by local urban, castle and village forges. The approximate scale of the needs is reflected in the lists of duties of the Przewóz and Żagań Weichbilds from 1472 and 1480. According to the lists, the dukes could raise a force of 81 horses, 42 wagons, and 260 knechts from both administrative units.¹¹⁸ In 1470, Balthazar II of Żagań declared a contingent of only fifteen horses and thirty infantrymen to envoys of the Bohemian king Matthias Corvinus.¹¹⁹ In 1514, the Duchy of Żagań asserted a supply of six horses, 30 infantrymen and four wagons to the king.¹²⁰ The numbers of armed men in individual families must have been greater than the imposed duties. A similar inventory from neighbouring Upper Lusatia from 1427, covering eighty villages of the Weichbild of Zgorzelec (Görlitz), lists over 1821 (according to M. Goliński's estimates — 1950) mobilised *knechts*, with each fifteen armed men having one or two crossbows, three flails, and 9–11 polearms (*spiesse*).¹²¹ At that time, small military contingents were also provided by the towns of Greater Poland located in the studied region. For the war with the Teutonic Order in 1458, Międzyrzecz had to contribute fifteen soldiers, Skwierzyna — six, and Trzciel — two.¹²² The demand for elite and thus more elaborated arms and armour was probably even smaller. According to estimates from the 16th century, the nobility in the Duchy of Żagań, Głogów, Legnica and Oleśnica constituted only about 1.5% of the total population.¹²³ This indicates a rather low demand that could be easily satisfied by imports from German centres or from Poznań or Wrocław. On the other hand, it should be assumed that there were small workshops at the courts in Żagań, Krosno and Głogów where ducal arms and armour could have been repaired.

* * *

On the basis of this study, it seems that existence of the local production of arms and armour in workshops situated in the Silesian-Greater Poland-Brandenburg-Lusatian borderland can be considered more feasible. Its scale was probably rather small. The weaponry manufacturing was most likely aimed at fulfilling the needs of the local troops, rather than for export. This fact could also have an impact on the number of weaponry parts found in the region. The lack of mentions about blacksmith's craft in the written sources referring to individual towns may simply be a result of the absence of mass and highly organised production. This, however, does not rule out low scale production aimed at inhabitants of a given town. The evolving specialisa-

¹¹⁶ DGÄ. 1921, p. 774.

¹¹⁷ Żabiński G. 2014, pp. 127–128.

¹¹⁸ Steller G. 1968, pp. 12–14; Goliński M. 2011, 79.

¹¹⁹ Goliński M. 2011, footnote 38.

¹²⁰ Goliński M. 2011, footnote 39.

¹²¹ Goliński M. 2011, pp. 74–75.

¹²² Nalepa J. 1961, p. 26; Boras Z. 1998, p. 68.

¹²³ Dziwulski W. 1952, p. 424.

tion and advancement of particular municipal centres was largely associated with the level of urban economic and social development.¹²⁴ Let us note that the more specialised and organised armament craftsmanship in the studied area developed not before the 16th century. There is no question that the frontier character of this region, situated at the intersection of markets of the dominant centres of Wrocław, Poznań and Dresden, was also of considerable significance. The scale of production and specialisation in these dominant centres was certainly much larger. It is noticeable that major arms production centres functioned in larger cities with various administrative and political functions. From this point of view, the region in question does not appear to be a creator, but rather a consumer of weaponry innovations.

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¹²⁴ Szymczak J. 1989, p. 205.

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Terra incognita? Nie tylko o wytwórstwie broni na pograniczu Śląska, Wielkopolski, Brandenburgii i Łużyc w późnym średniowieczu

Broń w średniowieczu była uważana za przedmiot zbytku i nie była wytworem codziennie i powszechnie używanym. Chociaż krąg jej nabywców był dość szeroki, a wyroby były znacznie zróżnicowane cenowo, jednak popyt ograniczał fakt, że uzbrojenie kupowano raz na jakiś czas. Miało to także wpływ na liczbę miejsc, gdzie ją wytwarzano. Obok wyspecjalizowanych centrów produkcji ulokowanych w miastach funkcjonowały również kuźnie wiejskie, w których wykonywano broń na potrzeby mniej zamożnych nabywców.

Zagadnienia związane z wytwórczością broni na pograniczu Śląska, Wielkopolski, Brandenburgii i Łużyc, czyli na obszarze odpowiadającym w przybliżeniu dzisiejszemu województwu lubuskiemu, a zlokalizowanemu w większości poza granicami średniowiecznej Polski, nie zostały dotychczas omówione. Wnioskowanie o produkcji uzbrojenia na tym terenie jest utrud-

nione, głównie ze względu na niedostatek odpowiednich źródeł. Brak jest świadectw bezpośrednich, istnieją tylko pośrednie przesłanki ku temu.

Żelazo, które pozyskiwano w średniowieczu głównie z rud darniowych, stanowiło podstawowy surowiec do wyrobu większości elementów wojennego ekwipunku. Dlatego też na możliwość wytwarzania uzbrojenia na omawianym obszarze wskazuje przede wszystkim duża liczba małych warsztatów hutniczych — kuźnic i hamerni wspominanych w późnośredniowiecznych i wczesnonowożytnych źródłach pisanych. Wczesne wzmianki dotyczą miejscowości: Drożków koło Żar, Klikowa koło Iłowy, Szprotawa, Łozów nad Kwisą, Sanice koło Przewozu, Dobrzyń oraz Bucz (ryc. 1). Materialne dowody potwierdzające działalność w średniowieczu kuźnicy w Podrozie/Przewozie uzyskano w trakcie przeprowadzonych tam badań archeologicznych.

Większość badaczy przyjmuje, że skala działalności kuźni wiejskich w zakresie produkcji uzbrojenia była nieduża. Ograniczała się ona w zasadzie do podkuwania koni, wykuwania podstawowych narzędzi ciesielskich i rolniczych (w tym siekier i toporów) oraz ostrzenia albo napraw bardziej specjalistycznych przedmiotów. Groty bełtów i strzał oraz żeleźce broni drzewcowej również mogły tam być wytwarzane, ale w masowej skali raczej tylko w czasie wojen i przygotowań do nich. Relikty takiej domniemanej kuźni wiejskiej datowanej na XV w. odkryto w Nowej Wsi, w powiecie międzyrzeczkim (ryc. 2). We wnętrzu obiektu zalegała duża ilość żużli żelaznych, poza tym znaleziono tam narzędzia, wytwory i półwytwory kowalskie, a także broń.

Bardziej wyspecjalizowane w wykonywaniu i naprawie poszczególnych elementów wojskowego rynsztunku były kuźnie zamkowe. Pozostałości takich warsztatów z XIV w. odkryto m.in. w Międzyrzeczu (ryc. 3) i Santoku (ryc. 4). Natomiast inwentarze zamków krzyżackich w Kostrzynie i Drezdenku zawierają informacje o przechowywaniu znacznych ilości saletry, siarki i ołowiu, co może potwierdzać produkcję prochu i pocisków do broni palnej w tych warunkach.

Niewiele zaś wiadomo o miejskim rzemiośle metalowym w badanym regionie, gdyż źródła pisane dostarczają skromnych informacji na ten temat (ryc. 5). Bez wątpienia cechy kowalskie funkcjonowały w większych miastach (ponieważ było to typowe dla ośrodków średniowiecznej Europy Środkowej i Zachodniej), ale znane, stosunkowo późne wzmianki dostarczają niewiele wiadomości w tym zakresie. Pewne dane uzyskano w wyniku analizy znalezionych zabytków. Część z nich jest sygnowana; na ich powierzchni znajdują się marki rzemieślnicze, których identyfikacja może przyczynić się do ustalenia miejsca produkcji poszczególnych części broni. Wskazują one jednak na wytwarzanie tych przedmiotów w ośrodkach położonych poza badanym obszarem (ryc. 6). To znaleziska takie jak półprodukty i przedmioty niedokończone mogą sugerować wytwarzanie elementów uzbrojenia w miejscach, w których zostały one odkryte (ryc. 7).

Przytoczone przesłanki wskazują, że skala produkcji uzbrojenia na analizowanym terenie nie była duża, a jednak zapewne wystarczająca na potrzeby odbiorców o różnym stopniu możliwości. Popyt na prostą i masową broń mógł być zaspokajany przez kuźnie miejskie, zamkowe i wiejskie. Bardziej wyrafinowane produkty były raczej importowane.

