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HABEBANTURNE IN REGNO POLONIE MONTANA ARGENTI? SILVER MINING VERSUS COINAGE AND POWER IN MEDIEVAL POLAND

ABSTRACT: Was there any link between silver mining in Poland and medieval Polish coinage and politics? The answer needs to submit hitherto conducted and published historical mining studies to a critical examination. It is necessary to discern between the justified beliefs of scholars, and their wishful thinking, using three kinds of evidence: documentary, archaeological and natural.

ABSTRAKT: Czy polskie średniowieczne mennictwo i polityka miały jakiś związek z krajowym wydobyciem srebra? Odpowiedź wymaga krytycznego przejrzenia przeprowadzonych i opublikowanych dotychczas badań nad historią górnictwa. Konieczne jest rozróżnienie między uzasadnionymi stwierdzeniami uczonych a ich pobożnymi życzeniami na podstawie trzech rodzajów źródeł: dokumentalnych, archeologicznych i przyrodniczych.

KEYWORDS: silver mining, Srebrna Góra, Bytom, Zversov, Olkusz, Mogiła, the Tatras, Boleslas IV the Curly, Mieszko IV the Young, Casimir the Great, Alexander Jagiellon, kwartnik, half-groschen

SŁOWA KLUCZOWE: górnictwo srebra, Srebrna Góra, Bytom, Zversov, Olkusz, Mogiła, Tatry, Bolesław IV Kędzierzawy, Mieszko IV Młody, Kazimierz Wielki, Aleksander Jagiellończyk, kwartnik, półgroszek

Introduction

The great, though ephemeral, momentum of the state of Boleslas the Brave (992–1025)[1] — witnessed not only in external conquests, but in the foundation of five bishoprics as well — raises a question about the economic basis of this potential. Typically, tributes, the spoils of war, and, more recently, income from the sale of slaves, have been presented in answer to that question.[2] It is even more difficult to answer the question about the economic foundations of the ambitious and aggressive international policy of Boleslas II the Generous (1058–1079), who also restored or founded three bishoprics, or about the expansive policy of Boleslas III the Wrymouth (1102–1138), who not only conquered Pomerania, but also carved out a zone of Polish influence in Rus′ and founded two bishoprics as well.[3] And further on, what was the basis of the first multi-tier, grosso type coinage in Central Europe that was introduced in Silesia at the end of the 13th century? Where exactly did *or et argent en plate* come from, which was recorded in Bruges as imported *dou royaume de Polane* in the last quarter of the 13th century?[4] Finally, what material resources supported the reconstruction of the Kingdom of Poland in the 14th century? Was it only lead and salt (whose extraction in the Middle Ages is beyond doubt) and spoils of war behind these and other successes of Poland?

Recent decades have brought a revision of traditional views on the origin of coin metals in the Middle Ages. This revision was particularly thorough in Bohemia where it was formerly believed that domestic silver had been mined as early as the 10th century. After several decades of research, when this view had been deemed unfounded and Czech silver was widely believed to have not been exploited before the 13th century, traces of smelting silver from ore in Prague in the 10th century were revealed.[5] So the old views prove correct, at least in part. On the contrary, it was believed that "precious metals obtained from domestic deposits constituted only a negligible percentage of the total mass of these metals in early medieval Poland."[6] Also with regard to the High Middle Ages, the Bruges account quoted above was considered to be the result of a misunderstanding.[7]

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[1] The article is an extended and updated version of the paper read at the conference "Bullion Trade in Medieval and Early Modern Europe," organised by Roman Zaoral and held on-line in Prague in October of the plague year 2020.

[2] Even Gerard Labuda (2012, p. 243) still omits the slave trade. The question is given a more extended treatment (but with reference to the Slavic countries as a whole) in: Lewicka-Rajewska 2004, pp. 204–207. For Western silver: Adamczyk 2018, pp. 255–257.

[3] Jarosław Wenta prompted to "think what was the driving force behind the political activity during the reign of Boleslas the Wrymouth" (Wenta 2010, p. 486).

[4] Hans.Ub. 3, p. 419.

[5] Zavrzel, Čiháková 2019.

[6] Molenda 1963, p. 46.

[7] Obara-Pawłowska 2014, p. 311.

Nevertheless, a historian of money, Roman Zaoral, expresses no doubts regarding the Bruges report.[8] Local historians, associated with regions where metal mining was alive in the modern times, were eager to guess even a much earlier exploitation of local ores. The historian of technology Jan Pazdur believed that indirect evidence proved a larger-scale mining of silver and gold in Poland in the 11th—13th centuries.[9] Indeed, new archaeological discoveries and metallographic analyses indicate that there were certain periods when the role of Polish silver deposits in the Middle Ages could be important. They also make it possible to better explain the development cycle of Polish coinage and economy. Marian Małowist suggested that there was a relationship between the development of towns, agriculture and breeding in Central Europe in the 13th—14th centuries on the one hand, and the greater abundance of silver coins, the production of which was made possible by silver mining, on the other.[10]

The reports on ore mining are, however, susceptible to mythologisation and mystification. This is partly due to the secrecy of former miners who were not eager to spread their knowledge about the places where precious metals were found, partly from the excessive ambitions of today's researchers, who sometimes lose criticism of their own ideas, and partly from a certain information barrier between geologists and co-operating mining historians on the one hand, and historians *sensu largo* and archaeologists on the other hand. There is a feedback loop between representatives of natural and historical sciences, in which working hypotheses or even barely concepts of future theses are picked up and strengthened on the other side, and then they return to the work of subsequent researchers on the initial side as proven certainties.[11] The review of reports on silver mining and metallurgy must therefore first be separated from unjustified suggestions and freely formulated hypotheses that, since lead or — less frequently — copper was mined somewhere, silver certainly was also obtained there. It is true that lead and copper ores usually also contain admixtures of silver, but these had to be important to the country's

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[8] Zaoral 2018, p. 79 and footnote 3.

[9] Pazdur 1968.

[10] Małowist 1972, p. 593.

[11] A clear example: Godzik, Woch 2015, p. 29. The authors, both biologists, refer to a historian who based his conclusion on unverified biological research. A sad example of the discrepancy in the understanding of the term "science" is the new publication announced as a scientific monograph: Mikoś *et al.* 2022. Fanciful speculations taken from obsolete popular literature are uncritically presented as historical sources there, the rule of checking information at the source is completely unknown, all references omit page numbers and part of them are ostensible. The feedback loop is a broader problem. Ian Blanchard's monograph (2001) is frequently cited by Polish mining historians and archaeologists in spite of evident incoherencies and shortcomings concerning Polish affairs. Indeed, it has been practically dismissed by economic historians as methodologically substandard; see the reviews by M. Allen (*Economic History Review* 118, 2003, pp. 1037-8) and E. Westermann (*Journal of European Economic History* 36, 1, 2006, pp. 221-3).

precious metal balance to be taken into account. Therefore, such suggestions only create information noise for our considerations. On the other hand, Polish lead was undoubtedly of great importance for Czech and Hungarian precious metal metallurgy,[12] and therefore had to play some role in the importation of the precious metals to our country. Similarly, from the 14th century, if not earlier, Hungarian gold was imported to Poland in exchange for salt;[13] this, however, will not be dealt with here.

In order to make the study complete, Silesian mining will be considered here up to the end of the Middle Ages, also after Silesia had ceased to belong to Poland in political sense in the middle of the 14th century.

1. The Bytom-Cracow metal deposits

(a) Written evidence

There are basically two pieces of written evidence concerning the extraction of precious metals in early medieval Poland, both difficult to interpret. Both of them concern the area limited by the present-day towns of Olkusz, Siewierz, Bytom and Chrzanów. This area, full of various minerals, is referred to as "Silesian-Cracow" or the "Bytom-Cracow mining district" (Map 1B: I).[14] The latter name is better justified because a part of the area has only been regarded as part of Silesia since the end of the 14th century. In the 11th and 12th centuries the whole area was part of the Cracow Province and diocese. Bytom and Siewierz from around 1177 belonged to the Duchy of Racibórz-Opole, and entered the Czech Crown in the mid-14th century. The rest belonged to the Cracow Duchy until the Kingdom of Poland was rebuilt (and then to the Cracow voivodeship of the Polish Crown).

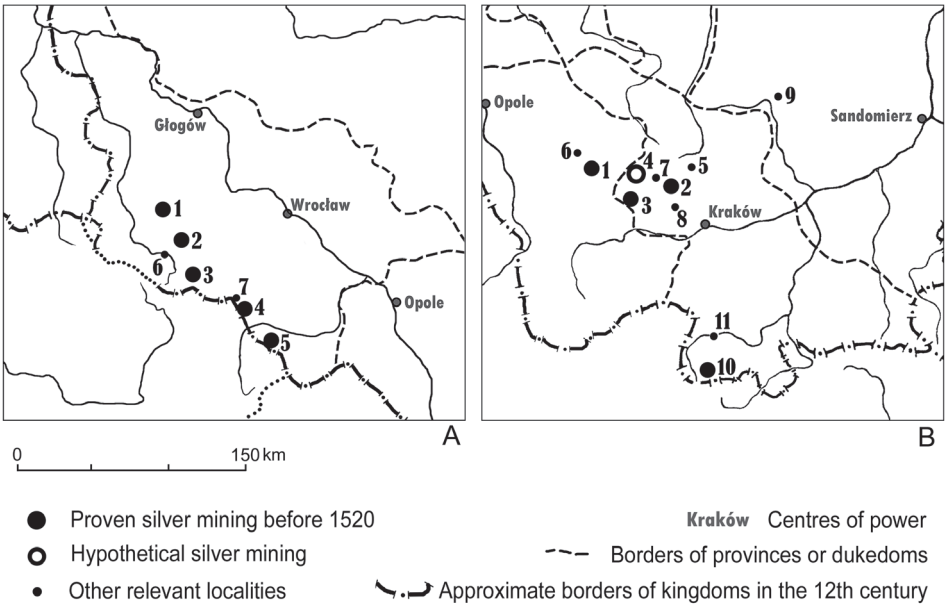
In order to explain the obscure Biblical epithet of Prophet Nahum, "the Elkoshite" (i.e. a native of Elkosh, *Helcesei* in the Vulgate),[15] Ravvi Shlomo Yitzchaki known as Rashi of Troyes (1040–1105) persuaded: "*Ha'elqoshi* is a town in the State of *Blwwnyah*, which belongs to the Land of Israel, though outside the borders of the Land of Israel. And you should know that there are gold and silver ores, and there is salt nearby, for the Salt Sea [=Dead Sea] approaches to that place." It might seem to be one of the many erudite mistakes of medieval scholars describing the world, but if *Blwwnyah* means *Polonia*, there really was a town in that

[12] Małowist 1972, p. 591; Molenda 2001, pp. 51–66; Duczko, Miśta-Jakubowska, Czech-Błońska 2022, pp. 213, 215 and 218.

[13] Grodecki 1933, p. 12.

[14] An outdated monograph: Molenda 1963. For geological and archaeological details of this area's ores see Boroń 2013b.

[15] Nahum 1: 1.



Map 1. Silver mining in Poland in the Middle Ages (A – the Sudetan Foreland and the Sudetes; B – the Bytom-Cracow, Holy Cross and Carpathian mining districts).
A: (1) Goldberg (Złotoryja); (2) Altenberg (Radzimowice); (3) Gottesberg (Boguszów); (4) Silberberg (Srebrna Góra); (5) Reichenstein (Złoty Stok); (6) Kupferberg (Miedzianka); (7) Steinkunzendorf (Kamionki).
B: **(I) Bytom-Cracow mining district:** (1) Bytom (*Zversov*?); (2) Olkusz; (3) Zagórze; (4) Łosień; (5) Wolbrom; (6) Repty; (7) Sławków; (8) Nowa Góra. **(II) Holy Cross mining district:** (9) Chęciny. **(III) Carpathian mining district:** (10) The Tatras; (11) Nowy Targ.
Drawing by Nicole Lenkow.

Mapa 1. Wydobycie srebra w średniowiecznej Polsce (A – Przedgórze Sudeckie i Sudety; B – okręgi górnicze: bytomsko-krakowski, świętokrzyski i karpacki)
A: (1) Goldberg (Złotoryja); (2) Altenberg (Radzimowice); (3) Gottesberg (Boguszów); (4) Silberberg (Srebrna Góra); (5) Reichenstein (Złoty Stok); (6) Kupferberg (Miedzianka); (7) Steinkunzendorf (Kamionki).
B: **(I) Bytomsko-krakowski okręg górniczy:** (1) Bytom (*Zversov*?); (2) Olkusz; (3) Zagórze; (4) Łosień; (5) Wolbrom; (6) Repty; (7) Sławków; (8) Nowa Góra. **(II) Świętokrzyski okręg górniczy:** (9) Chęciny. **(III) Karpacki okręg górniczy:** (10) Tatry; (11) Nowy Targ.
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country called "Ilkusz" or "Elkusz," located northwest of Cracow. Today, its name is Olkusz, and the origin of this name remained a mystery.[16] In the late Middle Ages and early modern times, resources of galena (a mineral containing up to 87% lead and up to 0.4% silver, but occasionally more) were exploited there.

[16] Pytel 1970, p. 173; Rozmus 2002.

Despite general problems with the identification of place names used in early medieval Arab travellers' accounts, the hypothesis that Rashi meant Olkusz in Poland is plausible. The notation *Ha'elqoshi* is not a transcription of a Slavic name, but an original Hebrew name.[17] This identification brings a philologically correct, hitherto unknown origin for the name "Olkusz," which is certainly non-Slavic. The details given by Rashi concerning the name of the country and silver mined in it (which was certainly mined in Olkusz in the 16th—17th centuries) and salt (known to the east of Cracow from the 11th century)[18] also agree. Only gold has not been observed among the minerals from the Olkusz area known to us, and, of course, the "Salt Sea" is situated in a different place. The former mention may result from the trope ("precious metals" in general), and the latter from an erudite explanation of the presence of salt (Rashi believed that this *Ha'elqoshi* was the hometown of Prophet Nahum). The only thing that might be regarded as doubtful is that someone gave a town near Cracow a name derived from the Hebrew Bible. He would have to be a Jew dwelling there, in a sufficiently high position to be able to impose that name on a linguistically alien environment. Nevertheless, a Jewish community having their own court of law existed in Cracow in the first half of the 11th century.[19] The route from Kyïv via Cracow to Prague, followed by Jewish slave traders, already existed in the 10th century.[20] In the 13th century, the route from Cracow to Prague even led through Olkusz, but it is unclear from when.[21]

The other record known today is Pope Innocent II's bull, *Ex commisso nobis a Deo*, issued in 1136. The Pope revoked another papal document issued three years before, and restored the archdiocese of Gniezno, confirming its previous possessions. The state of affairs described in the bull was therefore much earlier than the year of its issue.[22] On the extensive list of the archiepiscopal estates, accumulated until 1133, the bull states that "also the village near Bytom, called *Zversov*, with peasants, silver miners, and two taverns, belongs to the archbishop's jurisdiction only" (*Item villa ante Bitom quae Zversov dicitur cum rusticis, argenti fossoribus, cum duabus tabernis, nonnisi ad archiepiscopi pertinet jurisditionem*).[23] The link between the jurisdiction and the exaction of levies consisted in the power to punish infringements

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[17] Admittedly, Dariusz Rozmus believes that Rashi "had associated the name that he heard from a merchant with a similarly pronounced name of the town from which the Biblical prophet Nahum came" (Rozmus 2014, p. 100). Rozmus does not explain, however, why he abandons the view he presented five years earlier, quite well-founded, that "Olkusz owes its name to the Biblical prototype" (Rozmus 2009, pp. 11 and 16).

[18] Jodłowski 1969, pp. 155–156; Jodłowski 1981, pp. 26–30; Górecki 2016, p. 109.

[19] Gorlińska 2015, pp. 185–191, further literature therein.

[20] Zaremska 2008, pp. 123–128.

[21] Wyrozumska 1977, pp. 46–47 and 58.

[22] Modzelewski 1975, p. 360.

[23] Chr.stpol., p. 20; Małecki 1894, pp. 396–397.

in paying services.[24] That *Zversov* (Świerczów?), not mentioned any more under this name, probably lay in the place where the chartered town of Bytom was located in 1254,[25] in any case far beyond the Gniezno Archdiocese. It was not only the sole access to precious metal deposits that the head of the Church of Poland had at that time, but also the only taverns mentioned in the bull. The function of the tavern in the later Middle Ages was a "permanent sale point and service centre," which, if situated in a town, "accepted payments mainly in money and bullion."[26] Sławomir Gawlas points to the relationship between taverns and the right to brew and sell beer, and to the "town-forming" nature of this institution in the 13th century.[27] Gerard Labuda emphasizes the relationship between taverns — as early as in the 12th century, when they appear in records — with "castles and larger settlements."[28] *Zversov*, associated with the Bytom castle, was therefore a mining settlement, paying tribute to the archbishop, and "the relationship of the taverns [of *Zversov*] with silver miners is not to be questioned," Tadeusz Lalik said. The archbishop had been granted the income from *Zversov*, most probably when Boleslas II the Generous raised the archbishopric of Gniezno from collapse and the rebuilt cathedral was consecrated (in 1064, or maybe in 1075).[29] Ryszard Kiersnowski noted that "since this [i.e. silver] production was at the disposal of the archbishop, probably other, similar centres were also owned by the prince, and perhaps other people as well."[30] It turns out, therefore, that silver was mined in a place not distant from Olkusz, more or less contemporarily with Rashi of Troyes's account.

It is not clear when the extraction of silver in this district ceased, but the lack of written records about silver mining in the 13th century — a period from which more written sources have survived — suggests that the deposits available with the contemporary technology had previously been exhausted.[31] That early phase of mining is most likely related to the achronic legends recorded at the end of the 15th century. They speak of Bytom's ancient abundance in silver, and the luxury the townspeople of Bytom had enjoyed. These blissful times were said to be terminated by the flooding of deposits with water. This event was interpreted as a punishment by Providence for crimes committed by the townspeople. Chroniclers from the end of the 15th century believed that this fatal crime was the murder of the parson and the preacher by the Bytom townspeople in 1367, which was a his-

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[24] Modzelewski 1975, p. 357; Dąbrowski 2007, pp. 191–214.

[25] Szydłowski 1998.

[26] Trawkowski 2005, pp. 219–220.

[27] Gawlas 2015, pp. 12 and 19–20.

[28] Labuda 2012, p. 247.

[29] Lalik 2006, p. 187; on the controversy over the date of the cathedral's reconstruction see Delestowicz 2016, pp. 294–298.

[30] Kiersnowski 1960, p. 25.

[31] Witkowski 2009, pp. 150–162; Boroń 2013b.

torical fact.[32] However, since we do not have contemporary evidence of silver mining in Bytom in the 14th century, these are only providentialistic speculations to embed the legendary events, the memory of which came from a distant past, in history.[33]

A document from 1247 mentions only the lead mining in Repty near modern-day Tarnowskie Góry.[34] Lead mining in various localities between Bytom and Olkusz (especially in Sławków) continued over the next centuries, and silver was also searched for there all the time. However, results of these searches are not visible in sources. In the vicinity of Cracow, to the west of the capital, a small mining district was formed in Nowa Góra in the 14th century. The town, under the name of *Gory*, was listed as a church village as early as 1276[35] and its name itself already testifies to mining activities (*Gory* — "mines," Nowa Góra — a "New Mine").[36] The name of the neighbouring village of Płoki (i.e. "Washers"), recorded before 1324, speaks similarly.[37] In the years 1325–1327, Płoki was recorded as a parish seat (so the village was founded at least a decade earlier).[38] Poor deposits of galena were exploited there, from which King Wladislas II (1387–1434) did not expect significant amounts of silver since he granted them for merits to the magnate Jan Topór of Tęczyn between 1398 and 1402.[39]

In the mining privilege of Queen Elisabeth for Olkusz from 1374 (valid for six years), a royal share was established on silver and lead (in the amount of 1/11 of the metal extracted), but at the same time the *freihaller* tax on the sale of excavated material from the mines applied only to lead without mentioning silver.[40] It seems that in the time of Elisabeth, silver was obtained in Olkusz as one of the components of galena, but in such small amounts that it did not play any important role in the metal balance of the Kingdom. Unfortunately, we will not learn anything more about it, because the complete set of "Olkusz Mining Records" from 1367–1794 was burnt by the Germans in Warsaw in 1944.[41] At the turn

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[32] Długosz 9, pp. 422–424; Liebenthal 1839.

[33] Paszkiewicz 2000, pp. 32–33.

[34] RSG, no. 648.

[35] CDP 1, p. 113, no. l.

[36] Although it is possible to explain the name "Góry" as indicating a natural feature ("mountains"), this does not apply to the name "Nowa Góra," which is undoubtedly an indication of the place's cultural function. The identity of *Gory* and Nowa Góra settlements has been assumed by the authors of SHG kr I/4, pp. 828–829. In 1314, a prominent Cracow burgher, Hejnman, declared himself as coming from this town (Rajman 2004, pp. 224, 236, 285, 294 and 309).

[37] ZDM 1, p. 34, no. 27 (*de Plok*).

[38] MPV 1, p. 143, no. 139.

[39] Kurtyka 1997, pp. 115 and 221.

[40] SG 7, p. 487; KDM 3, pp. 279–280, no. DCCCLXVI.

[41] Kurtyka 2001, p. 198. The total destruction and looting of archives by the Germans in Warsaw in 1939–1945 is estimated at over five million archival units (Berska 2013, p. 300). These losses have irreversibly obliterated much of the knowledge about Poland's past.

of the 15th and 16th centuries, being partly in royal hands and partly in the possession of the Topór of Rabsztyn family, the Olkusz deposits produced only lead.[42]

(b) Archaeological evidence

Both the Olkusz and Bytom areas were thoroughly transformed in later epochs by mining and industrial activities, and it is practically impossible to gain well-dated relics of early medieval mining and metallurgy of silver and lead there. In the area of the historic centre of Bytom (thus in the presumed location of the *Zversov* settlement), mining shafts and relics of metallurgy were discovered only from the 13th—14th centuries. The originally proposed dating of these relics to the 12th century[43] was refuted. The relics were located in part on burgher plots at the market square, part on the outskirts of the town. However, there is no evidence that silver was smelted there.[44] On the other hand, unclear traces of silver metallurgy were found in Zagórze, a present-day district of Sosnowiec, dating back to the 12th century "and perhaps also to the eleventh century."[45] These were relics of smelting furnaces, a lump of molten silver and clay nozzles for air supply. The finds in Łosień, a rural district of Dąbrowa Górnicza, were of a similar nature. Traces of metallurgy and lead mining were discovered there: nuggets of molten lead and mining hoes (both types of artefacts were also found in other places in this region). What is more, a smelting furnace, abandoned with a full charge of lead ore, and a coin hoard associated with these relics were also discovered. The finders assure us that the furnace was also used for smelting silver, although no clear evidence of this statement is presented.[46] For this reason, *silver mining at Łosień, although possible, cannot be regarded as certain*.[47] The hoard contained mainly Polish coins of Wladislas II (1138–1146) and Boleslas IV (1146–1172), as well as 180 silver lumps, cast and cut.[48] The finders date the hoard to the early 1160s and believe that it is the date when the settlement was destroyed by an armed invasion. The settlement "might" have been established in the 11th century, although the basis for this dating has not been revealed either.[49]

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42 Kurtyka 1997, p. 407.

43 Szydłowski 1998, p. 344.

44 Andrzejewska 2004; Podyma 2007.

45 Sobota-Liwoch, Sych 2013; later research seems to confirm the early chronology: TOS 2016.

46 Bodnar *et al.* 2006, p. 26.

47 The statement introduced into the literature that silver was certainly produced in Łosień, is repeated in many publications (most recently: Duczko, Miśta-Jakubowska, Czech-Błońska 2022, p. 158). None of them refer to evidence other than that discussed above.

48 Rozmus 2014, p. 140; Rozmus, Suchodolski, Tokaj 2014.

49 Boroń 2013a, pp. 17–24; Rozmus 2013a, pp. 119–120; Rozmus 2014, p. 142.

(c) Natural evidence

Additional interesting evidence has been obtained regarding the chronology of silver and lead metallurgy in the area of the Bytom-Cracow deposits. The biologist Leszek Chróst and his colleagues conducted a study of lead traces in the layers of peat bogs adjacent to these deposits. They consider these traces to result from the pollution of the atmosphere or water during metallurgical production. In light of the published results, in the bog near Wolbrom, north-east of Olkusz, lead pollution increased rapidly in the years 830–860, culminated until *c*.980, then gradually and slightly decreased until around 1480. In the Ossy bog east of Tarnowskie Góry, an increase in lead content was observed in the layers dated around 850–1010, then a decrease and another, uneven, increase in the years 1150–1480 were visible. From around 1480, the lead content in both studied areas increased rapidly until well into the modern era.[50] *The dating of the layers was, however, an estimate*, resulting from the calculation of the average annual growth, when the actual growth of the fen could be subject to various disturbances. Publications about the bog near Wolbrom show the stratigraphic hiatus in the Middle Ages and the earlier part of the modern era.[51] A verification of Chróst's chronology, e.g. by the radiocarbon method, is not known to the present writer. Nor do these data indicate whether a significant amount of silver was obtained as a result of this activity. Therefore, the testimony of peat bogs can only be treated as a suggestion in our considerations.

A new scientific achievement is the results of analyses of silver ornaments from the Piaski-Dramino hoard, conducted by the team led by Władysław Duczko. In the final monograph it has been asserted that "it is beyond dispute that they were made of silver bullion from the area of the Silesian and Krakow Upland, i.e., the vicinity of today's Olkusz."[52] Seeking full justification for this thesis, one finds — following the references — a separate article devoted to metal analyses of this material. Save for ore attributions considered as uncertain by the authors themselves, four items (three fragments of ornaments and an ingot) are described there as "made of silver obtained from the Silesian Upland and Kraków area."[53] The Lead Isotope Analyses cited there as the basis, however, refer, as its name suggests, to lead used in silver refining.[54] Their relevance to silver ores is not substantiated, nor are reference samples described. Regarding the isotopic characteristics of silver, one reads there: "Compared data on Fig. 9 shows no dependence of silver isotope fractionation (ε^{109}Ag) on stylistic groups (a) and on deposit origin (b). The range of Ag isotope values in the artifacts overlaps the ranges presented

[50] Chróst n.d., 15; the chart presented there shows more details than its description on p. 14.

[51] E.g. Pawełczyk *et al.* 2017, p. 44; Pawełczyk, Okupny, Michczyński 2018.

[52] Duczko, Miśta-Jakubowska, Czech-Błońska 2022, p. 233.

[53] Miśta-Jakubowska *et al.* 2024, p. 9.

[54] Miśta-Jakubowska *et al.* 2024, p. 5: "artifacts minted from lead [!] from this region."

in silver [of] younger and older silver artifacts presented by Milot […]," and "mixing of different silver sources within the base metal and filigree of a single artifact is evident."[55] Therefore, *no criterion was indicated based on which the origin of silver from the Olkusz region had been established*.

Nevertheless, in the monograph by W. Duczko's team, one reads: "At least 21% of the analysed artefacts from the hoards were made using bullion from the Krakow-Silesian Uplands. In this case, the results may be questionable, because the deposits near Olkusz are located on the Asia-Germany remelting line." If something "may be questionable," it is not "beyond dispute." The notion of the "remelting line" is incomprehensible to the present writer (yet it must be admitted that the general reason for the doubts expressed here may be similar), but the authors of the monograph also misunderstood the literature on which they based themselves, for they say in the next sentence: "This area was described as the Melmer KG 8-11 group (950–980 AD)."[56] The description cited was obviously not referring to the Olkusz area, but to so-called Hedeby semi-bracteates, classified and dated by Brita Malmer (not Melmer).[57] Regardless of how the assertion that the Hedeby semi-bracteates were struck from Olkusz silver would be justified, in the present writer's opinion this would be a *reductio ad absurdum* of the method used. Basing the abundant Danish coinage of the 10th century, even in part, on silver deposits near Cracow defies even the most freely understood historical probability. Indeed, we learn from the authors further that Stephen William Merkel, whom they cite, identified "an isotopically unrecognised type of silver, and he did not include the deposits around Olkusz in his analyses." Thus, we are essentially dealing with another example of the communication barrier and feedback loop at the boundaries of academic disciplines, as discussed in the Introduction above.

The findings of natural sciences, indicating the early period (the 10th century) as the time of silver production in the Bytom-Olkusz area, turn out to be insufficiently substantiated. Nevertheless, the written sources which we consider more reliable relate to places other than the archaeological sources in the same mining region. This indicates not only that *silver mining and metallurgy existed here at the end of the 11th and the 12th century*, but also that the surviving sources reflect only a small part of the reality, and the role of mining silver from the Bytom-Cracow deposits might have been much greater than it appears.

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[55] Miśta-Jakubowska *et al.* 2024, p. 6.

[56] Duczko, Miśta-Jakubowska, Czech-Błońska 2022, pp. 235–236. The work cited there: Merkel 2016, pp. 100–106.

[57] Malmer 1966.

2. The Chęciny or Holy Cross deposits

There is a belief in historical scholarship that the deposits of lead and copper ores with a small share of silver were exploited from the beginning of the 14th century in Chęciny north of Cracow, in the area of the then Duchy of Sandomierz (Map 1B: II). It was part of a wider mining district, the so-called Holy Cross ("świętokrzyski") or Old Polish ("staropolski") District, also covering the vicinity of Kielce and Łagów,[58] but silver is mentioned only with reference to Chęciny.[59] However, it is difficult to find out the source justification of this belief in relation to the Middle Ages. The losses in archives, caused first by several fires in Chęciny, and the complete destruction of the Treasury Records and the Krasiński Library in Warsaw by the Germans during World War II, make any verification of old research very difficult.[60] The bishop of Cracow who possessed a large part of this area, was granted permission in 1306, *supparum salis, plumbi et cuiuslibet alterius minere*,[61] ("to extract mines of salt, lead and whatever he wants") but it does not necessarily refer to Chęciny (it might be Sławków as well), and does not mention silver explicitly. A document from 1396 mentions *Nicolaus Bochner, magister monete et theloneator Cracouiensis ac zupparius plumbifodinarum Ilkussiensium et Chancinensium* ("the mint master and customs master of Cracow, and the manager of lead mines of Olkusz and Chęciny").[62] This document evidences that only lead was being mined at Chęciny. Written sources from the 15th century relate to the mining of copper, lead and azurite.[63] The lead (galena) and copper ores certainly contained admixtures of silver, but it was a by-product only, since we do not know of any significant yield of this metal. It is only in 1564 that the silver content of galena mined there was evidenced at the considerable amount of 0.13%.[64]

Chęciny was given the rights of a mining town (that is, a town settled "not on plough-land, but on lead and copper mines") after 1306 and before 1325.[65] The parish church was built there, unknowingly located on an earlier adit. The present-day penetration of the adit did not produce any dateable items. Unfortunately, to this day no serious archaeological research has been undertaken of the mining relics in Chęciny. Czesław Hadamik's suggestion that the mining and smelting of lead in the Holy Cross region, and primarily in Chęciny, began when King Wenceslas II of Bohemia reigned in the Duchy of Sandomierz (1292–

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58 Kubicki, Saletra 2013, pp. 29 and 32.

59 SG 1, p. 577.

60 Molenda 1963, pp. 16–17.

61 KDKK 1, p. 147, no. CXIV.

62 KDM 4, p. 55, no. MXXXIX.

63 Paulewicz 1992, pp. 6–7.

64 Paulewicz 1992, pp. 27–39.

65 Kiryk 2013, pp. 307–309; Hadamik 2017, p. 13.

1305) is noteworthy. It was probably related to the material needs of the then rapidly developing Bohemian centre of silver mining and metallurgy in Kutná Hora and the Czech monetary reform[66] (in this way, the miners of Chęciny followed in the footsteps of miners from the Olkusz and Bytom areas from the 10th century).[67] Also, the construction of the mighty Chęciny Castle, surrounded by numerous settlements established at the turn of the 13th and 14th centuries, is now considered the achievement of Wenceslas II.[68] Apparently, a *modus operandi* similar to that seen in Kutná Hora was used here. The mining activity that was launched in Chęciny *c.*1300 continued until the mid-17th century, but silver extracted here never gained much importance in the balance of precious metals in Poland, while Polish — including Chęciny — lead was often exchanged for Czech and Hungarian silver.[69]

3. The Carpathian deposits

The Polish Carpathian mining district covers northern slopes of the Tatra, the Pienins and the Beskid Sądecki. Sometimes, it is referred to as the "Tatra-Pienin district."[70] The high Carpathians were penetrated by medieval miners relatively late. In 1409, searches for gold and silver were recorded for the first time in the Nowy Targ royal domain: *omnia montana sita sub districtu oppidi memorati* [i.e. Nowy Targ], *in quibus auri, argenti et cuiuslibet metalli minera potest reperire*.[71] It is debatable whether this concerned the Tatra Mountains (Map 1B: III), which were hardly accessible from the Polish side at the time. The mining works were conducted by Cracow burghers, Mikołaj Speckfleisch and Jakub Aurifaber, in 1417.[72] Only in 1494 and 1495 the operating mine of *Tatri* (or *Thatry*) *alias Snebergk* is mentioned,[73] from which the rent was paid in pure silver — undoubtedly coming from the mine itself. In 1502, a royal silver mine was operating in the Tatra Mountains, and King Alexander financed the search for silver carried out by the Cracow mint master, Henryk Slakier. Silver ore mining developed there on a modest scale in the 16th century.[74]

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66 Hadamik 2005.

67 Duczko, Miśta-Jakubowska, Czech-Błońska 2022, pp. 202, 212 and 249.

68 Gliński 2018; Okniński 2019, p. 166.

69 Molenda 2001, pp. 52–73.

70 Mikoś 2008, p. 252.

71 KDM 4, p. 118, no. MCXIII.

72 Cr.Art., p. 58, no. 203; Kutaś 2005, pp. 32–33.

73 Cr.Art., pp. 355 and 416–417, nos 1161 and 1400.

74 Matras 1959, pp. 140–150; Molenda 1963, pp. 164–166; Kutaś 2005, pp. 30–77; Paszkiewicz 2021.

The relics of mining in the Tatra Mountains attract geologists rather than archaeologists today, and the newly discovered adits and drifts are devoid of dating features.[75] Most probably all relics known today come from the modern period.

4. The Sudetan deposits

Silver-containing ores were also mined in what was later called Lower Silesia. They were located in the Sudetan Foreland and the Sudetes (Map 1A). We will look at them moving along the Sudetes chain to the south-east. The oldest records of the exploitation of copper ores containing a silver share near Goldberg (Złotoryja) come from the beginning of the 15th century.[76] However, it is not evident that these mines played any important role in the market of precious metals in the Middle Ages. A silver mine existed before 1455 in Altenberg (Radzimowice), a short-lived town in the Kaczawskie Mountains. That year, King Ladislas the Posthumous sold it to Christoph de Zedlitz,[77] which could prove that the profitability was falling then. Even then, it was the "old mine" (Altenberg), yet the name might also have been transferred from Meissen. Nevertheless, for the next century, these mines continued to work, although mainly copper ores were unearthed there. Archaeological relics of this activity have been preserved.[78] Already in 1311, *Cuprifodina in montanis* existed in Kupferberg (Miedzianka) — as we learn from the name of the property of the knight Albert, known as "the Bavarian" (*Beyer*).[79] Tomasz Stolarczyk points out that this is "the oldest record of copper mining in Poland."[80] Subsequent mentions of Kupferberg come from the years 1367–1371,[81] but all these records do not provide any hint about obtaining silver — apparently the ore richer in silver was found there only in modern times.

Gottesberg (Boguszów), located further east, is indicated in literature as a mining centre operating as early as the beginning of the 14th century.[82] Krzysztof Jaworski, having checked the credibility of these reports, concluded that they were created as part of a self-promotional legend for the town of Gottesberg in the 18th century and were not based on facts. Gottesberg was an important but local-scale centre of silver mining in the first half of the 16th century. The oldest contemporary record of this settlement comes from 1499, when King Wladislas II of Bohemia

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75 Pawlikowski, Wróbel 2013, pp. 37–46; further literature therein.

76 Stolarczyk 2013, pp. 347–349.

77 SBH, p. 82, no. 197.

78 Dziekoński 1972, pp. 250–251 and 257; Stolarczyk 2020, pp. 460–466.

79 SBH, p. 13, no. 40; RSG, no. 3180.

80 Garbacz-Klempka *et al.* 2013b, p. 32.

81 SBH, pp. 54–58.

82 Dziekoński 1972, p. 283.

granted it the rights of a mining town.[83] Local names testify to medieval (and certainly not early-medieval, due to the later beginnings of settlement) gold mining in the Bystrzyca Valley east of Wałbrzych. Also, later medieval relics of silver ore mines were recorded in the 1548 survey of villages.[84]

Silver mine relics of an uncertain chronology, perhaps dating back to the end of the Middle Ages, were discovered in the Owl Mountains, in the valley of the Srebrna Woda stream (Silberwasser),[85] yet it was an area of the Bohemian Kłodzko County, and not Silesia. Archival records from the 18th century also refer to a (silver?) mine called St. Elias close on the Silesian side, on the slope of Silberkoppe (Błyszcz), over the village of Steinkunzendorf (Kamionki), "whose origins were to date back to 1309."[86] Indeed, silver was extracted from ore there in the 19th century, but the credibility of early references not supported by actual medieval documents is as little as in the case of the alleged early mining in Boguszów.

The reports about Silberberg (Srebrna Góra), the name of which itself contains the message about a silver mine, are much more interesting. This name (*qui mons vulgariter Silberberg dicitur*) appears for the first time in 1331. Silberberg, located in the Owl Mountains being a part of the main range of the Sudetes, was situated then *ad metas regni Boemie*, but on the Silesian side. Duke Bolko II of Münsterberg sold the mine then to knight Kunad de Schönwalde.[87] This probably indicates that the duke no longer had high hopes for silver mined there. In 1419, minerals from Silberberg were mentioned,[88] but unspecified and thus probably base. New mining works were undertaken — hoping for gold, silver and precious stones — in 1454,[89] with unknown results. A miner's guide to the vicinity of Świdnica and Rychbach (Reichenbach, today Dzierżoniów), composed by an anonymous Silesian in the 1460s or 1470s, included in the *Breslauer Walenwegweiser* codex ("Wrocław's Italian Guide Book") and assigned to Antonius Wale (i.e. "Antonio the Italian"),[90] mentions only the presence of lead of exceptionally good quality in Silberberg.[91] Silver mining in Silberberg revived at the beginning of the 16th century, when the lead ore mined there contained up to 0.2% silver,[92] which is a relatively high result. *Breslauer Walenwegweiser* also mentions silver

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[83] Jaworski 2020, pp. 3–35.

[84] Stolarczyk, Madziarz 2021, p. 98.

[85] Mączka, Stysz 2006, pp. 216–220.

[86] Mączka, Stysz 2006, p. 220 (the source of the date of '1309' is not indicated there, so it is not credible).

[87] SBH, p. 17, no. 55.

[88] SBH, p. 73, no. 171.

[89] SBH, p. 80, no. 195.

[90] Peukert 1929, pp. 216–224 and 237.

[91] SBH, p. 85, no. 202.

[92] SBH, pp. 234–235 and 244, nos 413 and 426.

mining in Reichenstein (present-day Złoty Stok)[93] — a town where gold mining developed significantly at the end of the 15th century.

The document of Emperor Charles IV from 1373 mentions "the burghers of Wrocław and Świdnica," who transported "gold, silver and other goods from Poland, Silesia, and other foreign countries." The emperor allows them "to make their way through our lands without any obstacles and suffering no constraint, and moreover, their bales to display, so that one gives and does as is the old custom" (*burger von Bressla und von der Swidnicz furbas mit gold silber und ander kawfmanschaft, die sie von Polan Slesie und andern fremdem landen brengen, dorch unser land ungehindert czihen lassest und keinen gewalt tust yn doran noch ire ballen uffslahest, also doch das man dovon gebe und tu, als das von alters herkomen ist*).[94] It is difficult to agree with Marian Małowist that such a general mention proves these metals to have been mined in Silesia in the second half of the 14th century.[95]

The Sudetan mining is the subject of new archaeological research, but it does not actually concern a medieval silver production. Research in Srebrna Góra in 2015–2016 revealed relics of a silver mine initially described as late medieval, but eventually only the 16th century is mentioned as the time the activity commenced.[96] The published dendrochronological analyses of the material extracted from there do not date it back before the 18th century. However, the results of the analysis of wood extracted from the so far undated, but "old" mining heap in the Chłopina stream valley (Germ. Manns-Grund), in the immediate vicinity of Srebrna Góra, were surprising. The lumps of charcoal covered with this heap were not suitable for dendrochronological research, but the radiocarbon method gave the date 1192–1205 calAD,[97] thus much earlier than the written sources referring to this area. It is not certain, however, whether silver ore was extracted from this mine.

5. Polish silver: a summary

Summarizing the knowledge about silver mining and metallurgy in medieval Poland, we must emphasize that we have got only fractions of source information from the 11th—12th centuries and it is not a fantasy to assess that this activity had to be carried out on a much larger scale than suggested by the evidence known

[93] SBH, pp. 85–86, no. 195.

[94] SBH, p. 59, no. 139.

[95] Małowist 1931, p. 1020 (wrong reference); following him: Myśliwski 2006, p. 292. The latter author adds that this silver still found its way to Flanders. This looks like a pile of over-interpretations of one source.

[96] Duerschlag, Duerschlag 2016; also *Hereditas* 2015.

[97] Stysz, Szychowska-Krąpiec 2016, p. 54.

today. This evidence proves that silver was mined and smelted in the second half of the 11th century, in Olkusz and the Bytom area, both belonging to the Cracow Province at that time. This region was not only inhabited earlier, but also lead ore was smelted there in the earlier Middle Ages. Silver mining probably ceased in the middle of the 12th century due to the depletion of deposits in Olkusz, or their flooding with water at Bytom. For a slightly longer period, until the 1160s, silver was mined between these towns in the villages of Zagórze and perhaps Łosień.

From the later period, we only have an ambiguous trace of silver mining in Silberberg (Srebrna Góra) in Lower Silesia at the turn of the 12th and 13th centuries. Silver mining on a scale perceptible on the European market must have taken place in Poland at the end of the 13th century, but it is not known exactly where it took place. It was not until the beginning of the 14th century that silver mining was evidenced in Lower Silesia again. A short-term mining of silver in Silberberg can be dated to the first quarter of the 14th century.

The Kingdom of Poland was provided with silver (largely in coins) from Kutná Hora in Bohemia in exchange for lead mined in Chęciny in the Sandomierz Province from the beginning of the 14th century. In the second half of the 14th century, a small amount of silver was extracted from lead ore mined near Olkusz in the Cracow Province. From the beginning of the 15th century, small amounts of silver were mined near Goldberg (Złotoryja), and in the middle of this century in Altenberg (Radzimowice), in both cases in Lower Silesia that belonged to the Crown of Bohemia at that time. In the same country, silver mining began in Reichenstein after the middle of the 15th century. It was not until the end of the 15th century that silver was mined in the Tatra Mountains, which were unavailable to earlier generations. The amounts of silver extracted there, are difficult to estimate, but certainly not very large. At the same time, the exploitation of the Lower Silesian silver deposits in Gottesberg (Boguszów) was only launched. The contemporary mining enterprises were then developed during the 16th century, proving the effectiveness of new mining technologies.

6. Coinage and politics

(a) The first Piasts

On the basis of the origin of foreign coins found in Poland, it is agreed that in the 10th century, eastern silver in Arabic dirhems, and western silver, coming mainly from the Harz, were in use. The latter appeared from the 950s and eventually replaced the former. Written reports, apart from echoing the trope of the "gold-

en age,"[98] highlight the spoils of Boleslas the Brave, who took over two state centres with their resources: Prague and Kyïv. Usually, these sources are skipped in considerations because 14 years after the king's death, the Polish state centre was also plundered by the Czechs,[99] so these resources supposedly did not remain in Poland.[100] Undoubtedly, however, a major part of the loot of Boleslas the Brave was promptly distributed, and some found its way to church treasuries beyond the reach of Czech plunder, some was minted, and thus silver was spread throughout the country.[101]

No records of coinage volumes in medieval Poland are preserved, although there have been attempts to calculate these figures. In 1967, Stanisław Suchodolski, having determined the number of coin dies of Mieszko I (*c.*960–992) and Boleslas the Brave (992–1025), assuming the average die output of 3,000 specimens, estimated the total production at 72,000 coins, and he rounded the consumption of silver to *c.*100 kg.[102] Today, not only it is known that the coins with the name of Mieszko were minted during the reign of Boleslas the Brave, and the name on them refers to his son, the future King Mieszko II, yet more types of coins have been revealed, mainly anonymous imitations that came from Polish mints at the time.[103] Not all of them can be clearly distinguished. Mateusz Bogucki and Jacek Magiera collected eleven new anonymous types die-linked with coins of Boleslas the Brave.[104] Even if one adds a similar number of non-die-linked imitations,[105] a doubling of the amount estimated by Suchodolski may be considered, i.e. 200 kg of silver coined within a quarter of a century. There is a hypothesis of Dariusz Rozmus that the Bytom-Cracow mines supplied Slavníkid mints with silver in the years *c.*985–995.[106] The author does not explain why exactly Slavníkid ones (the Slavníkids was "a family closely cooperating with the Piasts," Rozmus

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[98] Gallus, pp. 407–408: […] *quique nobiles torques aureas inmensi ponderis baiulabant, tanta superfluitate pecuniae redundabant. Mulieres vero curiales coronis aureis, monilibus, murenulis, brachialibus, aurifrisiis et gemmis ita onustae procedebant, quod ni sustentarentur ab aliis, pondus metalli sustinere non valebant*.

[99] For the description of the treasures looted then, probably rhetorical rather than realistic, see: Cosmas, pp. 80 and 86 (II.2 and II.5).

[100] Kiersnowski 1960, pp. 34–35.

[101] Dzieduszycki 1995, pp. 65–69.

[102] Suchodolski 1967, pp. 160–161.

[103] Suchodolski 2015, pp. 67–94; Suchodolski 2022; the author sums up the increase in the number of types from only 18 to 21, but omitting the imitations.

[104] Bogucki, Magiera 2015; Bogucki 2022, pp. 182–186.

[105] See e.g. Bogucki 2022, pp. 187–193.

[106] Rozmus 2013b, p. 269.

says), while there were the Přemyslids who ruled Cracow in the 10th century.[107] Indeed, the latter dynasty is most recently considered as profiting from Cracow area silver in the 10th century (although no remark on their coinage has been made),[108] as discussed above (see paragraph 1c). Either way, these are conjectures drawn from a source vacuum.

Such a low efficiency of domestic mintage speaks against the possibility of a considerable silver mining in Poland in the times of Boleslas the Brave. It is deemed that there is no evidence of a well-developed production of silver ornaments in Poland either. Although it is debatable whether the ornaments found in Polish hoards from the 10th century are predominantly of Scandinavian and Bohemian origin or whether they instead came from the Balkans and the Eastern Roman ("Byzantine") Empire, it was not until the end of the 10th century that the first local, imitative products appear.[109] Another form of non-monetary silver appears in the first half of the 11th century and is deemed uniquely Polish. These are silver "cakes," i.e. solidified lumps of metal poured onto a wooden surface. They usually are a small admixture in hoards of coins and fragmented ornaments. Usually, it is thought that these lumps were a product of melting hacksilver, which was especially abundant in hoards at the turn of the 10th and 11th centuries. However, the issue of the origin of silver in archaeological artefacts from Poland requires a further involvement of natural sciences.

(b) A possible impact of Bytom-Cracow area mining on coinage

In the broadest possible context, this issue has been raised in the laboratory of the Institute of the History of Material Culture (today the Institute of Archaeology and Ethnology) of the Polish Academy of Sciences in Warsaw since the 1960s. Longina Koziorowska conducted analyses and collected data over several decades and summarized them in two works in the beginning of the 21st century. According to the observations made in world science in the 1980s, Koziorowska considered the Au : Ag ratio as a characteristic feature of specific deposits, which did not change in metallurgical processes known in the Middle Ages. As an auxiliary criterion, she adopted shares of several other elements in relation to silver. However, she did not have samples of metal that certainly originated from specific deposits, so she compared ornaments and cast silver with coins. Koziorowska learned that some of the ornaments found in Polish hoards (mainly in Silesia) were made

[107] The date of the end of the Přemyslid control over Cracow is widely discussed — it is only certain that the year 999 given by Cosmas is too late. According to Marzena Matla-Kozłowska, it happened before 984 (Matla-Kozłowska 2008, pp. 313–317 and 329) — anyhow, well after the beginning of the Přemyslid coinage *c.*970.

[108] Mišta-Jakubowska *et al.* 2024, p. 10.

[109] Duczko 2018, pp. 541–542 and 544; Duczko 2020, p. 363; Ungerman 2022.

of metal similar to the Czech pennies of Boleslas II (*c*.970–999), while the others were similar in terms of metal to Arabic or Byzantine coins. She met also with ornaments showing similarities to ancient coins or finding no analogies in coin silver at all. Cast silver has generally proved to be specific in content. A big disadvantage of the publications is the lack of photos of the studied coins, which, for example in the case of early medieval cross pennies, does not provide certainty about which coins were actually related to the given data.[110]

The metal of the oldest Polish coins of Boleslas the Brave and his son Mieszko was examined by Halina Młodecka and Piotr Chabrzyk. The method used (X-ray fluorescence) provides data on the elemental composition of objects, taken from their subsurface layers, so its use for determining the origin of silver is very limited and the results are uncertain. However, in the case of coins not enriched on the surface by blanching, like most of the coins of the first Piasts,[111] and with sufficiently numerous tests, the obtained data deserve attention. As a result, the authors cautiously state that "the chemical composition of the first Piasts' pennies is more similar to that of the Arab dirhems than the German coins," but "whether the dirhems were indeed the raw material for Polish coins cannot be definitively determined on the basis of the analyses carried out."[112] A large team formed by Mahir Hrnjić and colleagues examined a series of early Piast pennies using XRF and HE-PIGE/PIXE methods. They conclude that the trace elements detected speak for Harz silver rather than Transoxanian. "However, — they reserve — matching compositions of different coin groups cannot provide a definite answer about the provenance of silver."[113] In any case, there is no suggestion of a local origin of silver used in the earliest Polish coinage. One has to conclude for the current belief that *the source of silver and the material basis for the expansion of Boleslas the Brave's state was trade, tributes and spoils*.

Młodecka and Chabrzyk also tested a series of silver lumps from various hoards from central Poland and Łosień, using the X-ray fluorescence (XRF) method. First of all, they noticed that the silver lumps hoarded in the first half of the 11th century (the lumps themselves are deprived of formal dating features) are of almost pure silver (over 950/1000 Ag), while those hidden at the end of the 11th century contain lead admixtures of 5–20% and a significant share of copper. In ornaments from the same hoards, copper dominated over lead among admixtures, but a deliberate lowering of silver fineness is also visible. The authors put forward a working hypothesis that silver in the lumps came from the Bytom-Cracow deposits, and that silver extraction was a factor contributing to the displacement

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[110] A brief history and research methods: Koziorowska 2007; extensive discussion of the results: Koziorowska 2002.

[111] Hrnjić *et al.* 2021, p. 617.

[112] Młodecka, Chabrzyk 2010, p. 178.

[113] Hrnjić *et al.* 2021, pp. 622–623.

of the centre of the Polish state from the Gniezno-Giecz-Poznań area, devastated by the Bohemians, to Cracow.[114] Similar observations were made on the elemental analysis of the Kalisz-Dobrzec hoard, composed almost exclusively of silver lumps and hidden at the end of the 11th century.[115]

Research into isotopes of lead admixture from monetary and non-monetary silver from Polish hoards, carried out recently, brought an unexpected turn in the views on silver relations in the later part of the 11th century. In 2015, a team of researchers from the Institute of Nuclear Chemistry and Technology in Warsaw and the National Museum of Archaeology observed that a significant part of cross pennies of younger types V (*Pelleted cross*), VI (*Plain cross*) and VII (*Crosier*) were made of silver containing an admixture of lead typical not of Rammelsberg in Saxony, but of the Olkusz and Holy Cross deposits.[116] The identification of silver from the Olkusz ores is no surprise — we already met with the written evidence of their exploitation in the second half of the 11th century. Therefore, we have no reason to consider the possibility of the alternative origin of silver from Chęciny (Holy Cross) deposits.

Further work was carried out by the team led by Władysław Duczko. The preliminary results were published in 2019. The Polish coins studied in this project are anonymous cross pennies from the turn of the 11th and 12th centuries and the contemporary pennies of Palatine Sieciech (in office *c*.1080–1100). The Polish coins, like the Saxon ones, mainly contain silver from modern-day Afghanistan and Uzbekistan as well as from the Harz and Meissen deposits — so the result was different than in the previously cited studies. However, this may result from an imprecise definition of the subjects of the analyses (it was not specified exactly which coins were tested). A share of silver from the Olkusz area was recognized in jewellery from the 10th—11th centuries. The most surprising discovery is that silver from Czech deposits was also observed in silver lumps. This is in line with the most recent discoveries of silver metallurgy relics from the 10th century in Prague.[117] Unfortunately, it is not possible to specify these deposits, because the Kutná Hora and Příbram regions, although distant from each other, have the same characteristics of lead isotopes: "In the coins and jewellery the share of the Czech ores (K[utná] H[ora and] P[říbram]) is slight which is in contrast to the raw silver. Lumps are mainly made of silver from Czech (25%) and Polish (33%) deposits, which is consistent with their identification as local semi-finished products […]. However, they were not semi-products for the manufacture of the artefacts studied in the course of this project."

These are, among others, silver lumps from the Łosień hoard that the authors spoke about here. The Łosień lumps — as it turns out — were made of different

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114 Chabrzyk, Młodecka 2012.

115 Kędzierski, Wyczółkowski 2017.

116 Pańczyk *et al.* 2015, p. 660.

117 See above, footnote 5.

silver than the coins examined in their project.[118] Cross pennies struck in Poland at the turn of the 11th and 12th centuries and the contemporary pennies of Palatine Sieciech are distinguished — in the light of these studies — by a core with an increased content of copper with zinc.[119] However, this is not a characteristic of the raw material, but of an alloy made in a mint, and therefore cannot be considered a proof of the Polish origin of the silver as Kędzierski thought.[120] Details are severely lacking in the publication by the team. We do not know, for example, what Polish coins revealed German and Asian silver, in which items Czech silver was found and where these items were discovered. In the second, extended publication, the authors come to the conclusion that the study of isotopic ratios does not give sufficiently unambiguous indications of the metal origin.[121]

Based on purely numismatic observations, S. Suchodolski had previously concluded that the evident, significant debasement of Boleslas II the Generous (1058–1079) pennies argued against the ruler's access to silver mines. Boleslas would therefore coin silver imported from Saxony through trade.[122] The subject of this trade could be largely forest crops, while the slave trade, although not completely ceased, decreased in importance — prisoners abducted in wars were often settled in the country.[123] Suchodolski dates the beginning of this ruler's coinage to *c*.1070 or maybe a little earlier. Dariusz Adamczyk draws attention to the considerable war booty gained by Boleslas II the Generous and Wladislas I Herman, as well as to the robbery by the former of Prince Iziaslav I of Kyïv, in 1073. He believes that the coincidence of the latter event with the beginning of Boleslas II's coinage may not be accidental.[124] However, this would suggest that Boleslas II launched his coinage a couple of years later than generally believed.

It is still not known where the silver in his pennies came from, but contemporary anonymous Polish imitations of cross pennies turned out to be made of domestic silver (thanks to the research of the Institute of Nuclear Chemistry and Technology, Warsaw, and the National Museum of Archaeology). Suchodolski wrote about coins with the name or figure of Boleslas II that "their production was intense and in peak periods it could reach up to a million pieces a year." If the oldest variant of pennies with Boleslas's name weighs 0.845 g on average,[125] then honest coinage of this standard would require 845 kg of silver per year (and twice as much, if we agree with Adamczyk on shortening the coinage period). Although it is a small

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118 Miśta-Jakubowska *et al.* 2019a, p. 247.

119 Miśta-Jakubowska *et al.* 2019a, p. 249; Miśta-Jakubowska 2022, p. 119.

120 Kędzierski 1998, pp. 37–41.

121 Miśta-Jakubowska *et al.* 2019b.

122 Suchodolski 2013.

123 Samsonowicz 1974, p. 294; Korta 1982, p. 103; but see Adamczyk 2020, p. 136.

124 Adamczyk 2020, pp. 121 and 135–136.

125 Suchodolski 1973, p. 37.

amount when compared with the tributes and taxes levied from Viking-age England, it is considerable in comparison with the productivity of quite significant mines at the time.[126] We cannot be surprised that Boleslas II did not have that much silver and he lowered both the weight of the coins and their fineness (even up to 10% of pure silver). While waiting for the isotope analysis of his coins, we can suppose that the access to silver — the discovery of the Olkusz or Bytom deposits in the 1060s — encouraged Boleslas to begin his large-scale coinage as well as to pursue his adventurous policy. Only then it would turn out, as often in history, that the king overestimated his abilities and resources — an excellent example of such ambitions exceeding even great possibilities is King John the Blind of Bohemia (1311–1346), who was endowed with the richest silver mines in Europe at his time, yet nevertheless debased his coinage and ended his reign as a bankrupt.

S. Suchodolski agreed that it was not before the reign of Wladislas I Herman (1079–1102) and Boleslas III the Wrymouth (1102–1138) when Polish coins could be minted from silver mined in Łosień.[127] Although the Łosień silver mining still cannot be considered as proven, we already know that anonymous cross pennies were minted from Polish silver in the times of these rulers. Nevertheless, there is still no confirmation of the domestic origin of the silver used to strike coins bearing the ruler's name. It should be observed that the extraordinary stability of Wladislas Herman's coinage — the same type of penny struck throughout his reign, over 20 years — is typical of coinage based on a stable (though not necessarily mining) material supply, such as Otto-Adelaide pennies or English sterlings. The most recent research by Grzegorz Śnieżko brought the maximum total amount of pure silver minted during the reign of Boleslas the Wrymouth as 3,324 kg.[128] In spite of the apparent intensity of the ruler's coinage, this is not a tremendous amount, especially when we consider the possibility of reusing German and Polish cross pennies withdrawn from circulation and the fact that the recoinage system favoured the multiple use of the same metal. In 1135, Boleslas III paid (or undertook to pay for the next 12 years) to Emperor Lothar III a tribute in the total amount of 6,000 marks,[129] i.e. about 1,300 kg of silver. This amount must have been significant in the precious metal balance at the time, and its loss should be visible in coinage. This fact is the basis for the hypothesis put forward recently by Witold Garbaczewski that the known bracteates of Boleslas the Wrymouth — the oldest Polish bracteates being also among the earliest bracteates in Central Europe — were introduced in 1136 as a result of a monetary reform and replaced the earlier two-sided pennies. The aim of the reform would be to increase the minting profit, i.e. make a better

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126 Cf. Allen 2012, pp. 241–246; Spufford 1988, p. 114.

127 Suchodolski 2013.

128 Śnieżko 2021, p. 197.

129 Rosik 2013, pp. 233 and 242–243.

use of the silver resource available to the duke.[130] The resources of Boleslas III's silver can be assessed as relatively significant in the period of the general decline in silver availability in Europe.[131] This would argue for a significant role played by domestic mining, although spoils and tributes cannot be disregarded.[132]

The mass issue of pennies subject to periodic recoinage took place during the reigns of Wladislas II the Exile (1138–1146) and Boleslas IV the Curly (1146–1173). Wladislas II's pennies are among the most common Polish coins from before the 15th century. The metal from which these coins were made has been examined, but the published results do not provide grounds for determining the origin of silver.[133] Such grounds are not provided by analyses of Boleslas IV's pennies either, yet the XRF method disclosed that these coins, although very light, were made of *c*.97% silver, so practically pure.[134] The analysts note that, unlike the coins minted from Harz silver, Polish coins of Wladislas II and Boleslas IV from the Łosień hoard do not contain any tangible amounts of bismuth.[135] Analyses of coins from the Głogów hoard provided similar results.[136] They support the conjecture that coins of these rulers were minted from domestic silver.

Coins attributed so far to the last years of the reign of Boleslas IV the Curly maintain a high silver fineness,[137] but they are much rarer in finds and collections — so much less were minted. They were absent from the hoard found at the mining and metallurgical settlement of Łosień, so they were struck after it was concealed, or in another province. The settlement was abandoned suddenly, after it was destroyed by an armed invasion, the traces of which have clearly been preserved, with several decades passing before it was re-inhabited.[138] Although it was certainly not the only settlement of miners and metallurgists in this region, the contemporary decrease of coinage volume suggests that this very invasion ended or at least significantly limited silver production in Poland. If indeed the effects were so wide-ranging, it could not be a local robbery, but an armed conflict on a regional scale at least. The hoard structure indicates that it was hidden at the beginning of the issue of Boleslas IV's type 4 penny (*Three princes*), which is dated to *c*.1162–1166 by scholars.[139] While the relative chronology of this coin type is based on finds, its absolute dating is based on the interpretation of the scene fea-

130 Garbaczewski 2018.
131 Spufford 1988, pp. 96–99.
132 Adamczyk 2017, pp. 160–161.
133 Książek *et al.* 2013, p. 62.
134 Książek *et al.* 2013, pp. 18, 21, 23 and 27; Paszkiewicz 2015, p. 192.
135 Garbacz-Klempka *et al.* 2013a, p. 211.
136 Książek *et al.* 2013, pp. 18–21, 23, 25 and 27.
137 Książek *et al.* 2013, pp. 21–28.
138 Rozmus 2014, p. 142.
139 Suchodolski 2014, pp. 31–32.

tured there with three princes sitting at a feast (Fig. 1). There is no doubt that Duke Boleslas IV is sitting in the middle, accompanied by his brothers. On his right would sit his longtime ally, Mieszko (the future Duke Mieszko III the Old), but the person on his left, diverging in hairstyle, could be both Henry of Sandomierz, who died in 1166 never being a paramount ruler of Poland, and the youngest brother, Casimir of Wiślica (the future Duke Casimir II the Just), if the coin had been struck after that date. So far, it has been assumed that it is Henry, and this is in order to fit three more alleged, not so common types of Boleslas the Curly pennies into the years 1166–1173. Today it appears that such a concept would even force us to cram into this final period as many as four types of pennies absent from Łosień[140] — therefore the present writer deems this attribution doubtful.[141]

Fig. 1. *Poland*, Boleslas IV the Curly (1146–1173), penny, *Three princes* type. Probably the last type of this ruler, struck, in the present writer's opinion, by 1166 to 1173. Cracow mint, silver, 0.30 g, 15.6 mm. Photo by Warsaw Numismatic Centre Marek Kondrat, sale catalogue 74 (16 May 2020), lot 26.

Ryc. 1. *Polska*, Bolesław IV Kędzierzawy (1146–1173), denar typu *Trzej książęta*. Prawdopodobnie ostatni typ tego władcy, wybijany zdaniem autora w latach ok. 1166–1173. Mennica Kraków, srebro, 0,30 g, 15,6 mm. Fot. Warszawskie Centrum Numizmatyczne Marek Kondrat, aukcja 74 (16 maja 2020), poz. 26

During the reign of Boleslas IV, the rulers of Germany undertook three military expeditions to restore Wladislas II the Exile to the throne or to defend rights of his sons: in 1146, 1157, and 1172. The first intervention of King Conrad III stopped on the line of the Oder. The second, by Emperor Frederick Barbarossa, was partially successful, but did not reach further from the west than to the vicinity of Poznań.[142] The Bohemian duke, Wladislas II, and Moravian dukes, probably

[140] Książek *et al.* 2013, p. 28.

[141] Książek (2019) and Piniński (2020) offer a new approach to the problem recently.

[142] Biniaś-Szkopek 2009, pp. 224–243.

Otto III and Conrad II, also took part in the expedition,[143] but they joined the general imperial march more probably than they undertook independent military actions from the southern flank. In 1172, Emperor Frederick set out with the army, again supported by Wladislas II of Bohemia. It is not known whether the emperor entered Poland at all, or he accepted only a ransom from Mieszko the Old who probably acted on behalf of his brother, Duke Boleslas, outside Poland's borders. It is known, however, that in the same year Legnica was burnt down under unknown circumstances,[144] which suggests some military actions, yet very distant from Łosień.

Master Vincent reports that in 1163, Boleslas the Curly granted his nephews, Boleslas the Tall and his younger brothers, the sons of Wladislas the Exile, *sacra Silencii* […] *prouincia*.[145] The chronicler passed over in silence the fact that the return of Wladislas's sons was actually of an armed nature, and their success was a consequence of the victory won in the battle of Modlikowice west of Legnica.[146] The term "the holy Province of Silesia" is interpreted as the area of the Wrocław diocese[147] rather than only Silesia proper, i.e. the land around Wrocław. This province had been, however, reduced by certain towns (*quasdam illius prouincie urbes* […] *donationi exceperat*).[148] This means that to the west of Bytom and Łosień (both being in the diocese of Cracow), the border between the lands of the supreme duke and the younger dukes, i.e. a zone of a potential military clash, appeared at that time. This clash took place already in 1166, when the sons of Wladislas the Exile — Boleslas the Tall with his brother Mieszko the Young — took over these excepted towns.[149] The names of the towns were not recorded. The adversary of younger dukes in 1166 was the supreme Duke Boleslas the Curly ruling in Cracow, and not the lord of Poznań, Mieszko the Old. Therefore, Janusz Bieniak rightly believes that the disputed towns, captured by the dukes of Silesia, were Opole, Racibórz and Cieszyn, that is, those very areas of the Wrocław diocese, which were close to Bytom from the west.[150] This is the only sensible concept on this subject that has appeared in historiography (Map 2). Most probably, during their first incursion in 1163, Wladislas's sons failed to reach the easternmost strongholds of the Wrocław diocese which they regarded their patrimony. The princes made up for this failure three years later. In the years 1166–1168, there were some unsuccessful attempts at retaliation by the supreme duke, which Wladislas the Exile's

143 Žemlička 1997, pp. 236–237.

144 Biniaś-Szkopek 2009, pp. 255–256.

145 Vincentius, p. 125, chapter III: 30.

146 Kowalski 2022.

147 Zientara 2008, p. 58.

148 Vincentius, p. 125, chapter III: 30.

149 Zientara 2008, p. 60.

150 Bieniak 2003, p. 55.

sons repelled.[151] However, if we are looking in the 1160s for an armed invasion of the Cracow Province in which Łosień was located, it must have been the action of Boleslas the Tall and Mieszko the Young in 1166 (as Piotr Boroń has suggested)[152] or their repulsion of the supreme duke's attack a bit later. Either the *Three princes* penny type of Boleslas the Curly was introduced shortly before the death of Henry of Sandomierz in 1166, and the type was not changed after that — Henry was replaced quietly by Casimir as the third feasting person there — or the third prince is Casimir only, and the type was introduced in 1166. Were the former true, the precious metal base of Boleslas the Curly's power suffered the attack from his nephews in 1166, if the latter — their counter-attack a year or two later. In this case, the four further types of pennies attributed to Boleslas the Curly would be in fact coins of Boleslas the Tall. It is puzzling, however, that Boleslas the Curly did not try to rebuild the mines that eventually remained in his hands.

Mieszko the Old (perhaps on behalf of his brother, the supreme duke) paid the emperor a heavy tribute of 8,000 marks, i.e. more than 1.5 tons of silver, in 1172. Next he became himself the supreme ruler of Poland a few months later (his first reign, 1173–1177/9). Then he probably did the same as his father did 38 years earlier in a similar situation — he increased the profitability of coinage by introducing bracteates reminted at short intervals. The number of these coins in finds is very small. Mieszko's successor, Casimir II the Just, in the years 1177–1179, granted the Bytom district (together with Zagórze, it is not known whether with Łosień, too) to Mieszko the Young.[153] It was supposed to be — as Master Vincent writes — a compensation for the fact that Mieszko had given up Wrocław to his brother, Boleslas the Tall.[154] This donation does not mean, therefore, that Bytom silver resources had been deemed not very promising then — on the contrary, their value was regarded sufficient to compensate for the whole Wrocław province. Interestingly, Casimir left a stronghold in Będzin for himself (see Map 2), controlling as much the trade route leading from the west to Cracow as the economic activity of this area. Boleslas the Tall and Mieszko the Young struck pennies, the metal composition of which, according to XRF analyses, was consistent

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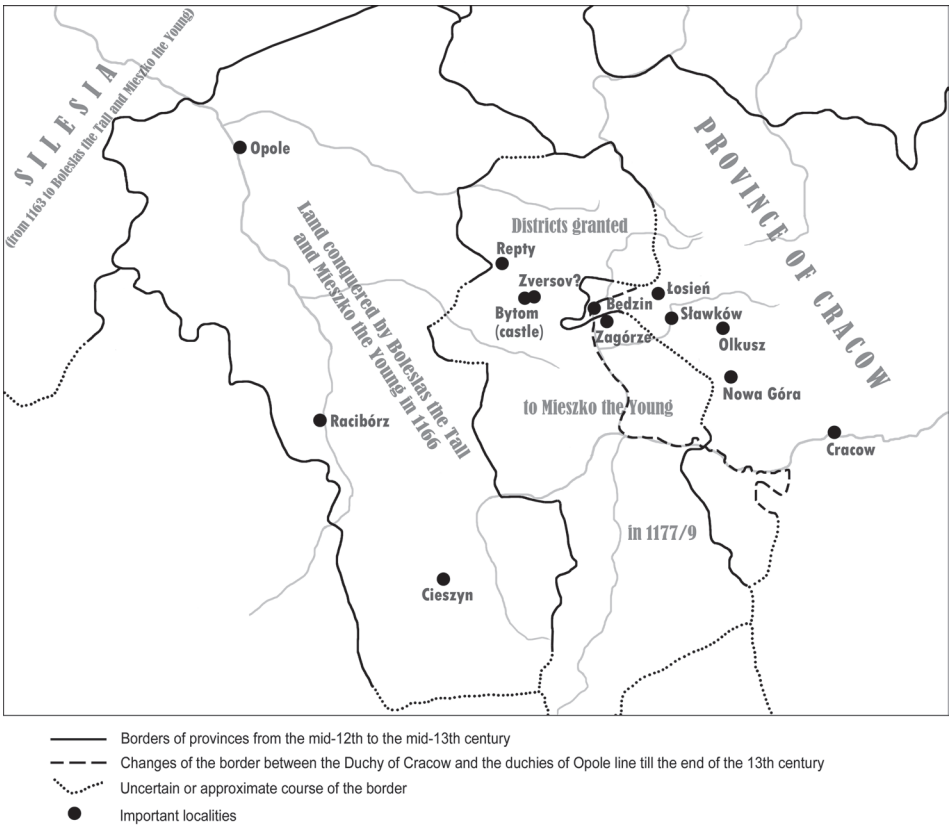
[151] Vincentius, p. 126, chapter III: 30; Zientara 2008, p. 61; Biniaś-Szkopek 2009, pp. 178–179. Jerzy Rajman argues, probably aptly, that it was Mieszko the Old who ejected Boleslas the Tall from Wrocław in 1172 (Rajman 2011, pp. 76–78). However, this does not refer to the "war of towns" in 1166 and the following years, which was a conflict between Boleslas the Tall and Boleslas the Curly, the former being supported by Mieszko the Young. Marek D. Kowalski has recently questioned whether the "war of towns" actually took place (Kowalski 2022, pp. 121–122), but this denial of an unambiguous account given by a chronicler contemporary to the events has not been convincingly substantiated.

[152] Boroń 2013b, p. 213.

[153] Rajman 2003, p. 89. Until the mid-13th century, the border between the Duchies of Opole and Cracow was very blurred. It probably changed frequently in details. See Rajman 1998, pp. 69–74 (Zagórze: pp. 64 and 76).

[154] Vincentius, p. 147, IV.8.



Map 2. Political divisions of the Bytom-Cracow mining area in the 12th—13th centuries. Drawing by N. Lenkow.

Mapa 2. Podziały polityczne w bytomsko-krakowskim okręgu górniczym w XII–XIII w. Rys. N. Lenkow

with the composition of Boleslas the Curly's pennies.[155] These coins are often met with in today's collections, but only thanks to the one, very large hoard from Głogów (1987), part of which was dispersed on the antiquarian market. Judging by the number of finds, these coins were much less numerous than Boleslas IV's, which would indicate a depletion of the ore resources in the Bytom part of the Bytom-Cracow deposits. This also applied to the Olkusz-Sławków part because the Cracow coinage at the end of the 12th and the first half of the 13th century is barely visible in finds.

[155] Książek *et al.* 2013, pp. 21–28 (types "V", "VI", "VII" and "VIII", attributed to Boleslas the Curly by the authors); pp. 31–34 and 37–38 (types "II", "III" and "IV" attributed to Mieszko the Young, and "II" attributed to Boleslas the Tall). The bracteates of Mieszko III the Old have not been analysed.

There is some doubt as to whether Boleslas the Tall could use silver from the mines in the lands of his brother Mieszko, with whom he had just been in conflict. However, a single conflict between brothers would not necessarily preclude the possibility of future cooperation. Boleslas the Tall could also have at his disposal silver from Silberberg (Srebrna Góra), if the deposits available at that time contained silver.

(c) Was Silesian mining behind Silesian minting?

In the subsequent decades of the 13th century, Polish coinage is poorly recognized, also in terms of its intensity. Silesia (modern-day Lower Silesia) provides many more finds (mainly hoards, but also single finds) than any other part of Poland. These are interpreted, however, not as evidence of greater coinage volume but, first of all, of economic development and the spread of German law, which introduced coinage to wider use. Was *argent en plate* from Poland, recorded in the fourth quarter of the 13th century in Bruges, used for the development of Polish coinage? It is not known what part of Poland it came from: (Lower) Silesia, Opole or Cracow provinces. One can observe, however, that the new silver weight measure introduced in Wrocław in the middle of the 13th century — a mark weighing *c.*196 g[156]—became widespread in most of Poland during the second half of the century. The most common mechanism for disseminating measurement units was the export of measured goods.[157] Finds of raw silver from that time in Poland are indeed rare, but in Laski Lubuskie (Słubice powiat), in a hoard from the turn of the 13th and 14th centuries, two silver round lumps weighing 195 and 196 g were found (Fig. 2).[158] This — despite controversy among scholars — proves that the Wrocław mark was used to form silver pieces.[159] We do not know whether it was Silesian or imported silver. However, if we look at Polish coinage at the turn of the 13th and 14th centuries, we can see a clear revival in only one of the Polish lands. This is Silesia, where the first grosso-size coins in Central Europe — kwartniks — have appeared in the 1290s.[160]

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[156] Wachowski 2002.

[157] Kula 2004, pp. 149–150. Franciszek Piekosiński believed that it was Wrocław municipal law that served as vehicle of the Wrocław mark between Wrocław and Cracow since the latter city's municipal charter of 1257 was modelled on the former's (Piekosiński 1898, p. 388).

[158] Menadier 1902, p. 247. Two other silver lumps from the hoard, similar in form, weigh 227 and 839 g which conform with other mark units (early Cologne and quadruple old Polish mark).

[159] The argument is summarized by Szczurek 2007, pp. 138–146.

[160] The copper listed in the same Bruges account probably came from Silesia, because copper was mined at the beginning of the 14th century in the Sudetan town of Kupferberg (Miedzianka), and there is no evidence that it was mined elsewhere in Poland in this period. See: Małowist 1931, pp. 1020–1021.

Fig. 2. Cast silver lump from the Laski Lubuskie hoard (*tpq* 1300). Originally a round, lens-shaped "cake" of silver, it was bent on two sides with the upper face inside, making a trough. 196 g, 67 mm in diameter. Staatliche Museen zu Berlin, Münzkabinett, no. 18215398. Photo by Reinhard Saczewski, Public Domain Mark 1.0.

Ryc. 2. Sztuka srebra lanego ze skarbu z miejscowości Laski Lubuskie (*tpq* 1300). Pierwotnie kolisty, soczewkowaty placek srebra, zagięty z dwu boków, wierzchnią stroną do wewnątrz, co nadało mu kształt rynienki. 196 g, średnica 67 mm. Staatliche Museen zu Berlin, Münzkabinett, nr 18215398. Fot. Reinhard Saczewski, domena publiczna 1.0

Fig. 3. *Silesia*, anonymous kwartnik, the early 14th century. The obverse, inscribed with [AVE] MARIAGA (*Ave Maria gratia plena*), refers to the Hainault *petit gros* (*cavalier*, *baudekin à cheval*) struck in 1301–1312 and then imitated in other Low Countries, whereas the reverse reproduces the type of the eagle groat (*arendgroot*) of Flanders, struck in 1275–1300 and also imitated later (Kiersnowski 1966, p. 206). Uncertain mint, silver, 1.72 g, 18 mm. Photo by a private owner.

Ryc. 3. *Śląsk*, anonimowy kwartnik, początek XIV w. Awers z legendą [AVE]MARIAGA (*Ave Maria gratia plena*) pochodzi z *petit gros* (*cavalier*, *baudekin à cheval*) Hrabstwa Hainaut, wybijanego w latach 1301–1312, a następnie naśladowanego w innych częściach Niderlandów, podczas gdy rewers imituje typ grosza z orłem (*arendgroot*) z Flandrii, bitego w latach 1275–1300, również naśladowanego później (Kiersnowski 1966, s. 206). Mennica nieznana, srebro, 1,72 g, 18 mm. Fot. właściciel prywatny

Until recently, kwartniks were known from only a few finds and were deemed very rare coins. Despite the enormous variety of types, after the losses of World War II, their stock in collections was estimated at only *c*.100 pieces.[161] Only one hoard containing more of these coins was known. New finds, however, have changed this picture rapidly: the number of kwartniks in collections today is approaching a thousand. Nearly ten hoards and several dozen single finds are known.[162] R. Kiersnowski observed the dependence of kwartnik types on coin motifs from Flanders and its neighbouring countries (Fig. 3), from the third quarter of the 13th century. "The reception of Flemish influences — he added — was not a one-off phenomenon, appropriate only to the initial stage of the kwartnik coinage, but it was a continuous process, lasting at least the first dozen or so years of this coinage, and therefore based on repeated, non-accidental prerequisites."[163] Import of cloth from Flanders was recorded in Silesia from the early 1300s.[164] Although we do not know kwartnik finds in the Low Countries or any other evidence of their presence there, the kwartniks are observed along the trade routes connecting Silesia with the mouth of the Rhine. Therefore, Kiersnowski draws the conclusion that "the reform of Silesian coinage was a necessary condition for the maintenance and development of trade contacts once established with Flanders, the needs of which could not be satisfied with bracteate coinage."[165] This suggests that kwartniks were a new form of what had been *argent en plate* earlier, and their issue was based (at least in part) on Lower Silesian ores, perhaps from Silberberg (which, let us recall, the duke sold in 1331 — apparently having exhausted the available deposits), but also from other small veins deep in the mountains. Likely, the mining base for these coins had been exhausted, which — due to the price dumping by the Prague groschen in the times of King John — resulted in the end of the kwartnik coinage in the second half of the 1320s.[166] Against this background it is not surprising that, in the light of new research, the most productive kwartnik coinage comes from the Sudetan Duchy of Fürstenberg. It also becomes more understandable that Duke Bolko I of Fürstenberg had managed to fortify his duchy so that it resisted the Czech invasion in the last years of the 13th century. On the other hand, one wonders what the basis for the kwartnik coinages of the two other lines of the Silesian Piasts was: those of Wrocław and Głogów.

The subsequent deep decline of Silesian coinage, which lasted until the second decade of the 15th century, corresponds with the lack of reports of silver mining

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161 Albrycht-Rapnicka *et al.* 1966.

162 Observations by Dawid Maciejczuk, pers. comm.

163 Kiersnowski 1966, p. 215.

164 Myśliwski 2006, pp. 282–283.

165 Kiersnowski 1966, p. 217.

166 Kiersnowski 1962, p. 239.

in this country. It was not until 1470 that we see attempts to re-create larger monetary standards in Silesia, but the local exploitation of silver in Gottesberg (Boguszów) appeared 20 years later. The sources of metal used for the 1470s coinage, in view of the political conflict between Silesia and Bohemia proper, remain to be found (Hungarian silver rather than Serbian might be suggested here).

(d) The Kingdom of Poland's endeavours for silver

Kwartniks were struck in Greater Poland as well, but in the remaining part of Poland at the beginning of the 14th century, domestic coinage consisted only of small, local pennies. These are found very rarely, so were probably minted in small amounts. Some increase in coinage volume can be seen in the Cracow mint during the reign of King Casimir the Great (1333–1370) from *c.*1340. This was perhaps a large amount of silver from King George II of Ruthenia's treasury, inherited by Casimir in 1340,[167] that was minted into his coins. Initially, the king struck pennies only. In the Kingdom of Poland that had been rebuilt without Silesia, Casimir made attempts to create larger monetary standards from the middle of the 14th century, achieving only partial success. "The reasons were, on the one hand, the lack of precious metals, and on the other hand, the excessively applied fiscalism. The lack of the metals made it impossible to throw a larger amount of good silver coin on the market, which would have ousted Prague groschen," Zdzisław Kaczmarczyk wrote.[168] Although it was bad money that was necessary to drive out good, even bad money needed silver to be coined in sufficient amounts. The main raw material base for Polish coinage in the second half of the 14th century was Hungarian silver, brought in exchange for Olkusz and Chęciny lead. Gold in the form of Hungarian florins came in exchange for salt mined in Wieliczka and Bochnia, but in Poland it retained its original coined form.[169] From the beginning of the 14th century, Cracow was a trade junction connecting the Baltic Sea basin with Hungarian copper mines.[170] There were still no active silver mines in the Kingdom of Poland at the beginning of the 15th century. In the memorial on monetary matters, addressed by the Cracow city council to King Wladislas II Jagiełło in 1406, we read: *quod in regno Polonie non habentur montana argenti neque argentum, nisi quantum mercatores huc adducunt…*[171]

Studies of the isotope characteristics of lead admixture in half-groschen of Wladislas II Jagiełło (1387–1434) indicate that in around 1398–1399 the source

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[167] *Ubi spolia multa in argento, auro et gemmis, thesaurum ducum antiquorum tollens* […] (Traska, p. 860). Zob. Paszkiewicz 1925, p. 57; Kaczmarczyk 1939, p. 198.

[168] Kaczmarczyk 1939, p. 192.

[169] Kaczmarczyk 1939, p. 187.

[170] Pieradzka 1935, p. 142.

[171] Cr.Art., p. 41, no. 154.

of the mint silver was changed, but the identity of the old and new sources has not been established.[172] The change might have been related to the then control of the Hungarian silver trade by Mark of Nuremberg, who imposed unprofitable, monopolistic prices.[173] Nuremberg merchants were interested in exporting Hungarian silver and gold to Italy and Upper Germany. This negatively impacted the precious metal supply of Poland and the Baltic countries.[174] Attempts at trade war undertaken by the Polish side at the turn of the 14th and 15th centuries in order to break the monopoly of the Nuremberg merchants only led to a temporary loss of the Hungarian market by Polish lead.[175] However, attention should also be paid to another exchangeable product: the company of Simon de Talentis and Andrzej Czarnysza sent a considerable amount of cloth to Košice in 1403, in exchange for silver.[176] Both partners were leaseholders of the royal mint of Cracow at that time,[177] and undoubtedly they needed silver for this business. The cloth, on the other hand, was of Flemish or English rather than Polish origin.[178] Silver was imported from Transylvania via Moldavia as well.[179]

The historian of Cracow trade, Stanisław Kutrzeba, based on the city records, considered the import of silver from Hungary at that time to be insignificant and he completely denied the contemporary import of silver from Bohemia.[180] Perhaps there was indeed no import of raw silver from the latter country, but the influx of monetary silver in the form of Prague groschen is well confirmed both by the presence of this coin in all kinds of deals, and by numerous finds[181] which in the 15th century also covered huge areas of the Grand Duchy of Lithuania.[182] The issue was summed up by Stanisława Kubiak by stating that in the times of Wladislas II Jagiełło and Wladislas III of Varna (1434–1444), silver used in the royal mint came from three sources: raw material purchases in Hungary, smelting old home coinage and smelting Czech groschen. Indeed, she did not find — as the present writer did not too — any contemporary trace of obtaining silver from domestic mines.[183] It follows that *the raw material base of the royal mint was the city of Cracow itself* as an important trade centre, linking Hungary with the markets of Western and Northern Europe, and Upper Germany and Bohemia with markets of East-

172 Zawadzki *et al.* 2018; Pańczyk *et al.* 2016.
173 Starzyński 2010, p. 189.
174 Małowist 1972, p. 596.
175 Kutrzeba 2009, pp. 240–241; Molenda 2001, pp. 56–57.
176 Piekosiński 1878, pp. 74–75; Kutrzeba 2009, p. 241.
177 Kubiak 1970, pp. 43–44; Pawlikowski 2018, pp. 30–32.
178 Kutrzeba 2009, p. 242.
179 Czołowski 1891, p. 23; Marynowski 2018, p. 195.
180 Kutrzeba 2009, p. 269.
181 Kubiak 1985, pp. 280–281.
182 Riabtsevich 1995, pp. 149–152.
183 Kubiak 1970, p. 126; further literature therein.

ern Europe. This situation made Polish coinage highly dependent on external factors and was the cause of the shortage of silver coins in the first half of the 15th century.

Finds and coin collections show that the early years of King Casimir II Jagiellon (1447–1492) reign were a long period of very modest emission of silver half-groschen. Still after the office of the Grand Treasurer of the Crown (responsible for the mint) was assumed by Piotr of Kurozwęki in 1479, the production volume of these coins remained on a moderate level, to increase rapidly only at the end of the king's reign.[184] Although the quality of these half-groschen was not high (fineness of *c*.400/1000),[185] such a coinage required a rich and durable raw material base. It can be assumed that this was provided by the metalworks at Mogiła near Cracow, established in 1469 by Jan Turzo and his partners. There, the entrepreneur used the technology he had developed to extract silver from so-called black copper, imported from Hungary. We do not know the efficiency of this smelter, but it was a large and long-standing enterprise.[186] Nevertheless, it did not eliminate other sources of imported silver.[187] Recently, Witold Borowski published a series of results of XRF tests of half-groschen from the years 1455–1479. These results do not reflect actual mint standards of these blanched coins, yet the data on trace elements may be instructive on the origin of silver.[188]

This state of affairs continued until the end of the 15th century, when silver from newly discovered deposits, including those located in the Polish Carpathians and the Silesian Sudetes, appeared on the market.

On 11 February 1503, the Crown Treasurer Jakub Szydłowiecki donated to the Poor Clares in Cracow the amount of two zlotys of silver freshly found in the Tatra Mountains as a good start to the mining work (*Item die Sabbato in crastino S. Scolasticae monialibus ad S. Andream ex argento minerarum noviter invento propter Deum 2 floreni dedi propter bonum inceptum laboris fortunii*).[189] This sum had to be paid in 120 half-groschen of King Alexander (Fig. 4), as the only coins struck at the time in the royal mint. It is — if we understand this record correctly — the oldest known direct evidence of the use of silver mined in Poland to strike Polish coins. Certainly, however, the domestic resources did not meet the mint's demand, since in 1502 and 1505 King Alexander (1501–1506) concluded contracts with Jan Turzo and Jan Bonar (Boner) for the supply of a total

184 Borowski 2025, p. 178.

185 Kubiak 1998, p. 129.

186 Molenda 1975; Lacko, Mayerová 2022, pp. 49–58.

187 E.g., in 1495, Agnolfus Tebaldi imported silver from an unspecified country for the king, paying 11,500 Hungarian florins (Kutrzeba, Ptaśnik 1912, p. 99, note 1). Judging by the sum paid and assuming the usual 15/16 fineness (Gumowski 1912, pp. 71–72), the amount of purchased silver was *c*.2,200 marks, i.e. *c*.440 kg.

188 Borowski 2025, pp. 62–64.

189 Lubomirski 1868, p. 10; Eljasz-Radzikowski 1902, pp. 19 and 47.

of 10,000 marks of pure silver to the Cracow mint.[190] Both suppliers were Cracow burghers, but Turzo was at the same time a well-known Hungarian mining and metallurgical entrepreneur,[191] and the owner of the Mogiła metalworks, whereas Bonar was the owner of a trading post in Košice. Thus the contracted silver was to come from Hungary[192] where Turzo exported Polish lead in return.[193] The silver might have been in the form of refined bars or the black copper to be processed at Mogiła.

Fig. 4. *Poland*, Alexander (1501–1506), half-groschen, no date, early variant, possibly 1502–1503. Cracow mint. Photo by Warsaw Numismatic Centre Marek Kondrat, online auction, lot no. 118533 (29 October 2015).

Ryc. 4. *Polska*, Aleksander (1501–1506), półgroszek bez daty, wczesna odmiana, przypuszczalnie 1502–1503. Mennica krakowska. Fot. Warszawskie Centrum Numizmatyczne Marek Kondrat, aukcja internetowa, oferta nr 118533 (29 października 2015)

King Alexander's successor, Sigismund I (1506–1548), proposed to the Estates of the Kingdom in 1517, to grant the Olkusz miners "the right to mint coin, [...] so that their work could lead to an advantageous result more easily and better."[194] We do not know what happened next with this project — there was not enough silver found in Olkusz lead ore then. In 1520, the king again asked Jan Bonar to bring (from a not indicated country, but it was undoubtedly Hungary) as much as 100,000 marks (twenty tons) of silver to the mint[195]—so the general situation did not change. Lesser amounts of silver continued to come to Poland from Kutná Hora in exchange for lead.[196]

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190 Piekosiński 1878, pp. 280–282; Lubomirski 1868, p. 11.

191 Pošvář 1980, pp. 195–197.

192 Pieradzka 1935, pp. 68–69 and 156–163.

193 Bovan 2002, pp. 98–99.

194 Grażyński 1912, pp. 49–51; for documents see: Reyman 1975, pp. 161–165.

195 *Acta Tomiciana* 5, p. 166, document no. 163, without day date, 1520.

196 Lacko, Mayerová 2022, pp. 45–148; Pošvář 1980, pp. 200–201.

Conclusion

Despite the scarcity of historical records of silver mining in Poland, thanks largely to archaeological discoveries, numismatic studies and, in some measure, metallographic analyses, it is possible to capture the moments in which the domestic deposits of silver, processed into coins or not, influenced the political and economic potential of medieval Poland.

The first of these occurred in the late 11th century and the first six or seven decades of the 12th century, when Polish silver coinage stood out from the general background of heavily debased Central-European coins. This phenomenon was most probably based on Bytom-Cracow silver deposits, and it was not an accident that in this very period the Church structures were rebuilt and developed, and Boleslas II as well as Boleslas III pursued an ambitious and expansionist policy. It is more difficult to explain why the subsequent rulers: Wladislas II, Boleslas IV and Mieszko III, while continuing to strike coins of almost fine silver (they therefore still had significant silver resources), clearly limited their external political activity.

There are grounds for guessing that the significant growth of Silesian coinage in the second half of the 13th century and at the beginning of the 14th century was — at least in part — thanks to local silver mining. This might have been a second moment of influence of silver mining on coinage and politics, but this conjecture requires stronger confirmation in future research.

The lack of sufficiently rich silver deposits within the borders of the Kingdom of Poland, as it had been rebuilt in the 14th century, explains the dependence of Polish coinage on potential silver imports and the technology of processing enriched ore in the late Middle Ages.

Despite the caution the writer has tried to exercise, archaeologists' conclusions about the production of silver may be overly optimistic. The interpretation of metallographic analyses, on the other hand, is highly debatable. In order to identify coins minted from domestic silver, we not only need a much larger number of tests, but also more careful argumentation and resistance to wishful thinking.

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Bibliography

Abbreviations and primary sources

Acta Tomiciana 5 — *Acta Tomiciana. Tomus Quintus Epistolarum, Legationum, Responsorum, Actionum et Rerum Gestarum Serenissimi Principis Sigismundi Primi, Regis Polonie et Magni Ducis Lithuanie*, S. Gorski (ed.), Posnaniae 1855.

CDP 1 — *Codex diplomaticus Poloniae* 1, J. Bartoszewicz (ed.), Warszawa 1858.

CDS — *Codex Diplomaticus Silesiae*.

Chr.stpol. — W. Wydra, R. Rzepka, *Chrestomatia staropolska. Teksty do roku 1543*, Wrocław 1984.

Cosmas — *Kosmova kronika česká*, transl. by K. Hrdina, M. Bláhová, Praha–Litomyšl 2005.

Cr.Art. — *Cracovia artificum 1300–1500*, J. Ptaśnik (ed.), Źródła do Historyi Sztuki i Cywilizacyi w Polsce IV, Kraków 1917.

Długosz 9 — Jan Długosz, *Roczniki czyli kroniki sławnego Królestwa Polskiego*, liber IX, 1300–1370, transl. by J. Mrukówna, Warszawa 2009.

Gallus — *Galli Chronicon*, A. Bielowski (ed.), [in:] MPH 1, Lwów 1864, pp. 391–484.

Hans.Ub. 3 — *Hansisches Urkundenbuch*, K. Höhlbaum (ed.), Bd. III, Halle 1882–1886.

KDKK 1 — *Kodeks dyplomatyczny katedry krakowskiej ś. Wacława, cz. I, obejmująca rzeczy od roku 1166 do roku 1366*, F. Piekosiński (ed.), Monumenta Medii Aevii Historica Res Gestas Poloniae Illustrantia I, Kraków 1874.

KDM — *Kodeks dyplomatyczny Małopolski*, F. Piekosiński (ed.), 3, *1333–1386*, Kraków 1887; 4, *1386–1450*, Kraków 1905, Monumenta Medii Aevii Historica Res Gestas Poloniae Illustrantia X and XVII.

Liebental — Nicolaus Liebental, *Rumor de submersione sacerdotum in Bythom*, [a note to the work:] *Gesta abbatum monasterii S. Vincentii*, [in:] G.A. Stenzel (ed.), *Scriptores rerum silesiacarum* 2, Breslau 1839, pp. 149–151.

MPH — *Monumenta Poloniae Historica*. *Pomniki Dziejowe Polski*.

MPV 1 — *Monumenta Poloniae Vaticana* 1, *Acta Camerae Apostolicae* 1, *1207–1344*, J. Ptaśnik (ed.), Cracovia 1913.

RSG — *Regesten zur schlesischen Geschichte*, Th. 1–3, *Bis zum Jahre* 1300, C. Grünhagen (ed.), CDS VII, Breslau 1884; *1301-1315*, C Grünhagen, C. Wutke (eds.), CDS XVI, Breslau 1892.

SBH — *Schlesiens Bergbau und Hüttenwesen*, *Urkunden (1136–1528)*, K. Wutke (ed.), CDS XX, Breslau 1900.

SG — *Słownik geograficzny Królestwa Polskiego i innych krajów słowiańskich*, vol. 1, F. Sulimierski, B. Chlebowski, W. Walewski (eds), Warszawa 1880; vol. 7, B. Chlebowski, W. Walewski (eds), Warszawa 1886.

SHG kr I/4 — *Słownik historyczno-geograficzny województwa krakowskiego w średniowieczu*, vol. I, part 4, J. Laberschek, Z. Leszczyńska-Skrętowa, F. Sikora, J. Wiśniewski (eds), Wrocław 1986.

Traska — *Rocznik Traski*, MPH II, A. Bielowski (ed.), Lwów 1872, pp. 826–861.

Vincentius — *Magistri Vincentii dicti Kadłubek Chronica Polonorum*, M. Plezia (ed.), MPH nova series XI, Kraków 1994.

ZDM 1 — *Zbiór dokumentów małopolskich*, 1, *Dokumenty z lat 1257–1420*, S. Kuraś (ed.), Wrocław 1962.

Secondary studies

Adamczyk D. 2017. *Pieniądz czy strategiczny instrument władzy? Obieg kruszcu w społeczeństwie piastowskim przełomu XI i XII wieku, załamanie w dopływie denarów z Saksonii a ekspansja Bolesława Krzywoustego na Pomorze*, Przegląd Zachodniopomorski XXXII/2, pp. 143–167.

Adamczyk D. 2018. *Srebro i władza. Trybuty i handel dalekosiężny a kształtowanie się państwa piastowskiego i państw sąsiednich w latach 800–1100*, Warszawa.

Adamczyk D. 2020. *Monetarisierungsmomente, Kommerzialisierungszonen oder fiskalische Währungslandschaften? Edelmetalle, Silberverteilungsnetzwerke und Gesellschaften in Ostmitteleuropa (800–1200)*, Wiesbaden.

Albrycht-Rapnicka *et al.* 1966. D. Albrycht-Rapicka, J. Smacka, J. Szwagrzyk, M. Haisig, J. Modrzyński, *Materiały do inwentaryzacji kwartników śląskich*, Wiadomości Numizmatyczne X/4, pp. 221–236.

Allen M. 2012. *Mints and Money in Medieval England*, Cambridge.

Andrzejewska A. 2004. *Początki miasta lokacyjnego Bytomia w świetle badań archeologicznych*, [in:] D. Abłamowicz, M. Furmanek, M. Michnik (eds), *Początki i rozwój miast Górnego Śląska. Studia interdyscyplinarne*, Gliwice, pp. 215–220.

Berska B. 2013. *Projekt „Polska rozproszona. Program zabezpieczania polskiego dziedzictwa archiwalnego za granicą"*, Przegląd Archiwalny Instytutu Pamięci Narodowej 6, pp. 299–304.

Bieniak J. 2003. *Powstanie księstwa opolsko-raciborskiego jako wyraz przekształcania się Polski w dzielnicową poliarchię,* [in:] A. Pobóg-Lenartowicz (ed.), *Sacra Silentii provincia. 800 lat dziedzicznego Księstwa Opolskiego (1202–2002)*, Opole, pp. 37–81.

Biniaś-Szkopek M. 2009. *Bolesław IV Kędzierzawy — książę Mazowsza i princeps*, Poznań.

Blanchard I. 2001. *Mining, Metallurgy and Minting in the Middle Ages*, vols. 1–2, Stuttgart.

Bodnar *et al.* 2006. R. Bodnar, L. Krudysz, D. Rozmus, B.S. Szmoniewski, *Wczesnośredniowieczna ceramika szkliwiona z Dąbrowy Górniczej-Łośnia. „Skarb hutnika"*, Kraków — Dąbrowa Górnicza.

Bogucki M. 2022. *New types of the oldest Polish coins*, Wiadomości Numizmatyczne LXVI (210) (Polish Numismatic News X), pp. 181–197.

Bogucki M., Magiera J. 2015. *New coins of Bolesław the Brave*, Wiadomości Numizmatyczne LIX/1–2 (Polish Numismatic News IX), pp. 115–128.

Boroń P. 2013a. *Problematyka badań nad wczesnośredniowiecznym ośrodkiem górnictwa i hutnictwa srebra i ołowiu na pograniczu śląsko-małopolskim*, [in:] P. Boroń (ed.), *Argenti fossores et alii. Znaczenie gospodarcze wschodnich części Górnego Śląska i zachodnich krańców Małopolski w późnej fazie wczesnego średniowiecza (X–XII wiek)*, Wrocław, pp. 15–30.

Boroń P. 2013b. *Where did the Piasts take silver from? The research on metallurgy and mining centre on the border of Silesia and Lesser Poland in the early Middle Ages*, [in:] M. Bogucki, M. Rębkowski (eds), *Wolińskie Spotkania Mediewistyczne II: Economies, Monetisation and Society in the West Slavic lands 800–1200 AD*, Szczecin, pp. 209–221.

Borowski W. 2025. *Monety koronne Kazimierza IV Jagiellończyka 1447–1492*, Sieraków.

Bovan M. 2002. *Ján a Juraj Turzovci ako nájomcovia kremnickej banskej a mincovej komory*, Slovenská numizmatika 16, pp. 87–112.

Chabrzyk P., Młodecka H. 2012. *Polskie czy obce? Placki i siekańce srebrne z wybranych skarbów wczesnośredniowiecznych*, [in:] W. Garbaczewski, R. Macyra (eds), *Pieniądz i banki na Śląsku*, Poznań, pp. 111–130.

Chróst L. n.d. *Określenie intensywności dawnej produkcji srebra i ołowiu w rejonie Tarnowskich Gór w oparciu o pomiary depozycji ołowiu w torfowiskach*, <https://docplayer.pl/12196761-Okreslenie-intensywnosci-dawnej-produkcji-srebra-i-olowiu-w-rejonie-tarnowskich-gor.html> [accessed 9.10.2020].

Czołowski A. 1891. *Sprawy wołoskie w Polsce do r. 1412*, Lwów.

Dąbrowski F. 2007. *Studia nad administracją kasztelańską Polski XIII wieku*, Warszawa.

Delestowicz N. 2016. *Bolesław II Szczodry. Tragiczne losy wielkiego wojownika. 1040/1042–2/3 IV 1081 albo 1082*, Kraków.

Duczko W. 2018. *Post-wielkomorawski fenomen. Wczesnośredniowieczna sztuka złotnicza w środkowej i wschodniej Europie*, [in:] B. Gediga, A. Grossman, W. Piotrowski (eds), *Inspiracje i funkcje sztuki pradziejowej i wczesnośredniowiecznej*, Biskupin–Wrocław, pp. 535–547.

Duczko W. 2020. *Srebro pierwszych Piastów. Uwagi w związku z książką Dariusza Adamczyka*, Kwartalnik Historyczny 127/2, pp. 355–367.

Duczko W., Miśta-Jakubowska E., Czech-Błońska R. 2022. *Metale — ozdoby — historia. Relacje słowiańskich i skandynawskich elit w epoce wikingów. Metals — Ornaments — History. Contacts of Slavic and Scandinavian Elites in the Viking Age*, Wrocław, [actually released in March 2025].

Duerschlag I., Duerschlag J. 2016. *Koncepcja zagospodarowania odkrytej w dniu 13 XI 2015 r. kopalni srebra w Srebrnej Górze oraz terenu w jej otoczeniu*, [in:] P.P. Zagożdżon *et al.* (eds), *Materiały I. Warsztatów. Dziedzictwo i historia górnictwa. Złoty Stok, 14–15 IV 2016*, Wrocław, pp. 14–16.

Dzieduszycki W. 1995. *Kruszce w systemach wartości i wymiany społeczeństwa Polski wczesnośredniowiecznej*, Poznań.

Dziekoński T. 1972. *Wydobywanie i metalurgia kruszców na Dolnym Śląsku od XIII do połowy XX wieku*, Wrocław.

Eljasz-Radzikowski S. W. 1902. S. W. Eljasz z Radzikowa Ogończyk Radzikowski, *Góry srebrne w Tatrzech otwarte R. P. 1502 w czterechsetną rocznicę*, Kraków.

Garbacz-Klempka *et al.* 2013a. A. Garbacz-Klempka, A. Łukaszczyk, D. Rozmus, J. Tokaj, *„Skarb hutnika" w świetle badań metaloznawczych*, [in:] P. Boroń (ed.), *Argenti fossores et alii. Znaczenie gospodarcze wschodnich części Górnego Śląska i zachodnich krańców Małopolski w późnej fazie wczesnego średniowiecza (X–XII wiek)*, Wrocław, pp. 203–223.

Garbacz-Klempka *et al.* 2013b. A. Garbacz-Klempka, S. Rzadkosz, T. Stolarczyk, J. Kozana, M. Piękoś, *Archaeological remains of the copper metallurgy in Lower Silesia*, Metallurgy and Foundry Engineering 39/2, pp. 29–36.

Garbaczewski W. 2018. *Czy Bolesław Krzywousty w ostatnich latach swego panowania przeprowadził reformę monetarną?*, [in:] W. Garbaczewski, R. Macyra (eds), *Pieniądz i banki w Małopolsce*, Poznań, pp. 113–134.

Gawlas S. 2015. *Ustrojowe i społeczne uwarunkowania lokacji miejskich na ziemiach polskich w 1. połowie XIII wieku*, Archaeologia Historica Polona 23, pp. 7–56.

Gliński W. 2018. *Królewski zamek w Chęcinach w relacjach dziejopisów, krajoznawców, artystów oraz w świetle badań architektów i archeologów*, [in:] B. Wojciechowska, S. Konarska-Zimnicka (eds), *Zamek królewski w Chęcinach na tle Europy Środkowej. Geneza — funkcje — znaczenie*, Kielce, pp. 11–74.

Godzik B., Woch M.W. 2015. *History of mining in the Olkusz region*, [in:] B. Godzik (ed.), *Natural and historical values of the Olkusz Ore-bearing Region. Przyrodnicza i historyczna wartość Olkuskiego Okręgu Rudnego*, Kraków, pp. 29–36.

Gorlińska D. 2015. *Żydzi w administracji skarbowej polskich władców czasu rozbicia dzielnicowego*, Kraków.

Górecki P. 2016. *The Duke as Entrepreneur: The Piast Ruler and the Economy of Medieval Poland*, [in:] J. Hudson, S. Crumplin (eds), *The Making of Europe: Essays in Honour of Robert Bartlett*, Leiden-Boston, pp. 96–122.

Grażyński M. 1912. *Projekt przyznania prawa bicia monety gwarkom olkuskim w r. 1517*, Wiadomości Numizmatyczno-Archeologiczne 4/4, pp. 49–51.

Grodecki R. 1933. *Początki pieniężnego skarbu państwowego w Polsce*, Wiadomości Numizmatyczno-Archeologiczne 15, pp. 1–32.

Gumowski M. 1912. *Moneta złota w Polsce średniowiecznej*, Kraków.

Hadamik C. 2005. *Zamek królewski w Chęcinach: archeologiczne przesłanki do kwestii jego genezy i pierwotnej funkcji*, [in:] L. Kajzer (ed.), *Późnośredniowieczne zamki na terenie dawnego województwa sandomierskiego*, Kielce, pp. 145–170.

Hadamik C. 2017. *O problemie genezy eksploatacji świętokrzyskich rud ołowiu w średniowieczu*, Kielecka Teka Skansenowska 3, pp. 10–22.

Hereditas 2015. *Historia, udostępnienie i wyniki wstępnych badań kopalni srebra w Srebrnej Górze*, Hereditas Minariorum 2, pp. 179–188.

Hrnjić *et al.* 2021. M. Hrnjić, S. Röhrs, A. Denker, B. Weisser, C. Stoess, M. Matosz, J.M. del Hoyo-Meléndez, *Multi-technical study of silver denars from medieval Poland for an improved understanding of their archaeological context and provenance*, Archaeometry 63/3, pp. 609–626.

Jaworski K. 2020. *On the silver slopes of High Forest. Political and economic history of the western part of the Wałbrzych region in the Middle Ages and modern times*, [in:] B. Paszkiewicz (ed.), *A hoard of fourteenth and fifteenth century Prague groschen from Boguszów (the so-called Wałbrzych hoard)*, Wrocław, pp. 25–37.

Jodłowski A. 1969. *Problem eksploatacji soli w okolicach Krakowa w starożytności i we wczesnym średniowieczu*, Archeologia Polski 14/1, pp. 137–165.

Jodłowska A. 1981. *Początki eksploatacji soli w Wieliczce i Bochni (do końca XIII wieku)*, Kraków.

Kaczmarczyk Z. 1939. *Monarchia Kazimierza Wielkiego* 1*, Organizacja państwa*, Poznań.

Kędzierski A. 1998. *Polskie denary krzyżowe w skarbie ze Słuszkowa*, Wiadomości Numizmatyczne XLII/1–2, pp. 21–48.

Kędzierski A., Wyczółkowski D. 2017. *Skarb placków srebrnych z Kalisza-Dobrzeca* [sic!]. *Nowe możliwości badawcze problemu srebra lanego*, [in:] M. Bogucki, W. Garbaczewski, G. Śnieżko (eds), *Nummi et humanitas. Studia ofiarowane Profesorowi Stanisławowi Suchodolskiemu w 80 rocznicę urodzin*, Warszawa, pp. 331–351.

Kiersnowski R. 1960. *Pieniądz kruszcowy w Polsce wczesnośredniowiecznej*, Warszawa.

Kiersnowski R. 1962. *Kwartniki śląskie i czeskie grosze*, Wiadomości Numizmatyczne VI/3–4, pp. 225–244.

Kiersnowski R. 1966. *W sprawie genezy kwartników śląskich*, Wiadomości Numizmatyczne X/4, pp. 197–218.

Kiryk F. 2013. *Miasta małopolskie w średniowieczu i czasach nowożytnych*, Kraków [first published in 1976].

Korta W. 1982. *Problem niewolnictwa w Polsce wczesnośredniowiecznej*, [in:] S. Kuczyński (ed.), *Społeczeństwo Polski średniowiecznej. Zbiór studiów* 2, Warszawa, pp. 82–124.

Kowalski M.D. 2022. *Nieznany dokument Mieszka Plątonogiego z 1207–1211 r. Zbrojny powrót synów Władysława Wygnańca na Śląsk*, Studia Źródłoznawcze 60, pp. 111–123.

Koziorowska L. 2002. *Materiały złotnicze w świetle wyników analiz składu chemicznego srebrnych przedmiotów antycznych i wczesnośredniowiecznych*, Archeologia Polski 47/1–2, pp. 101–204.

Koziorowska L. 2007. *Origin of the raw material for silver ornaments: using the results of chemical composition studies*, Archaeologia Polona 45, pp. 113–115 + 2 tables.

Książek K. 2019. *Denar typu Stronczyński 54, ostatnia moneta Bolesława Kędzierzawego?*, Wiadomości Numizmatyczne LXIII (207), pp. 63–111.

Książek *et al.* 2013. K. Książek, M. Krąpiec, B. Łydżba-Kopczyńska, H. Młodecka, *Skarb średniowieczny z Głogowa. Analizy specjalistyczne i konserwacja wybranych zabytków*, Głogów.

Kubiak S. 1970. *Monety pierwszych Jagiellonów (1386–1444)*, Wrocław.

Kubiak S. 1985. *Udział monet zagranicznych w obiegu pieniężnym w Królestwie Polskim w XV wieku*, [in:] S.K. Kuczyński, S. Suchodolski (eds), *Nummus et historia. Pieniądz Europy średniowiecznej*, Warszawa, pp. 277–287.

Kubiak S. 1998. *Monety koronne z 2. połowy XV w. (1447–1506)*, Wiadomości Numizmatyczne XLII/3–4, pp. 117–181.

Kubicki R., Saletra W. 2013. *Hutnictwo i górnictwo w regionie świętokrzyskim — do Księstwa Warszawskiego*, [in:] Z. Kałamaga, A. Szplit (eds), *Nauki dla zarządzania. Od czasów Adamieckiego do współczesności. 200-lecie Huty w Ostrowcu Świętokrzyskim*, Kielce, pp. 29–40.

Kula W. 2004. *Miary i ludzie*, Warszawa [first published in 1970].

Kurtyka J. 1997. *Tęczyńscy. Studium z dziejów polskiej elity możnowładczej w średniowieczu*, Kraków.

Kurtyka J. 2001. *Odrodzone Królestwo. Monarchia Władysława Łokietka i Kazimierza Wielkiego w świetle nowszych badań*, Kraków.

Kutaś P. 2005. *Górnictwo kruszcowe w Tatrach polskich do I rozbioru Rzeczypospolitej*, Kraków.

Kutrzeba S. 2009. *Finanse i handel średniowiecznego Krakowa*, Kraków [first published in 1903].

Kutrzeba S., Ptaśnik J. 1912. *Dzieje handlu i kupiectwa krakowskiego*, Rocznik Krakowski 14.

Labuda G. 2012. *Pierwsze wieki monarchii piastowskiej*, Poznań.

Lacko M., Mayerová E. 2022. *Der Thurzo-Kodex — eine einzigartige Quelle zum europäischen Bergrecht und Münzwesen um 1500*, Vienna.

Lalik T. 2006. *Studia średniowieczne*, Warszawa.

Lewicka-Rajewska U. 2004. *Arabskie opisanie Słowian*, Wrocław.

Lubomirski J.T. 1868. *Trzy rozdziały z historyi skarbowości w Polsce 1507–1532*, Kraków.

Malmer B. 1966. *Nordiska mynt före år 1000*, Lund.

Małecki A. 1894. *Studyum nad bullą Inocentego II. z roku 1136, wydaną dla arcybiskupstwa gnieźnieńskiego*, Roczniki Towarzystwa Przyjaciół Nauk Poznańskiego 20, pp. 371–423.

Małowist M. 1931. *Le développement des rapports économiques entre la Flandre la Pologne et les pays limitrophes du XIIIe au XIVe siècle*, Revue belge de Philologie et d'Histoire 10/4, pp. 1013–1065.

Małowist M. 1972. *Górnictwo w średniowiecznej Europie Środkowej i Wschodniej jako element struktur społeczno-gospodarczych w XII–XV w.*, Przegląd Historyczny 53/4, pp. 589–604.

Marynowski M. 2018. *Kupcy z Polski na mołdawskich i siedmiogrodzkich szlakach handlowych w XV–XVIII wieku. Historiografia i źródła rumuńskojęzyczne*, Przemyśl.

Matla-Kozłowska M. 2008. *Pierwsi Przemyślidzi i ich państwo (od X do połowy XI wieku). Ekspansja terytorialna i jej polityczne uwarunkowania*, Poznań.

Matras M. 1959. *Prace górniczo-hutnicze w okolicy Szczawnicy do połowy XVIII wieku*, Studia z dziejów górnictwa i hutnictwa 3, J. Pazdur (ed.), Warszawa–Wrocław, pp. 103–236.

Mączka M., Stysz M. 2006. *Relikty dawnych robót górniczych w Górach Sowich — wykorzystanie materiałów archiwalnych do lokalizacji i udokumentowania wyrobisk*, Prace Naukowe Instytutu Górnictwa Politechniki Wrocławskiej 117, pp. 215–226.

Menadier J. 1902. *Zwei märkische Denarfunde*, Zeitschrift für Numismatik 23, pp. 223–272.

Merkel S.W. 2016. *Silver and the Silver Economy at Hedeby*, Bochum.

Mikoś T. 2008. *Górnicze skarby przeszłości. Od kruszcu do wyrobu i zabytkowej kopalni*, Kraków.

Mikoś *et al.* 2022. T. Mikoś, A. Szumiński, J. Tichanowicz, A. Szumska, *Złoty Stok: fascynujące dzieje górniczego miasta. Kalendarium wydarzeń górniczo-hutniczych ośrodka produkcji złota i arsenu do czasu likwidacji kopalni*, T. Mikoś (ed.), Kraków-Złoty Stok.

Miśta-Jakubowska E. 2022. *Microanalysis of early medieval archaeological objects made of silver alloy*, Wiadomości Numizmatyczne LXVI (210) (Polish Numismatic News X), pp. 111–139.

Miśta-Jakubowska *et al.* 2019a. E.A. Miśta-Jakubowska, R. Czech-Błońska, W. Duczko, A.M. Gójska, P. Kalbarczyk, A. Turos, G. Żabiński, M. Widawski, *Origin and Production of Silver in Early Medieval Poland*, Archaeologia Polona 57, pp. 241–255.

Miśta-Jakubowska *et al.* 2019b. E. Miśta-Jakubowska, R. Czech-Błońska, W. Duczko, A.M. Gójska, P. Kalbarczyk, G. Żabiński, K. Trela, *Archaeometric studies on early medieval silver jewellery from Central and Eastern Europe*, Archaeological and Anthropological Sciences 11, pp. 6705–6723. <https://link.springer.com/article/10.1007/s12520-019-00935-z> [accessed 26.10.2020].

Miśta-Jakubowska *et al.* 2024. E. Miśta-Jakubowska, W. Duczko, A.B. Kowalska, R. Czech-Błońska, R. Mathur, A. Gójska, D. Rozmus, R. Siuda, D. Oleszak, A. Brojanowska, J. Klimaszewski, *Amulets from Viking-age Baltic coast: A unique hoard from*

Piaski-Dramino (Poland) in the light of provenance and technological research of silvercraft art, Journal of Archaeological Science: Reports 53, 104356.

Młodecka H., Chabrzyk P. 2010. *Analiza XRF denarów Bolesława Chrobrego i jego syna Mieszka Bolesławowica w świetle wybranych monet z przełomu X i XI wieku*, Biuletyn Numizmatyczny 2–3, pp. 93–106, 161–178.

Modzelewski K. 1975. *Dziedzictwo plemienne w ustroju Polski piastowskiej*, Kwartalnik Historii Kultury Materialnej 23/3, pp. 351–383.

Molenda D. 1963. *Górnictwo kruszcowe na terenie złóż śląsko-krakowskich do połowy XVI wieku*, Wrocław.

Molenda D. 1975. *W sprawie badań huty miedzi w Mogile pod Krakowem w XV i XVI wieku*, Przegląd Historyczny 66/3, pp. 369–382.

Molenda D. 2001. *Polski ołów na rynkach Europy Środkowej w XIII–XVII wieku*, Warszawa.

Myśliwski G. 2006. *Strefa sudecko-karpacka i Lwów. Miejsce Śląska, Małopolski i Rusi Czerwonej w gospodarce Europy Zachodniej (połowa XIII–początek XVI wieku)*, [in:] R. Czaja *et al.* (eds), *Ziemie polskie wobec Zachodu. Studia nad rozwojem średniowiecznej Europy*, Warszawa, pp. 247–319.

Obara-Pawłowska A. 2014. *Polityka gospodarcza Władysława Łokietka*, Lublin.

Okniński P. 2019. *Miasto górnicze Chęciny w późnym średniowieczu*, [in:] A. Barciak (ed.), *Miasta górnicze i górnictwo w Europie Środkowej. Pamięć — dziedzictwo — tożsamość*, Katowice–Zabrze, pp. 165–172.

Pańczyk *et al.* 2015. E. Pańczyk, B. Sartowska, L. Waliś, J. Dudek, W. Weker, M. Widawski, *The origin and chronology of medieval silver coins based on the analysis of chemical composition*, Nukleonika 60/3, pp. 657–663.

Pańczyk *et al.* 2016. E. Pańczyk, J. Kierzek, L. Waliś, M. Zawadzki, M. Widawski, W. Weker, *Characterization of silver Władysław Jagiełło crown half-groschen made by the Polish mint in Kraków in 1394–1434 by the X-ray fluorescence method*, Annual Report, Institute of Nuclear Chemistry and Technology, pp. 87–93.

Paszkiewicz H. 1925. *Polityka ruska Kazimierza Wielkiego*, Warszawa.

Paszkiewicz B. 2000. *Pieniądz górnośląski w średniowieczu*, Lublin.

Paszkiewicz B. 2015. *Metallographic characterisation of coins from Giecz, site 4*, [in:] T. Krysztofiak, A.M. Wyrwa (eds), *Monety ze stanowiska nr 4 w Gieczu. Coin finds from Giecz, site 4*, 1, Lednica, pp. 185–208.

Paszkiewicz B. 2021. *Półgrosze z tatrzańskiego srebra*, Warszawski Pamiętnik Numizmatyczny 9, pp. 95–105.

Paulewicz M. 1992. *Chęcińskie górnictwo kruszcowe (XIV do poł. XVII wieku)*, Kielce.

Pawełczyk *et al.* 2017. F. Pawełczyk, L. Chróst, T. Magiera, A. Michczyński, J. Sikorski, K. Tudyka, E. Zając, *Radiocarbon and lead-210 age-depth model and trace elements concentration in the Wolbrom fen (S Poland)*, Geochronometria 44, pp. 40–48.

Pawełczyk F., Okupny D., Michczyński A. 2018. *Zróżnicowanie zawartości pierwiastków śladowych w osadach torfowisk Wolbrom i Otrębowskie Brzegi odzwierciedleniem wpływu antropopresji*, Acta Geographica Lodziensia 107, pp. 175–190.

Pawlikowski M., Wróbel M. 2013. *Rediscovering old mining activities in the Tatra Mountains*, Geotourism 1–2 (32–33), pp. 37–46.

Pawlikowski S. 2018. *Półgrosze koronne Władysława Jagiełły 1394–1414*, Łódź.

Pazdur J. 1968. *La provenance des métaux de monnayage dans le haut Moyen Âge en Pologne*, [in:] W. Hensel (ed.), *I Międzynarodowy Kongres Archeologii Słowiańskiej. Warszawa 14–18 IX 1965,* 6, Wrocław–Warszawa–Kraków, pp. 301–305.

Peukert W.-E. 1929. *Walen und Venediger*, Mitteilungen der Schlesischen Gesellschaft für Volkskunde 30, pp. 205–247.

Piekosiński F. 1878. *O monecie i stopie menniczéj w Polsce w XIV i XV wieku*, Rozprawy i Sprawozdania z Posiedzeń Wydziału Historyczno-Filozoficznego Akademii Umiejętności 9, pp. 1–320.

Piekosiński F. 1898. *Moneta polska w dobie piastowskiej*, Rozprawy Akademii Umiejętności. Wydział Historyczno-Filozoficzny II/10, pp. 387–409.

Pieradzka K. 1935. *Handel Krakowa z Węgrami w XVI w.*, Biblioteka Krakowska 87, Kraków.

Piniński J. 2020. *Is the penny of the Stronczyński 54 type a coin in the name of Duke Bolesław IV the Curly? On the penny coinage issued in Silesia in the second half of the 12th century*, Wiadomości Numizmatyczne LXIV (208), pp. 109–121.

Podyma D. 2007. *Bytomskie szyby górnicze z okresu średniowiecza*, Rocznik Muzeum Górnośląskiego w Bytomiu. Archeologia 17, pp. 83–90.

Pošvář J. 1980. *Kutnohorská mincovna a Jan Turzo*, Slovenská numizmatika 6, pp. 195–204.

Pytel R. 1970. *Wzmianka o Olkuszu oraz kopalniach złota, srebra i soli w Polsce z XI wieku*, Slavia Antiqua 17, pp. 171–177.

Rajman J. 1998. *Pogranicze śląsko-małopolskie w średniowieczu*, Kraków.

Rajman J. 2003. *Książę Mieszko Plątonogi jako twórca księstwa opolskiego*, [in:] A. Pobóg-Lenartowicz (ed.), *Sacra Silentii provincia. 800 lat dziedzicznego Księstwa Opolskiego (1202–2002)*, Opole, pp. 83–91.

Rajman J. 2004. *Kraków. Zespół osadniczy. Proces lokacji. Mieszczanie do roku 1333*, Kraków.

Rajman J. 2011. *Utworzenie księstw raciborskiego i opolskiego. Z problematyki pierwszego podziału Śląska w drugiej połowie XII wieku*, Wieki Stare i Nowe 3 (8), pp. 59–88.

Reyman J. 1975. *Mennica olkuska 1579–1601*, Wrocław.

Riabtsevich V.N. 1995. *Numizmatika Belarusi*, Minsk.

Rosik S. 2013. *Bolesław Krzywousty*, Wrocław.

Rozmus D. 2002. *Czy Olkusz ma coś wspólnego z biblijnym Ha-'Elqoš?*, Slavia Antiqua 43, pp. 97–132.

Rozmus D. 2009. *O nazwie Olkusz słów kilka*, Ilcusiana 1, pp. 6–21.

Rozmus D. 2013a. *Elementy infrastruktury hutniczej na wczesnośredniowiecznych stanowiskach do wytopu srebra i ołowiu na pograniczu obecnego Śląska i Małopolski na przykładzie Dąbrowy Górniczej-Łośnia i Sosnowca-Zagórza*, [in:] P. Boroń (ed.), *Argenti fossores et alii. Znaczenie gospodarcze wschodnich części Górnego Śląska i zachodnich krańców Małopolski w późnej fazie wczesnego średniowiecza (X–XII wiek)*, Wrocław, pp. 115–149.

Rozmus D. 2013b. *Konsekwencje istnienia wczesnośredniowiecznej metalurgii srebra i ołowiu na obszarach obecnego pogranicza Śląska i Małopolski*, [w:] P. Boroń (ed.), *Argenti fossores et alii. Znaczenie gospodarcze wschodnich części Górnego Śląska i zachodnich krańców Małopolski w późnej fazie wczesnego średniowiecza (X–XII wiek)*, Wrocław, pp. 261–271.

Rozmus D. 2014. *Wczesnośredniowieczne zagłębie hutnictwa* [sic!] *srebra i ołowiu na obszarach obecnego pogranicza Górnego Śląska i Małopolski (druga połowa XI–XII/XIII wiek)*, Kraków.

Rozmus D., Suchodolski S., Tokaj J. 2014. *Wczesnośredniowieczny „skarb hutnika" z Dąbrowy Górniczej-Łośnia. Monografia. Część 1. Early Medieval "Metallurgist Hoard" from Dąbrowa Górnicza-Łosień. A Monograph. Part 1*, Dąbrowa Górnicza.

Samsonowicz H. 1974. *Handel dalekosiężny na ziemiach polskich w świetle najstarszych taryf celnych*, [in:] S. Herbst *et al.* (eds), *Społeczeństwo. Gospodarka. Kultura. Studia ofiarowane Marianowi Małowistowi w czterdziestolecie pracy naukowej*, Warszawa, pp. 289–302.

Sobota-Liwoch K., Sych D. 2013. *Wczesnośredniowieczne hutnictwo ołowiu i srebra w kontekście stanowiska nr 5 w Sosnowcu-Zagórzu*, [in:] P. Boroń (ed.), *Argenti fossores et alii. Znaczenie gospodarcze wschodnich części Górnego Śląska i zachodnich krańców Małopolski w późnej fazie wczesnego średniowiecza (X–XII wiek)*, Wrocław, pp. 91–97.

Spufford P. 1988. *Money and Its Use in Medieval Europe*, Cambridge.

Starzyński M. 2010. *Krakowska rada miejska w średniowieczu*, Kraków.

Stolarczyk T. 2013. *Wyniki badań reliktów dawnego górnictwa miedzi na terenie Pogórza Kaczawskiego w roku 2012*, [in:] P.P. Zagożdżon, M. Madziarz (eds), *Dzieje górnictwa – element europejskiego dziedzictwa kultury* 5, Wrocław, pp. 339–351.

Stolarczyk T. 2020. *Relikty górnictwa i wstępnej obróbki rud*, [in:] J. Piekalski (ed.), *Historyczny krajobraz kulturowy zachodnich Sudetów. Wstęp do badań*, Wrocław, pp. 395–478.

Stolarczyk T., Madziarz M. 2021. *Mining of non-ferrous metal ores in the valley of the Bystrzyca river in relation to Grodno Castle*, Architectus 4 (68), pp. 97–106.

Stysz M., Szychowska-Krąpiec E. 2016. *Dawne górnictwo Srebrnej Góry w badaniach dendrochronologicznych i radiowęglowych; sztolnia Amalie — próba datowania wyrobiska*, [in:] P.P. Zagożdżon *et al.*(eds), *Materiały I. Warsztatów. Dziedzictwo i historia górnictwa. Złoty Stok, 14–15 IV 2016*, Wrocław, pp. 54–57.

Suchodolski S. 1967. *Moneta polska w X i XI wieku*, Wiadomości Numizmatyczne XI/2–3, pp. 65–193.

Suchodolski S. 1973. *Mennictwo polskie w XI i XII wieku*, Wrocław.

Suchodolski S. 2013. *W sprawie pochodzenia srebra w monetach polskich z XI–XII wieku*, [in:] P. Boroń (ed.), *Argenti fossores et alii. Znaczenie gospodarcze wschodnich części Górnego Śląska i zachodnich krańców Małopolski w późnej fazie wczesnego średniowiecza (X–XII wiek)*, Wrocław, pp. 257–260.

Suchodolski S. 2014. *Mennictwo Bolesława Kędzierzawego w świetle skarbu z miejscowości Dąbrowa-Górnicza-Łosień*, [in:] D. Rozmus, S. Suchodolski, J. Tokaj, *Wczesnośredniowieczny „skarb hutnika" z Dąbrowy Górniczej-Łośnia. Monografia. Część 1. Early Medieval "Metallurgist Hoard" from Dąbrowa Górnicza-Łosień. A Monograph. Part 1*, Dąbrowa Górnicza, pp. 27–33.

Suchodolski S. 2015. *The beginnings of Polish coinage in the light of recent research*, Wiadomości Numizmatyczne LIX/1–2 (Polish Numismatic News IX), pp. 67–94.

Suchodolski S. 2022. *A new/old coin type of Bolesław I the Brave, and a hoard that was not there*, Wiadomości Numizmatyczne LXVI (210) (Polish Numismatic News X), pp. 167–180.

Szczurek T. 2007. *Obrót pieniężny w Nowej Marchii w okresie askańskim (ok. 1250–1319) w świetle mennictwa krajów niemieckich*, Warszawa.

Szydłowski J. 1998. *Item Villa ante bitom…*, [in:] H. Kóčka-Krenz, W. Łosiński (eds), *Kraje słowiańskie w wiekach średnich. Profanum i sacrum*, Poznań, pp. 341–348.

Śnieżko G. 2021. *Moneta w Polsce za panowania Bolesława III Krzywoustego*, Warszawa.

TOS 2016. *Wykopaliska archeologiczne w Zagórzu*, Sosnowiec Nasze Miasto, 17 August. <https://sosnowiec.naszemiasto.pl/wykopaliska-archeologiczne-w-zagorzu-zdjecia/ar/c13-3829848> [accessed 2.10.2020].

Trawkowski S. 2005. *Opuscula medievistica. Studia nad historią społeczną Polski wczesnopiastowskiej*, Warszawa.

Ungerman Š. 2022. *Die Herkunft und Provenienz des Luxusschmucks in den Hacksilberschätzen des nördlichen westslawischen Raums – Bemerkungen zu Forschungsstand, Quellenbasis und Methoden*, [in:] F. Biermann, A. Kieseler, E. Pernicka, J. von Richthofen (eds), *Frühmittelalterliches Hacksilber im nördlichen westslawischen Raum. Archäologie und Archäometallurgie. Beiträge der internationalen Konferenz im Kulturhistorischen Museum Görlitz, 18./19. Oktober 2019. Ergebnisse des Projektes „Hacksilberschätze im Oder-Neiße-Raum"* 1, Bonn, pp. 209–262.

Wachowski K. 2002. *System wagowo-pieniężny i obrachunkowy na Dolnym Śląsku po reformie Henryka III Białego*, Wiadomości Numizmatyczne XLVI/1, pp. 59–66.

Wenta J. 2010. *Dlaczego Bamberg, dlaczego Nordgau?*, [in:] A. Bartoszewicz *et al.* (eds) *Świat średniowiecza. Studia ofiarowane Profesorowi Henrykowi Samsonowiczowi*, Warszawa, pp. 483–491.

Witkowski S. 2009. *Górnictwo srebra i ołowiu w świetle Bulli Gnieźnieńskiej z 1136 roku. Lokalizacja osady Zversov*, [in:] D. Rozmus, S. Witkowski (eds), *Gospodarka nad Przemszą i Brynicą od pradziejów do początków XX wieku w świetle badań interdyscyplinarnych*, Dąbrowa Górnicza, pp. 150–162.

Wyrozumska B. 1977. *Drogi w Ziemi Krakowskiej do końca XVI wieku*, Kraków.

Zaoral R. 2018. *Mining, trading and minting in late medieval Bohemia*, [in:] G. Depeyrot, I. Leimus (eds), *From Ore to Money, Mining, Trading, Minting. Proceedings of the Tallinn (2018) conference*, Wetteren, pp. 79–98.

Zaremska H. 2008. *Dlaczego w Krakowie? Początki gminy żydowskiej w Krakowie*, [in:] Z. Piech (ed.), *Miasta, ludzie, instytucje, znaki. Księga jubileuszowa ofiarowana Profesor Bożenie Wyrozumskiej w 75. rocznicę urodzin*, Kraków, pp. 123–133.

Zavřel J., Čiháková J. 2019. *Stříbrná Praha. Výsledky analýz raně středověkých archeometalurgických nálezů z Malé Strany*, Archeologické rozhledy 71/3, pp. 475–528.

Zawadzki *et al.* 2018. M. Zawadzki, M. Widawski, L. Waliś, E. Pańczyk, *Kilka uwag o analizie składu chemicznego półgroszy Władysława Jagiełły ze skarbów z Bieli oraz Łodzi*, Warszawski Pamiętnik Numizmatyczny 6, pp. 47–54.

Zientara B. 2008. *Bolesław Wysoki. Tułacz, repatriant, malkontent*, Kraków [first published in 1971].

Žemlička J. 1997. Čechy v *době knížecí (1034–1198)*, Praha.

HABEBANTURNE IN REGNO POLONIE MONTANA ARGENTI? GÓRNICTWO SREBRA A MENNICTWO I WŁADZA W ŚREDNIOWIECZNEJ POLSCE

(Streszczenie)

Wyniki nowych badań archeometrycznych i numizmatycznych ujawniły, że wbrew wcześniejszym przekonaniom, w niektórych częściach Polski i w niektórych odcinkach średniowiecza srebro mogło być wydobywane na znaczącą skalę. Zagadnienia te są przedmiotem zainteresowania tyleż przedstawicieli nauk przyrodniczych, ile humanistycznych, którzy jednak nie zawsze rozumieją się wzajemnie. W literaturze pojawia się czasem błędne koło, w którym hipotezy robocze lub wręcz luźne sugestie wysunięte z jednej strony druga strona przyjmuje za udowodnione pewniki, które następnie służą za punkt wyjścia do dalszych badań. Celem pracy jest weryfikacja publikowanych danych źródłowych na temat górnictwa i hutnictwa srebra oraz poszukiwanie związków przyczynowo-skutkowych między produkcją srebra a zjawiskami historycznymi — przede wszystkim emisją monet.

Najlepiej poświadczone jest górnictwo w okręgu bytomsko-krakowskim. Wspominają je najwcześniejsze źródła pisane (złoża metali szlachetnych w Olkuszu i górnictwo srebra pod Bytomiem). Brak późniejszych zapisek wskazuje, że wydobycie z tych złóż zakończyło się w 2. połowie XII w. Szeroko rozgłaszane odkrycia archeologiczne w tym okręgu przyniosły w rzeczywistości tylko jedno stanowisko z prawdopodobnymi (ale nie pewnymi) śladami wytopu srebra w XII w. (Zagórze). Ciekawe zanieczyszczenia ołowiem, zaobserwowane w torfowiskach w okolicy, nie zostały wystarczająco zweryfikowane pod względem chronologii. Z drugiej jednak strony fakt, że źródła pisane odnoszą się do innych miejscowości niż materiały archeologiczne z tego samego regionu, przypomina, że znane dziś źródła odzwierciedlają jedynie ułamek przeszłej rzeczywistości.

Złoża chęcińskie, eksploatowane od przełomu XIII/XIV w., nigdy nie przyniosły znaczących ilości srebra, ale dostarczały ołowiu używanego do wytopu srebra w Kutnej Horze, sprzedawanego za wybite tam srebrne grosze. Złoża tatrzańskie zaczęły przynosić srebro na przełomie XV/XVI w., ale w ilościach dalece niewystarczających dla potrzeb Królestwa Polskiego.

Liczne kopalnie kruszcu odnotowano w Sudetach w późnym średniowieczu i wczesnej nowożytności, ale nie ma śladów, by przyniosły one większą ilość srebra. Jedynie nazwa Srebrnej Góry, Silberberg, zapisana po raz pierwszy w 1331 r., świadczy o górnictwie srebra w tej miejscowości na początku XIV w. Badania archeologiczne wykazały tam relikty górnictwa datowane na ok. 1200 r., ale nie wiadomo, jaki minerał wówczas wydobywano. Około 1500 r. nowe technologie umożliwiły wydobycie srebra w Bożej Górze (Gottesbergu, Boguszowie).

Pytanie, jakie zasoby materialne umożliwiły Piastom budowę polskiego państwa i Kościoła i prowadzenie ekspansywnej polityki w XI–XII w., rzadko jest stawiane w literaturze. Analizy metaloznawcze wykazują, że mennictwo czasów Bolesława I Chrobrego (992–1025) — aczkolwiek jego rozmiary były większe niż dawniej sądzono — oparte było na srebrze importo-

wanym, czy to w drodze handlu, czy trybutów lub łupów. Pierwsze ślady użycia srebra ze złóż bytomsko-krakowskich do wyrobu ozdób i monet pochodzą z 2. połowy XI w. Jak dotąd srebro to odkryto w miejscowych anonimowych naśladownictwach denarów krzyżowych. Pochodzenie srebra w monetach Bolesława II Szczodrego (1058–1079) nie zostało ustalone. Te ostatnie monety pokazują szybki i głęboki spadek standardu. Nie musiał to być jednak wynik braku krajowego srebra, jak w sąsiednich Czechach czy Węgrzech, a jedynie przeszacowania przez króla swych finansowych możliwości. Bolesław wszak odbudowywał i rozbudowywał zniszczone kościoły i zakładał opactwa, a nadto prowadził wojny w wielu kierunkach.

Monety polskie z pierwszych trzech ćwierci XII w. wyróżniają się na tle mennictwa krajów sąsiednich wykonaniem z niemal czystego srebra. Wskazuje to na dostęp do krajowych złóż tego metalu, niemal nieznany źródłom pisanym. Wspierają ten wniosek wyniki analiz srebra w tych monetach.

Szczególną uwagę zwracamy na cztery typy denarów, przypisywane dotychczas Bolesławowi IV Kędzierzawemu (1146–1173). Badania osady hutniczej w Łośniu wskazują, że została ona zniszczona i opuszczona — wraz z pozostawionym skarbem monet Władysława II Wygnańca (1138–1146) i Bolesława IV Kędzierzawego — w wyniku zbrojnego najazdu. Skarb został ukryty na początku emisji 4. typu denarów Bolesława Kędzierzawego („Trzej książęta"). Ów typ datowany był na lata ok. 1162–1166. Jeśli wspomniany najazd był związany z tzw. wojną o grody, stoczoną w tym regionie ok. 1166 r., lub z jej kontynuacją podjętą przez Bolesława Kędzierzawego rok lub dwa później — a nie znamy innych konfliktów zbrojnych na tym obszarze w 2. połowie XII w. — to typ „Trzej książęta" był ostatnim typem denarów tego władcy, który zmarł na początku 1173 r. Cztery dalsze typy denarów przypisywanych Bolesławowi Kędzierzawemu były zatem monetami Bolesława Wysokiego ze Śląska (1163–1201) lub Mieszka Młodego (tzw. Plątonogiego) z Raciborza (1173?–1211). Zniszczenie bazy kruszcowej mennictwa polskiego podczas „wojny o grody" i konieczność zapłacenia ośmiu tysięcy grzywien cesarzowi w 1172 r. mogły być przyczyną wprowadzenia częstej wymiany monety i mennictwa brakteatowego przez Mieszka III Starego (1173–1201).

Można też wyrazić domysł, że srebro sudeckie było podstawą powstania w połowie XIII w. grzywny wrocławskiej o ciężarze 196 g, przyjętej potem w całej niemal Polsce. To jego przypuszczalne wydobycie mogło być powodem utworzenia dwu kolejnych, powiększonych, śląskich standardów monetarnych: szerokiego brakteatu ok. 1250 r. i kwartnika po ok. 1290 r. Polskie lane srebro, notowane w Brugii, przybrało wówczas postać monetarną. Ono też stało się podstawą potęgi księstwa fürstenberskiego na Śląsku, położonego na obszarach pozornie nieatrakcyjnych gospodarczo.

Brak złóż srebra w granicach odbudowanego w XIV w. Królestwa Polskiego znacząco ograniczał potencjał tego państwa. Być może to raczej odziedziczony skarbiec królów halickich, zdobyty we Lwowie w 1340 r., umożliwił Kazimierzowi Wielkiemu (1333–1370) podjęcie prób reformy monetarnej. Czyniono wysiłki dla przezwyciężenia tego niedostatku przez wydobycie i eksport w zamian za srebro innych kopalin, przede wszystkim ołowiu i soli. Uruchomienie w 1469 r. huty w Mogile pod Krakowem, używającej nowej technologii odciągania srebra z tzw. czarnej miedzi sprowadzanej z kopalń węgierskich, umożliwiło znaczący wzrost wydajności mennictwa polskiego w ostatnich dekadach XV w.

Nawet ograniczając się do nielicznych niewątpliwych przesłanek źródłowych, można zatem przyjąć istnienie średniowiecznego górnictwa srebrnego na obszarze złóż bytomsko-krakowskich w XI–XII w. i w Górach Sowich na początku XIV w. oraz dostrzegać odzwierciedlenie tej działalności w mennictwie. Nowe technologie otwarły możliwości uzyskiwania srebra z miedzi węgierskiej dla mennicy krakowskiej oraz wydobycia srebra w rejonie Bożej Góry (Boguszowa) i w Tatrach ok. 1500 r. Wszystkie te działania wpływały na mennictwo i potencjał polityczny władców. Mimo że brak srebra często powodował trudności polityczne, nadmierne ambicje mogły doprowadzić do kryzysu nawet władców dysponujących stosunkowo bogatymi zasobami kruszcu.

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