

Adam Kędzierski

Polish and Saxon
Cross Deniers
from the Turn of
the 11th and 12th
Centuries from
the Słuszków I Hoard



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1. Introduction

Cross deniers are the most frequently discovered early mediaeval coins in the Polish lands. During this period they functioned as a supranational form of money, used primarily in Poland, but also in Slavic Polabia, Saxony or Sweden. They are distinguished from other coins of the early Middle Ages by their characteristic high edge and all-round legends, usually consisting of individual letters, circles and wedges. On their obverses the following were depicted: a temple, a chapel, the letters Alpha and Omega, a cross surrounded by pearl-like beads (pearly cross), a Greek cross, a crosier, as well as a head, a glove or a flag. The reverse generally depicted a cross pattée and occasionally a Greek cross. They were produced from the middle of the 10th to the beginning of the 12th centuries by many mint workshops. Initially, their production was carried out only in Saxony, and from the 1080s, also in Poland. Here, at the turn of the 10th and 11th centuries, minting was started by Bolesław I the Brave (992-1025). The scale of production of his coins and those of his successor Mieszko II was small, as evidenced by the few finds of deniers of both rulers, comprising at present some 200 known examples. The participation of Polish deniers in domestic monetary circulation at the beginning of the 11th century was marginal, with imported Oriental silver coins still being in use. From the second half of the 10th century, Western European coins, mainly German ones, began to arrive. The second stage of Polish minting began with the reign of Bolesław II the Bold (1058-1079). From c. 1070 to 1079, two types of coins bearing the image of the ruler were issued in Kraków. His successor, Władysław I Herman (reigned 1079-1102), produced one type of denier throughout his reign. His coins depicted the duke's head on the obverse and his name in the obverse legend (Suchodolski 1973). Stanisław Suchodolski, when researching Polish minting in the 11th and 12th centuries, had 640 coins of Bolesław the Bold and 979 of Władysław Herman available for study (Suchodolski 1973). However, a large proportion of the deniers of both rulers previously recorded in the literature have since disappeared. These include the 2,000 deniers of Władysław Herman from the Płock II hoard (Gorlińska *et al.* 2015, no. 111), or the 1,585 coins issued by both Piast rulers from the Karczmiska deposit (Reyman *et al.* 2013, no. 35). Comparing the number of recorded coins of Bolesław II and Władysław I Herman to the number of finds of cross deniers from the last third of the eleventh and early twelfth centuries from the territory of Poland, one can see the huge predominance of the latter. In the two hoards of Słuszków I and Słuszków II alone, over 19,000 of them were found. This illustrates the extent of the minting of cross deniers. At the turn of the 11th and 12th centuries, they became practically the only type of bullion coinage in use in the territory of the Piast state. The content of the above-mentioned Słuszków II deposit from the beginning of the 12th century is a good illustration of that. The fully preserved assemblage includes 6,700 coins, with more than 6,500 cross deniers, mainly of the latest varieties, and only about 30 West European deniers and one Kraków

denier of Władysław Herman. Such a large number of cross deniers indicates that they were also produced in Polish mints.

This book presents the latest cross deniers from the late 11th and early 12th centuries discovered in the Słuszków I hoard. It presents a classification of the most numerous of the late cross deniers - types with a pearly cross, a Greek cross and a crosier on the obverse, most frequently discovered in Poland. Apart from the typology, the present work discusses their metrology, origin and the chronology of particular varieties and types as well as the activity of the first mint in Kalisz, where cross deniers were produced.¹

The analysis of this unique find, the Słuszków I hoard, has made it possible to trace the monetary circulation in the early years of the 12th century, when cross deniers were produced on a large scale in Poland and gradually displaced foreign money. Due to its size and time of deposition, the Słuszków assemblage provides information on previously unrecorded varieties of cross deniers. This makes it possible to distinguish issues - probably local ones, which do not occur outside Poland. Therefore, the paper presents a new typological division of the later varieties of cross deniers with images of the pearly cross, the Greek cross and the crosier, based on types from the most complete classification of them by Marian Gumowski in his *Corpus Nummorum Poloniae* (Gumowski 1939, further referred to in the paper with the abbreviation CNP). Older deniers with a high edge from before c. 1080 and those classified as other types minted in the late 11th and early 12th centuries, which occurred in the Słuszków hoard in single specimens (specimens with a representation of the letter S, head, hand, and crosier and banner) were determined according to the aforementioned division by M. Gumowski (Gumowski 1939). The present monograph deals with the last and most intensive period of the circulation of cross deniers in Poland, starting from the 1080s, when the production of Polish imitations of cross deniers began, to the early 12th century, when their production ceased both in Saxony and Poland.

At this point, I would like to thank Professor Stanisław Suchodolski for his invaluable help during the creation of my doctoral thesis and later the book. The valuable remarks of Professor Borys Paszkiewicz allowed me to better show the issues presented in this work. For making the Słuszków hoard available for my research I would like to thank the Management and Employees of the Regional Museum of the Kalisz Land. I would like to thank my colleagues for their help in the creation of this work: Dariusz Wyczółkowski, Danuta Banaszak, Tadeusz Baranowski, Paul Barford, Mateusz Bogucki, Zbigniew and Maciej Brajer, Barbara Buttent-Stefaniak, Dorota Cyngot, Piotr Chabrzyk, Władysław Duczko, Arkadiusz Dymowski, Witold Garbaczewski, Krzysz-

¹ The present publication is a revised and expanded version of the 2021 publication entitled *The Słuszków I. Cross Denarii from the End of the 11th and Beginning of 12th Century*. It was based on my dissertation "The early mediaeval hoard of coins from the village of Słuszków near Kalisz. The origin, typology and chronology of younger types of cross deniers", which I defended at the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in 2011. (Kędziński 2011a). This thesis was written under the supervision of Professor Stanisław Suchodolski.

tof Grabowski, Iwona Hildebrandt-Radke, Zbigniew Kubiowski, Marcin Magdziński, Tomasz Nowakiewicz, Zbigniew and Frank Olszanowski, Andrzej Romanowski, Łukasz Rosiak, Natalia Sawicka, Danuta Synkiewicz, Rafał Szelański, Iwona and Arkadiusz Tabaka, Maciej Trzeciecki, Estera Wałęsa, Maciej Widawski, Michał Zawadzki, Leszek Ziabka and Members of the Denar Kalisz Association. Their contribution to the book was very important.

2. Słuszków I and Słuszków II hoards

2.1. Location of Słuszków

Słuszków is situated in the south-eastern part of the Greater Poland region, on the Rychwał Plain, which is surrounded to the south-west by the Kalisz Upland and to the east by the Turek Upland. The Rychwał Plain is a basin-like depression, probably of tectonic origin, which is covered by sandy sediments occurring on moraine clay. The clayey, impermeable substrate has determined the occurrence of numerous marshes (Fig. 1).



Fig. 1. Mesoregions of the southern Greater Poland Lowland: 318.16 – Rychwał Plain, 318.12 – Kalisz Upland, 318.17 – Turek Upland, 318.13 – Konin Valley, 318.21 – Grabów Basin (physico-geographical regionalisation according to: Kondracki 1998)

The surface of the described area consists mainly of lake plains and plains of windblown sands, forming numerous parabolic or longitudinal dunes. In the vicinity of the dunes, there are deflation depressions filled with mineral-organic sediments. In the vicinity of Mycielin, situated to the north of Słuszków, kettles, depressions formed by the melting of dead ice have been preserved; peat plains have developed in some of them. Site no. 10 in Słuszków, in the area of which the second deposit (Słuszków II), and most probably also the first hoard (Słuszków I), was found, is located on an elongated terrain elevation with a meridional direction, dominating over the areas surrounding it from the east and west. In the highest parts of this elevation there are kame forms, hills formed on clays and sands of the Warta glaciation. The site discussed here is situated in a slightly lowered zone, between kames, on a surface built of clays and water-glacial sands, on which dunes are locally present. A contemporary geological map in the vicinity of the site shows a valley filled with mineral-organic silts. This is a depressed area. Like other depressions in the area, it is drained by a small, periodically drying watercourse. However, it should be remembered

that many of the minor watercourses in the study area are contemporary drainage ditches. On the 1940 topographic map, the valley mentioned above is not yet visible, and the area adjacent to the site is marked as wet meadows (Fig. 2). Perhaps in the past it was a shallow depression of land periodically filled with water. It can be assumed that in the modern period the water collecting there was used to feed the fish ponds placed at the manor house located to the east of the site. The hydrographic conditions of the area in the past were very different from the modern situation. Widespread land reclamation has contributed to the lowering of the groundwater level, which has made it possible to develop a large part of the wetlands of the Rychwał Plain.



Fig. 2. Fragment of the Messtischblatt map from 1940 (sheet 4075 Korzeniew, Western Poland Map Archive) with location of the archaeological site discussed here marked, showing the explored area from before contemporary land reclamation

The site is located at a height of approximately 129 m above sea level. Towards the east of it, elevations decrease to 120 m a.s.l., while they increase towards the north, reaching up to 137.5 m a.s.l. in the case of elevations on clayey sands and up to 144.8 m a.s.l. in the case of kemic elevations.

2.2. Słuszków in the early Middle Ages

Given the topographical situation of the area, it must be assumed that in the early mediaeval period the main communication routes passing through here were probably linked to a network of local roads. They must have used the highest elevated places, exposed between numerous wet and swampy areas.

The village of Słuszków appears in sources in the early 15th century (KZK 1991). From earlier accounts, however, a Jan Słuszkowski is known, who was probably one of the owners of the village. His name can be found in a document from 1382 (Piekosiński 1899, 152).

Słuszków lies on an early mediaeval trade route between major towns (Figs. 3 and 4) leading from Kalisz to Konin and on to Kruszwica (Wąsowiczówna 1960, 90). This was one of the most important roads in Poland in the early mediaeval period, connecting the region of Silesia to Kuyavia and leading on further to the coast of the Baltic Sea (Wąsowiczówna 1960, 90; Wyczółkowski, Kędzierski 2016).

This route at the turn of the 11th and 12th centuries must have been established using developed settlement clusters. Their role probably increased in connection with the existence of a trade road, which is emphasised by the discovery of bullion hoards along its course. Other early mediaeval hoards have been found near Słuszków. In nearby Zbiersk, a deposit dating to around 1085 was discovered (Mitkova-Szubert 1997). In Mycielin, located about 2 km north of Słuszków, another hoard was discovered, with silver ornaments dating to the 11th century (Piotrowski 2007, 17). Further north a hoard from Ogorzelczyn dating to the last years of the 11th century (Tabaka 2001) and a similarly dated hoard from Konin-Grójec (Szczurek *et al.* 2017, no. 74) have been recorded.

It is therefore likely that a complex of private estates may have developed as early as the end of the 11th century on the northern border of the Kalisz stronghold district, near Słuszków. This may also be indicated by two Romanesque churches in the same area. The first, located 3 km south-west of Słuszków, in Kościelec, Kalisz district, dedicated to St Adalbert (Fig. 5), dates to the second half of the 12th or early 13th century (Świechowski 1963, 98-99; 2009, 109). It is possible that this church is slightly older and was built in the first half of the 12th century (Wiliński 1952). However, it does not appear that this stone foundation is contemporary with the time of the hiding of the hoard at Słuszków.

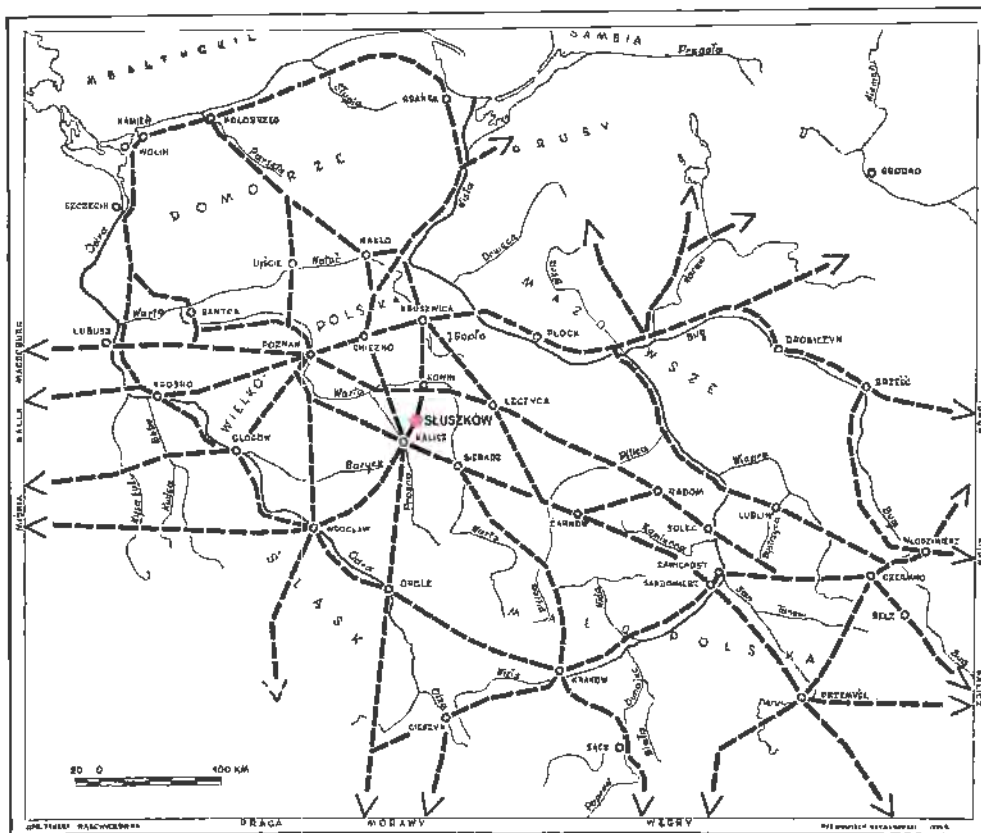


Fig. 3. Trade routes in the early Middle Ages according to T. Wąsowiczówna (1960)

The second stone church built in the Romanesque style, dedicated to All Saints (Fig. 6), is situated in Dzierżbin, 7 km north of Słuszków. Its origin is determined to be at the end of the 12th century (Świechowski 1963, 33-34). The founders of both churches are unknown. However, it should be assumed that they were private foundations, among the first in this part of Greater Poland. The establishment at Kościelec may have been in some way closely connected with Słuszków, due to its proximity.

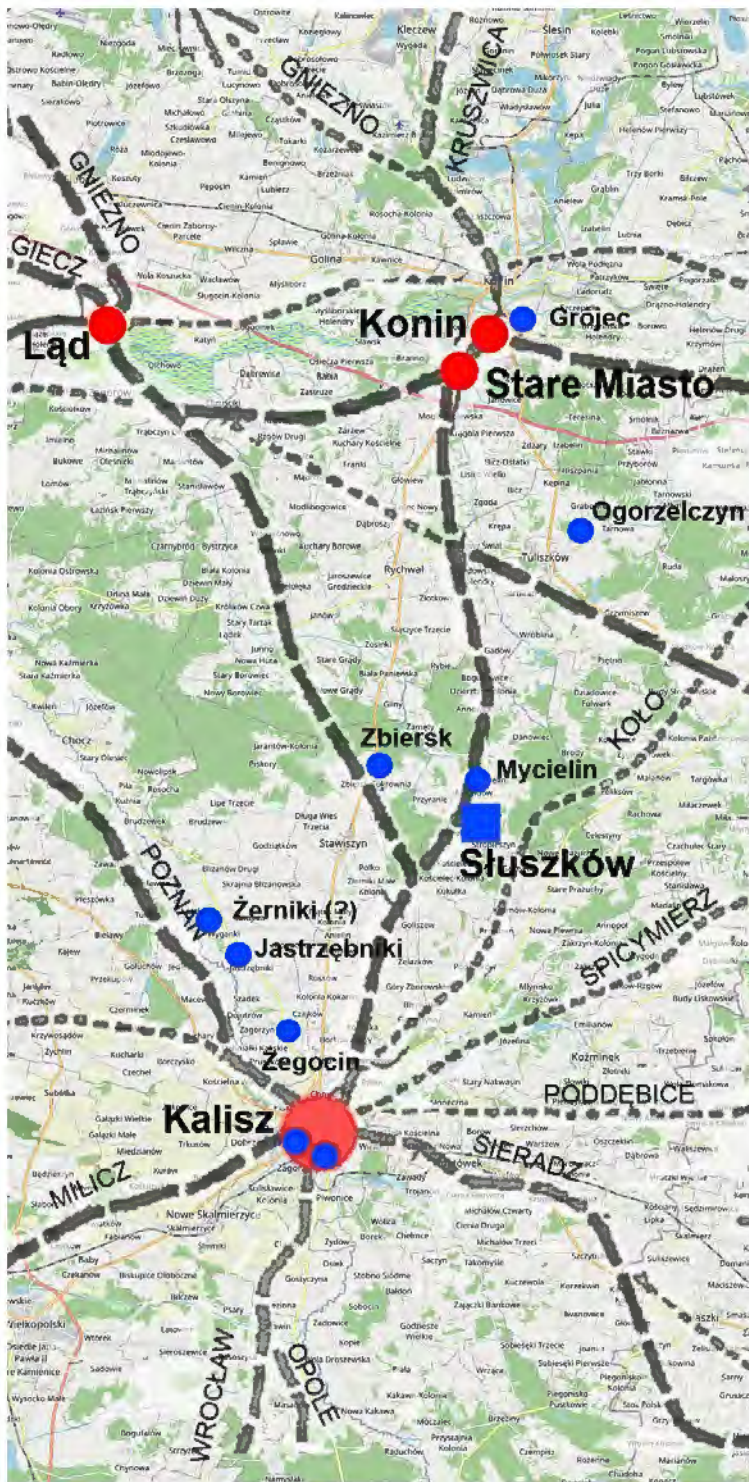


Fig. 4. Słuszków in the context of the eastern Great Poland road network – based on a sketch of T. Wąsowiczówna (1960), with marked locations of the early mediaeval hoards discoveries from the turn of the 11th and 12th centuries (prepared by: A. Kędzierski)



Fig. 5. Kościelec, church of St Adalbert (photo: A. Kędzierski)



Fig. 6. Dzierżbin, church of All Saints (photo: A. Kędzierski)

2.3. History of the discovery of the Słuszków I hoard

According to articles published in the late 1950s about the Słuszków find, a vessel containing silver objects was discovered by Janina Karpińska, in 1935 "during ploughing of fields connected with land regulation between the estate and the village of Słuszków", in an undetermined location, probably in the northern part of the village. The silver coins and objects were said to have been found where they had been hidden on a baulk between fields under a stone, in a large clay pot, which has not survived. Janina Karpińska gave her father 13,500 coins and several dozen silver ornaments (Dąbrowski, Suchodolski 1958). However, according to the account of another Słuszków resident, Maria Szymańska, the hoard was discovered during the excavation of a large stone that protruded slightly above the surface of the ground at the intersection of the land boundaries belonging to Jan Remelski, Zygmunt Maciejewski and Wiesław Żarnecki (Fig. 7: 1). The deposit was subsequently excavated by Andrzej Karpiński, Janina's father, and Andrzej Szymański, the husband of the aforementioned Maria (Andrałojć *et al.* 2011, 104-105). Another findspot was indicated by numismatist Rev. Dr Jan Stachowiak, who was said to have been working on the hoard in the 1980s and therefore also conducted field interviews. Based on his conversations with Janina Przygodzka (née Karpinska, daughter of the discoverer) and her husband Tadeusz, he determined that the hoard was supposed to have been hidden directly by the road from Kościelec to Dzierzbin. This road was widened in the 1950s, and the hoard itself was buried in a place that is now inaccessible, as it lies under the surface of the new road (Kędzierski 1998a). An unknown number of the objects from the hoard² were stored during the period of German occupation in the outbuildings of Tadeusz Przygodzki, Andrzej Karpiński's son-in-law, in the village of Przedzeń. Part of the assemblage was dispersed and destroyed during a farm fire. Among other things, a silver chain was lost in this way, as well as an unknown number of coins (Dąbrowski, Suchodolski 1959). After the War, through the Kalisz artist Władysław Kościelniak, Janina and Tadeusz Przygodzki informed Krzysztof Dąbrowski (head of the Kalisz Archaeological Station of the Institute of the History of Material Culture of the Polish Academy of Sciences), about the find. In October 1958, thanks to his efforts, the hoard was purchased by the Jubilee Committee for the Celebration of the Eighteenth Centuries of Kalisz. After conservation and initial processing of the assemblage by Stanisław Suchodolski at the Institute of the History of Material Culture, the hoard was transferred to the Kalisz City Museum, today the District Museum of the Kalisz Area (Dąbrowski, Suchodolski 1958; Suchodolski 1960).

Information about the hoard appeared in the scientific literature shortly after the deposit was revealed. They mainly concerned the circumstances of its discovery and composition. Particular attention was devoted to the presence of specimens of the extremely rare large deniers of Sieciech,

2 Numismatist Rev. Jan Stachowiak, on the basis of conversations with Janina and Tadeusz Przygodzki, estimated the original size of the hoard at around 20,000 specimens.

the count palatine of Duke Władysław Herman, and the hoard's content of foreign coins. The information about the hoard's cross deniers was very general and limited to listing the types of coins found in the deposit, although attention was also drawn to the presence of coins of a variety similar to CNP 813, which were represented in the hoard by a high number of examples (Dąbrowski, Suchodolski 1958; Suchodolski 1960; Żak 1966, 88-89). The assemblage from Służków has become an invaluable source for the study of the minting of count palatine Sieciech. Prior to its disclosure in 1958, only two large Sieciech deniers depicting a cross pattée on the reverse were known (Suchodolski 1987, 16). The Służków deposit yielded more than a hundred such coins (Suchodolski 1963; 1987, 12-44). A comprehensive study of the deposit in the 1980s was attempted by Rev. Jan Stachowiak and Associate Professor Andrzej Mikołajczyk, but only 1000 coin catalogue sheets made by the latter researcher have survived to date. Between 1994 and 1996, the hoard was inventoried. This work was carried out under a grant from the State Committee for Scientific Research - research project No. 0788/P1/94/06, *Early mediaeval coin hoard from Służków near Kalisz. The Polish origins of later types of cross deniers*. Of the silver coins found in the hoard, 13 061 were made available for study in the Kalisz museum.³

By analysing the combination of dies it was possible to separate out the Polish issues among the coins. The processing of numismatic material from Służków enabled further research (Kędzierski 1998a; 1998b; 2002; 2005) concerning mainly domestic imitations of cross deniers. These issues were linked to the mints of Palatine Sieciech, Prince Władysław Herman and his son Duke Zbigniew.

The first Służków hoard, after an inventory, was published in 2017 as part of a multi-volume publication edited by Mateusz Bogucki, Peter Ilisch and Stanisław Suchodolski. It contains information on the entire assemblage, including older issues of cross deniers, foreign coins and silver ornaments and ingots (Szczurek *et al.* 2017, no. 235).

2.4. Search for the hoard deposition site

In the area of Służków in 1982, surface studies of the Archaeological Survey of Poland (AZP) were carried out in the survey area designated as 63-40 by Mirosław Ciesielski, Krzysztof Górczyca and Grzegorz Teske. As a result, only three mediaeval sites were recorded in the area of the village. It would appear, therefore, that the deposit was buried in an uninhabited area in the early mediaeval period. One of the recorded features was Site 10 (identified as a settlement from the 14th-15th centuries), in the manor areas where, according to published accounts, the hoard was supposed to have been hidden. The site of the hoard find itself was not, however, located on the ground during the 1982 AZP fieldwork.

3 Among the artefacts not included in the paper were 67 specimens of later varieties of cross deniers of types V, VI and VII. This number of artefacts (13 061) was included in the latest edition of the inventories of early mediaeval hoards (Szczurek *et al.* 2017), as well as in this publication.

The exact place where the first Słuszków hoard was hidden is not known so far, although exploratory research has been carried out in Słuszków several times to locate it. The first time was in May 1996, when probing research was carried out to verify Maria Szymańska's account. A trial trench measuring 2.5×1 m was excavated at the point indicated (Fig. 7: 1).⁴



Fig. 7. Aerial photo, looking west, of the northern part of Słuszków village: 1 – place of archaeological survey with test trench in 1996 and 2007, 2 – findspot of the hoard specified by W. Żarnecki, 3 – findspot of the hoard specified by Rev. Dr J. Stachowiak, 4 – findspot of the Słuszków II hoard (photo: M. Osiadacz)

The top layer of excavated soil was dark brown humus, containing numerous fragments of ceramic vessels, mainly of modern and late mediaeval date. Below 30 cm from the ground surface lay a layer of light brownish-grey sands. Numerous fragments of modern, late mediaeval and early mediaeval pottery were present in this level, as well as fragments of clay floor and window glass. Beneath the layer of light brown sands, light yellow naturalsand lay from a depth of 80 cm. Not even a single early mediaeval coin was found at the investigated site, nor were any excavated trenches evidencing hoard excavation at this location. Only a granite survey post, set on top of

⁴ The survey work was carried out under a grant from the Committee for Scientific Research - research project No. 0788/P1/94/06, *Early mediaeval coin hoard from Słuszków near Kalisz. Polish origins of later types of cross deniers*. The research was led by A. Kędzierski.

a contemporary bottle, was exposed in the trench. In the same place a survey was carried out by a team led by Mirosław Andrałójć in 2007.⁵ These activities were then supplemented by field prospecting with metal detectors. However, it did not yield any silver artefacts from the early mediaeval period (Andrałójć *et al.* 2011).

Further research to discover the site of the deposition of the Słuszków I hoard was carried out in autumn 2020 by a team led by Adam Kędzierski and Leszek Ziąbka. Surface work using metal detectors was concentrated in two places. The first, which was indicated by a resident of Słuszków, Wiesław Żarnecki, was located in the north-eastern part of the manor park layout, on the slope of the embankment separating the former park from the pond (Fig. 7:2). Only one fragment of an early mediaeval vessel was discovered here, decorated at the base of the neck with a wavy line.

The second selected site was located at Słuszków AZP Site 10. The work was carried out in a field adjacent to the Dzierzbina - Kościelec road at the site indicated by Rev. Stachowiak as the site of the hoard's discovery. The investigators hoped to uncover at least individual coins from the deposit, which they believed might have been spilled in the field by the road during the hasty excavation of a silver-containing pot in 1935 (Fig. 7: 3). As a result of surface work with metal detectors, another assemblage of precious metal objects named Słuszków II was discovered, as well as numerous fragments of late mediaeval, modern and early mediaeval pottery vessels (Fig. 8), and several coins, dating from the second half of the 17th century to the present day. The presence of numerous fragments of early mediaeval vessels, indicated that without doubt, the site was in use during the early mediaeval period.

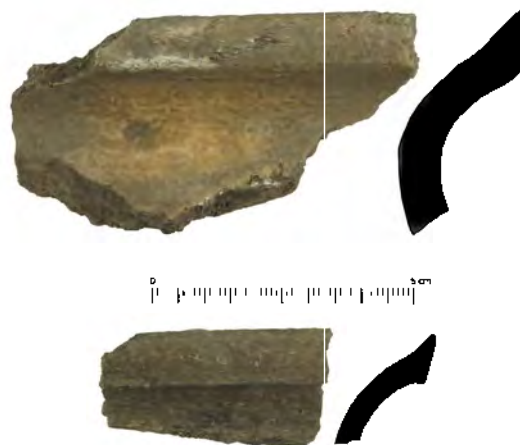


Fig. 8. Selected fragments of the early mediaeval-ceramic vessels from Site 10 in Słuszków (photo: A. Kędzierski)

⁵ The fieldwork under the direction of Mirosław Andrałójć was carried out within the framework of grant No. 1H01H 062 27 from the Ministry of Culture and Arts, led by Andrzej Prinke, PhD.

2.5. Contents of Słuszków I hoard

Among the relics donated to the museum by Janina and Tadeusz Przygodzki were 12,665 coins, 24 whole and three fragments of silver beads and one fragment of a silver ingot (Dąbrowski 1975, 308). The deposit was included in the inventory of historical collections of the District Museum of the Kalisz Area (MOZK) under the number 1236, common to all the relics (Fig. 9).



Fig. 9. Słuszków I – the first hoard from Słuszków (photo: IAE PAN Archive)

In 1976, the head of the History Department of the Kalisz museum, Wiktoria Kunicka, through Jan Orczykowski, acquired another several dozen coins, ornaments and silver ingots. These relics were included in the inventory under the number 1412. In the documentation on the hoard kept in the History Department of the MOZK there is information about 12,665 silver objects and 407 fragments. Their total is 13,072 pieces. An inventory of the hoard carried out in the Kalisz museum in 2020-2021 showed a slightly higher number - 13,129 silver items. There is some

inconsistency in the number of large deniers of Sieciech when compared with the information given in scientific articles from the early 1960s. In a 1960 publication, Stanisław Suchodolski lists a total of 120 pieces of such coins from the deposit: 115+2 with a cross pattée of Type I and 1+2 with a monogram on the reverse of Type II according to the typology of S. Suchodolski (1960, 29). In a 1987 paper, the same researcher listed 119 Type I and four Type II specimens (Suchodolski 1987, 16-21). There are currently 122 large palatine deniers in the MOZK collection: 117+3 Type I and 0+2 Type II. The large monogrammed deniers, present in the assemblage in the early 1960s (Suchodolski 1960, 29, photo 3), are not in the assemblage today, and a fragment of a Type I deniers has appeared. A lost whole example of a large Sieciech Type II denier with a depiction of a monogram according to Borys Paszkiewicz was exhibited in 1998 at the eighteenth auction of the Gdańsk Numismatic Cabinet under the number 118. This auction also featured a large Sieciech denier with a cross pattée (number 117) and several dozen later varieties of deniers, including deniers of the CNP 813 variety (numbers 60-63), which are characteristic of the Słuszków assemblage.⁶

Apart from a huge number of relics, unknown from other chronologically similar hoards, the first Słuszkow hoard contained most of the known large deniers of count palatine Sieciech with a cross pattée on the reverse, Type I according to Stanisław Suchodolski (Suchodolski 1987). The governor was the first known coin issuer by name in the Piast state from outside the ruling dynasty (Fig. 10).



Fig. 10. Large deniers of Sieciech from the Słuszków I hoard (photo: A. Kędziński)

⁶ Catalogue of the Gdańsk Numismatic Cabinet. Auction No. 18 of 24.10.1998, 10.00 a.m.

A second unique feature of the hoard is the presence in its composition of a huge number of cross deniers, mainly of the latest issues, unknown in such quantities in other hoards. Also noteworthy are two varieties of later cross deniers with the representation of a simple cross on the obverse, which are practically unheard of elsewhere (Gumowski 1939, varieties: CNP 813 and CNP 867-868), represented, in total, by over three thousand specimens. Such a large and homogeneous group of material may indicate the local origin of these particular deniers. The uniqueness of the material from Słuszków also lies in the time of its deposition. The latest well-dated coin in the hoard is a denier of King Coloman of Hungary (1095-1116)⁷ from the middle part of his reign (Huszár 1979, no. 37; Fig. 11), which makes it possible to define the Słuszków deposit as the latest known assemblage from the Polish lands, closing chronologically the era of the dominance of cross deniers in Polish monetary circulation.



Fig. 11. Denier of Coloman from the Słuszków I hoard (photo: A. Kędzierski)

From this time –the middle of the first decade of the 12th century – there are no recorded bullion hoards from Poland apart from Słuszków. This huge assemblage is therefore an invaluable source for the study of monetary circulation in the Polish lands during this period. The Słuszków I assemblage contains examples of the extremely rarely discovered latest cross deniers CNP 813 and CNP 867-868, and identical varieties of these issues are found as well as in the Słuszków II deposit.

Another unique feature of the first deposit from Słuszków is its size. The part of it preserved in the Kalisz museum weighs 11.5 kg and contains more than 13 thousand artefacts. Similar large assemblages have been recorded from Greater Poland - e.g., from Dzierznica II near Środa Wielkopolska - about 15 kg, or Lisówek near Słubice - about 10 kg (Szcurek *et al.* 2017, no. 109 and no. 441). However, they are much older; they date from the late 10th and early 11th centuries. The later deposits from the reign of Władysław Herman did not reach such large sizes. The hoard

⁷ Besides Słuszków, only one other hoard containing a coin of King Coloman is known from Poland – from Sędziszowice in the Kazimierza Wielka district (Reyman-Walczak *et al.* 2013, no. 95). This hoard contained numerous issues of Kraków deniers of Władysław Herman and early issues of Bolesław the Wrymouth, coins of types I and II according to Stanisław Suchodolski (1973), which were not present in the Słuszków I hoard.

from Słuszków is therefore the largest known deposit from the early 12th century. The time of its concealment is connected with the middle of the first decade of this century, i.e., the period of civil war between Bolesław the Wrymouth and his brother, Duke Zbigniew. It is possible that the deposition of the bullion is directly connected with these war events of 1106. The size and unique content of the Słuszków assemblage may indicate that it could have belonged to Duke Zbigniew or one of his high officials. The recent discovery at Słuszków of a second deposit of 6,700 artefacts, including gold rings, which may have belonged to members of the Polish elite of the time, may confirm such a hypothesis. These two large hoards were not recovered by their owner. Perhaps Duke Zbigniew, or his supporter, was unable to retrieve the deposited bullion and transport it away from the region of Greater Poland occupied by Bolesław the Wrymouth.

The hoard Słuszków I contains mainly cross deniers of types I, II, IV-VIII. Apart from them, the most interesting component is the collection of large deniers from Palatine Sieciech with his sign on the obverse (1987; Szczurek *et al.* 2017, nos. 235/7952-8073). It also contains a number of foreign coins: Arabic dirhams (Szczurek *et al.* 2017, nos. 235/1-2), German deniers (Szczurek *et al.* 2017, nos. 235/3-46), including a fragment of a Cologne denier of Emperor Henry II (1014-1024) (Fig. 12: 1; cf. Szczurek *et al.* 2017, no. 235/3). There were also a few Bohemian deniers (Szczurek *et al.* 2017, no. 235/7948-7950), including a denier of Spytihnev II (1055-1061) (Fig. 12: 3; cf. Szczurek *et al.* 2017, no. 7950), Moravian issues (Szczurek *et al.* 2017, no. 235/7951), Hungarian coins (Szczurek *et al.* 2017, no. 235/12932-12947) including deniers of Ladislaus I (1075-1095) (Fig. 12: 4; cf. Szczurek *et al.* 2017, no. 235/12944). Other issues included English pennies (Szczurek *et al.* 2017, nos. 235/12948-12950) such as a fragment of a Canute 'Helmet' type denier (1016-1035) (Fig. 12: 2; cf. Szczurek *et al.* 2017, no. 235/12948) and single Danish (Szczurek *et al.* 2017, no. 235/12951) and Scandinavian imitation of English pennies (Szczurek *et al.* 2017, no. 235/12952) coins.

The coin assemblage was complemented by a group of hollow silver beads decorated with granulation (Fig. 13: 1; cf. Szczurek *et al.* 2017, nos. 235/13022-13054) and several silver ingots (Fig. 13: 2; cf. Szczurek *et al.* 2017, nos. 235/13055-13061).

The main group of source material discussed in the present work was the assemblage of the latest issues of cross deniers from the Słuszków I hoard of types: V with a beaded cross, VI with a plain cross and VII with a crosier (Fig. 14). These coins were the main component of most hoards from the late 11th and early 12th centuries in Poland. The assemblage obviously also included older issues of cross deniers (Fig. 15), defined here according to Marian Gumowski's (1939) classification.

Among the Type V deniers with a beaded cross on the obverse, 793 whole specimens, probably produced before 1080, were distinguished, including 21 illegible (Fig. 16). A large part of this material consists of deniers of the CNP 612-619 variety, as well as coins included in the CNP 620-645 and CNP 656-671 varieties.



Fig. 12. Western European coins from the Słuszków I hoard (photo: A. Kędzierski)



Fig. 13. Silver beads and silver ingot from the Słuszków I hoard (photo A. Kędzierski)

Older or illegible Type VI cross deniers depicting a simple cross on the obverse are represented by 279 specimens. The largest number belong to the CNP 784-812 variety, as well as CNP 834-850 with preserved broad edges and CNP 748-477 (Fig. 17).

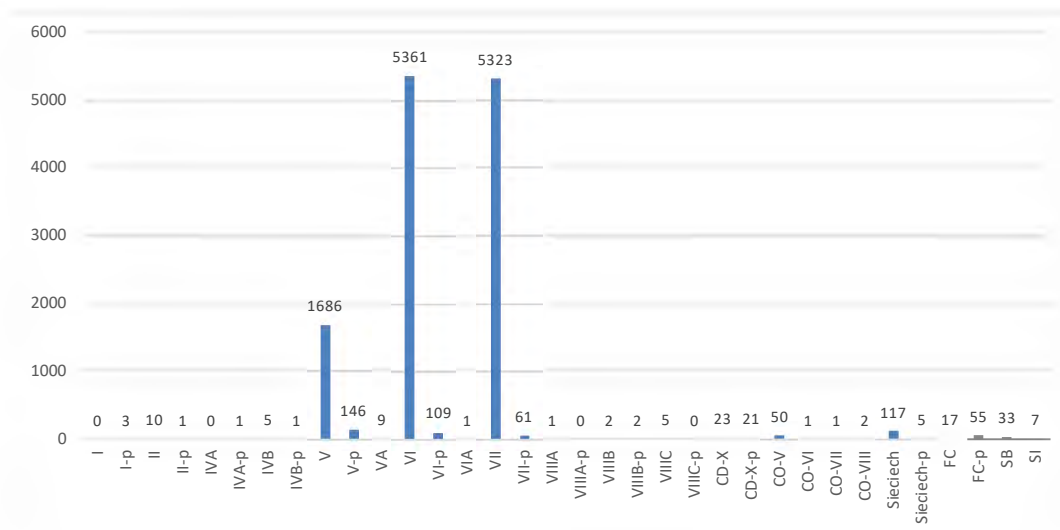


Fig. 14. The content of the Słuszków I hoard: **I** - cross deniers Type I according to CNP, **I-p** – pieces of cross deniers Type I, **II** – cross deniers Type II, **II-p** – pieces of cross deniers Type II, **IVA** – cross deniers Type IV with the Alpha and Omega, **IVA-p** – pieces of cross deniers Type IV with the Alpha and Omega, **IVB** – cross deniers Type IV with the letter S, **IVB-p** – pieces of cross deniers Type IV with the letter S, **V** – cross deniers Type V, **V-p** – pieces of cross deniers Type V, **VA** – cross deniers Type V and VII, **VI** – cross deniers Type VI, **VI-p** – pieces of cross deniers Type VI, **VIA** – cross deniers Type VI with the letters *ETO*, **VII** – cross deniers Type VII, **VII-p** – pieces of cross deniers Type VII, **VIIIA** – cross deniers Type VIII with a hand and a banner, **VIIIA-p** – pieces of cross deniers Type VIII with a hand and a banner, **VIIIB** – cross deniers Type VIII with a head, **VIIIB-p** – pieces of cross deniers Type VIII with a head, **VIIIC** – cross deniers with a banner and a hand, **VIIIC-p** – cross deniers with a banner and a hand, **CD-x** – unspecified cross deniers, **CD-x-p** – unspecified pieces of cross deniers, **CO-V** – cross obols Type V, **CO-VI** – cross obols Type VI, **CO-VII** – cross obols Type VII, **CO-VIII** – cross obols Type VIII, **Sieciech** – deniers of palatine Sieciech with his emblem on the obverse, **Sieciech-p** – pieces of deniers of palatine Sieciech with his emblem on the obverse, **FC** – foreign coins (cross deniers excluded), **FC-p** – piece of foreign coins (cross deniers excluded), **SB** – silver beads, **SI** – silver ingots (prepared by: A. Kędziński).



Fig. 15. Older types of cross deniers from the second and the third quarter of the 11th century, Type V, VI and VII (CNP 572-576, CNP 759, CNP 1470) (photo: A. Kędzierski)

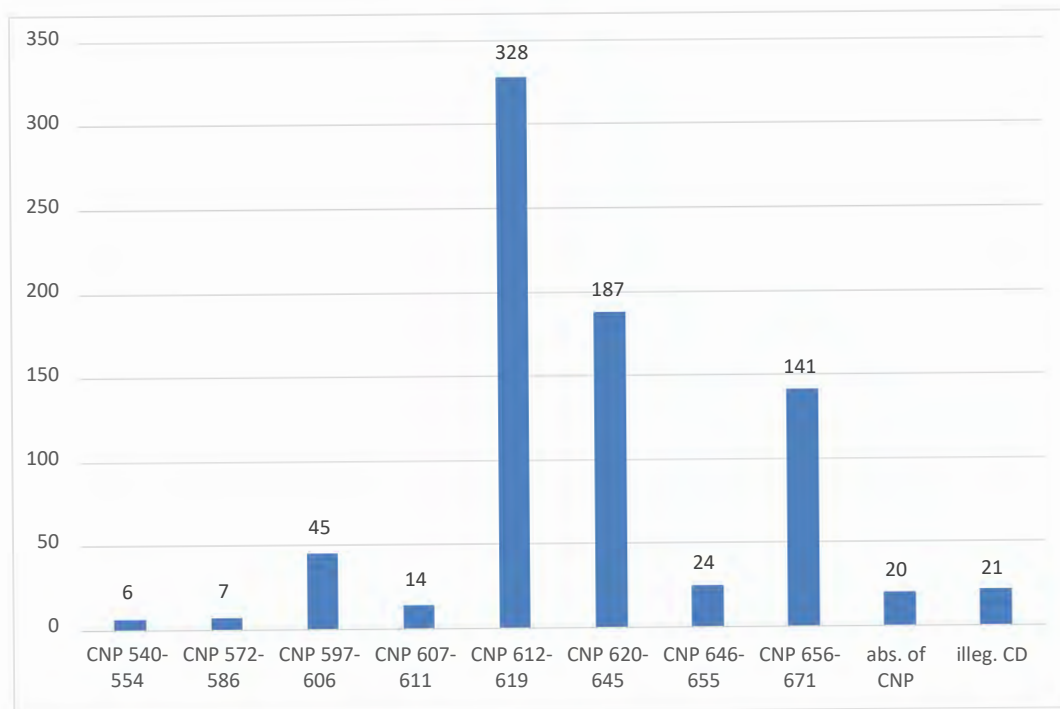


Fig. 16. Older or illegible cross deniers Type V (classification based on: Gumowski 1939) (prepared by: A. Kędzierski)

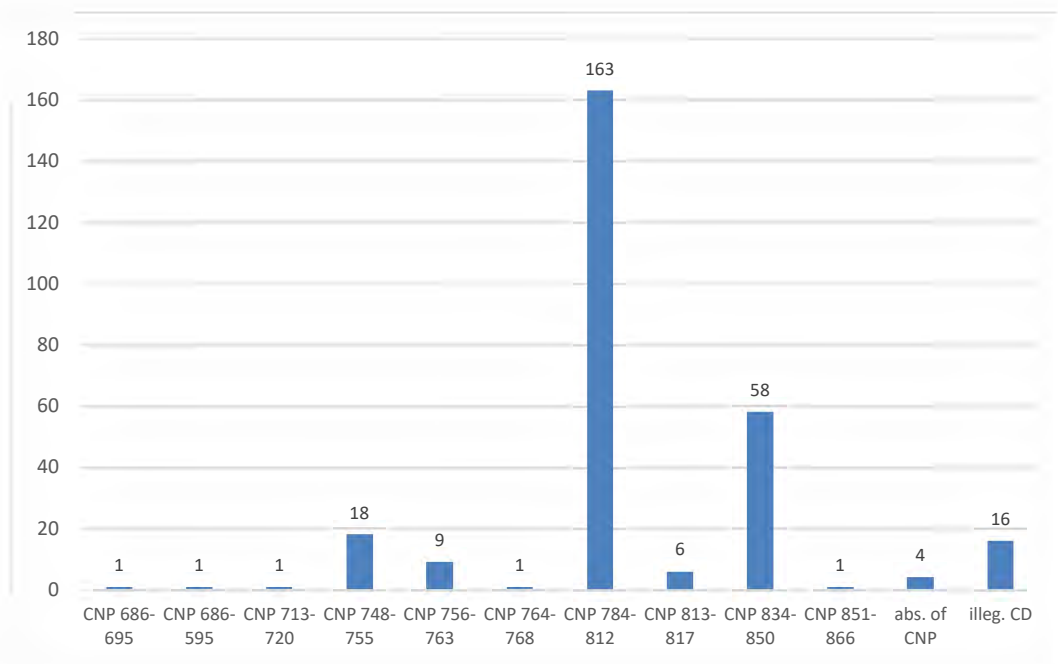


Fig. 17. Older or illegible cross deniers Type VI (classification based on: Gumowski 1939) (prepared by: A. Kędzierski)

There are 682 whole examples of the older cross deniers and illegible Type VII pieces with a representation of a crosier, of which as many as 399 specimens may be included in CNP varieties 967-971. These deniers are less carefully struck than those of the previous types, so as many as 181 of them are difficult to identify accurately (Fig. 18).

In the Słuszków I hoard, in addition to deniers coins, there were a small number of half-deniers fractions - obols, numbering 54 pieces. Of these, 48 examples divided into 21 varieties (SoV-1 - SoV-21) bear a representation of a beaded cross on the obverse (Kędzierski 2019, 201-211). Two Type VA obols, depicting a beaded cross with two arms similar to the crosses of Type VII deniers, were included in a further two varieties (SoVA-1 - SoVA-2) (Kędzierski 2019, 212). One specimen each of Type VI half-deniers with a representation of a simple cross (SoVI-1; Fig. 19: 2) and VII with a representation of a crosier (SoVII-1; Fig. 19: 3) were recorded in the hoard (Kędzierski 2019, 213). The list of obols in the Słuszków I hoard closes with two specimens of Type VIII, depicting a crosier, a ring and a banner on the obverse (SoVIII-1; see Fig. 19: 4) (Kędzierski 2019, 214). All obols can probably be linked to the Saxon mint and chronologically most of them can be assigned to the period before 1080. Only a few of them could be minted later. These are specimens belonging to the SoV-17 - SoV-21 varieties (CNP 682 and CNP 684), such as coin no. 2193 assigned to the SoV-20 variety (Fig. 19: 1). Type VIII obols of the SoVIII-1 variety (CNP 1029) are also similarly dated.

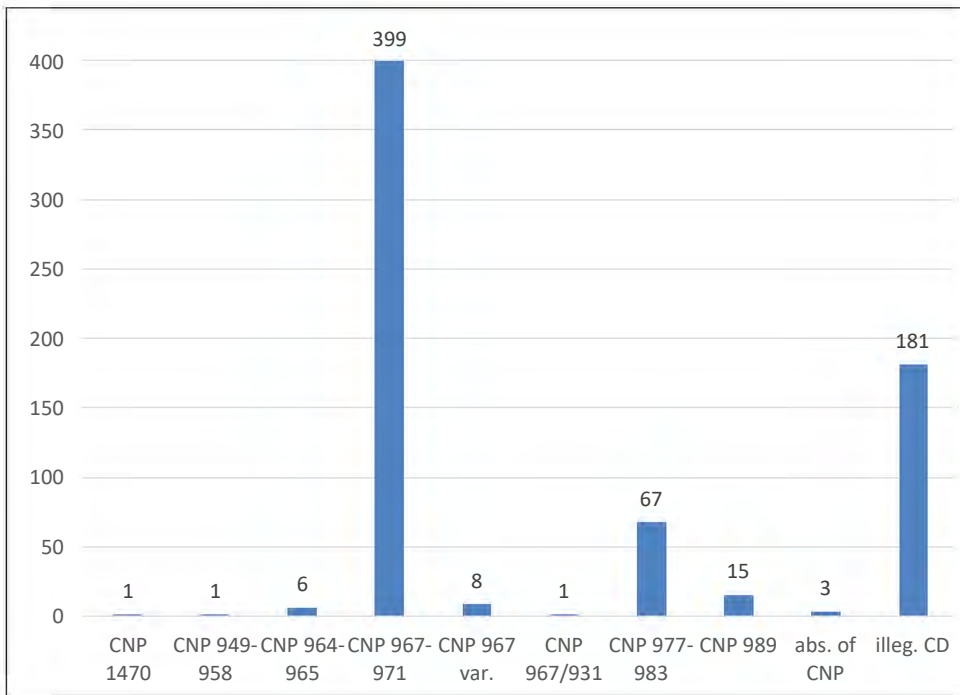


Fig. 18. Older or illegible cross deniers Type VII (classification based on: Gumowski 1939; prepared by: A. Kędzierski)



Fig. 19. Obols from the Słuszków I hoard (photo: A. Kędzierski)

2.6. Historical background to the deposition of the Słuszków I assemblage

The first Polish money from the times of Bolesław I the Brave and Mieszko II was issued in low numbers, and those coins constitute therefore a minor, almost imperceptible admixture among the Oriental and, above all, Western European coins circulating in Poland in the early 11th century. After the middle of the century, however, the national minting of Bolesław II the Bold and Władysław Herman began to develop on an unprecedented scale (Suchodolski 1973), and deniers with images of these rulers were produced in the Kraków workshop. Despite this, these issues still constituted a small part of the coinage used by the inhabitants of Poland at that time. This is confirmed by the few finds of coins of these two rulers, compared to the contemporary cross deniers.

At that time, cross deniers - coins already known from Polish finds from the second half of the 10th century - came to the fore in the composition of almost all deposits. These coins were distinguished from others by an obverse filled with illegible sequences of letters and signs imitating a legend. Only on older coins could the inscriptions **CRUX VERA**, **XPI**, **SCS PETRVS** as well as **OTTO**, **ODDO** and **EPERHARDVS EPC** be found.⁸ In their field were placed symbols of Christianity known from other Western European coins of the early mediaeval period: a cross, a schematic image of a temple and a chapel, the letters Alpha and Omega or a crosier. In addition, cross deniers were distinguished by a raised edge, much higher than that known from the coins of Bolesław the Bold and Władysław Herman. Such was the basis of monetary circulation in Poland in the second half of the 11th and early years of the 12th century. Its origin has been a disputed issue between Polish and German scholars for almost two centuries (as will be discussed in the chapter on the origin of cross deniers).

In the middle of the 12th century, deniers of Polish rulers were almost exclusively used in monetary circulation within the Polish state. In the fully preserved assemblage from Dąbrowa Górnicza-Łosień, deposited around 1160, among the 1125 coins it contained, there was only one cross denier (from the turn of the 11th and 12th centuries, with a depiction of a crosier which may have been minted in Saxony or Poland). The remaining silver coins: deniers of the princes Bolesław the Wrymouth, Władysław the Exile and Bolesław IV the Curly, came from domestic mints (Rozmus 2014). The process of transition from foreign to Polish coinage began as early as the 11th century, as is evidenced by the content of the monetary hoards from the reign of Władysław Herman. Analysing hoards of coins from Poland from the late eleventh and early twelfth centuries, one may wonder whether a period of domination of domestic coinage had already occurred at that time, mainly in the form of imitations of cross deniers of later issues, which are known from numerous finds in Poland. Such a period of domination certainly occurred during the independent reign of Bolesław III the Wrymouth, who – in view of the cessation of the influx of Saxon coinage – put

⁸ The latter two legends found on the few cross deniers discovered in Poland refer to their coin issuers.

the country's money market in order, while at the same time preparing for the introduction of a system of cyclical money exchange (Suchodolski 1973).

This work describes the problems of identifying Polish varieties of cross deniers. Their appearance is associated with the turbulent period of changes taking place in the Polish monarchy at the end of the 11th and the beginning of the 12th century. The beginning of the production of Polish varieties of cross denars can be dated for the period from the assumption of power by Prince Władysław I Herman and the start of his mint production. These events are related to the penultimate decade of the 11th century.

The Duke took the throne as a result of the revolt of the nobles against the previous king Bolesław II, who was the older brother of Władysław. The revolt was supported by the bishop of Kraków, Stanisław from Szczepanów. The execution of the clergyman for participating in the revolt finally led to the removal of Bolesław the Bold from the throne (Gallus Anonimus, Book 1, ch. 27, p. 51-52).

The end of the period of production of cross deniers type V-VII is considered to be the end of the reign of Duke Zbigniew, son of Władysław Herman, in Greater Poland until his exile in 1106.

When researching the origin and chronology of the later issues of cross deniers, it is important to take into account the political events in Poland of the late 11th and early 12th centuries. Unfortunately, there is a noticeable lack of written sources concerning this period. It is not known when exactly Władysław Herman took over the rule in Poland and what role he had played in the revolt against his predecessor, King Bolesław.⁹ Assuming the throne in such dramatic circumstances, he could not rely on his predecessor's existing allies: the Hungarians and Ruthenians. He had to seek agreement with his enemies: Vratislav of Bohemia and Emperor Henry IV. The alliance, maintained during the reign of the Bohemian ruler, was sealed by the marriage of the Polish duke with Judith, daughter of Vratislav and future mother of Bolesław the Wrymouth. On the other hand, Poland's improved relations with its western neighbour are evidenced by Władysław's recognition of the Emperor as superior, his move to the anti-papal camp, and the second marriage of the Polish duke to Judith of Swabia - Henry's sister. In time, relations with Hungary improved, as can be seen by the return of Mieszko (king Bolesław II's son) from there and with the Ruthenians - through his marriage to a Kyivan princess.

The troubled times of Bolesław II's reign, which may have strained Poland's economy, were probably followed by a period of rebuilding the country's economic potential, as well as attempts to

9 Some historians favour the idea of his active participation in the conspiracy. Tadeusz Wojciechowski (1904, 249-314) argued in favour of such an attitude on the part of Władysław, even in agreement with Bishop Stanisław, the Czechs and the Germans in a conspiracy against the king. However, other historians limited this event to actions only within the country (Abraham 1904; Brückner 1905, 31-33; Zakrzewski 1920, 76-77; Grodecki 1969, 60-61; Benyskiewicz 2010, 147-152). Some scholars have argued for the duke's passive attitude in the events of 1079 (Smolka 1909; Kętrzyński 1931, 171-175; Labuda 1981).

regain Pomerania, lost under Bolesław II. There must have been conflicts in the country between the supporters of Bolesław the Bold and the supporters of the new power, which was exercised on behalf of the duke by Sieciech (Kurtyka 1995-1996), the commander-in-chief and count palatine of Władysław Herman, a person enjoying the great trust by the new ruler. Sieciech was therefore the second most powerful figure in Poland apart from Władysław himself at the end of the 11th century. We do not know the origins of his political career; the chronicler Gallus Anonymous does not mention Sieciech in connection with the revolt of 1079, but only in connection with Herman's expedition against the Pomeranians and later in his description of the fate of Zbigniew, the ruler's elder son: *At this time, the count palatine was Sieciech, a wise man, good looking and of noble birth, but blinded by greed, through which he committed many cruel and unbearable acts. He sold some into slavery for trivial reasons, drove others out of the country, and elevated people of low estate above those of noble birth. As a result, many people left the country of their own free will, without being forced to do so, for fear of suffering the same fate through no fault of their own* (Gallus Anonymous, book 2, ch. 4, p. 66). By virtue of his position, the Count Palatine was hated by some of the magnates, yet he stood guard over the unity of the state. For this reason, the rebellions instigated by Herman's sons and their followers were mainly directed against him. The preference for his own supporters at the expense of former officials probably caused great tension in the country.

The first major events associated with this policy of Sieciech led to an opposition-inspired revolt by Władysław Herman's son Zbigniew. Duke Zbigniew was the first-born son of Herman, born around 1070-1073 from an informal union; his mother and Władysław's first wife was called "a concubine" by the chronicler Gallus Anonymous (book 2, ch. 4, p. 66). In the late 1080s, Zbigniew was sent for education to Kraków and then to the monastery at Quedlinburg, probably to remove him from the succession in favour of the younger Bolesław (Grodecki 1928, 76-77). Duke Zbigniew was brought back to the country in 1093 by the nobles rebelling against the rule of Władysław Herman, and above all against the privileged position of Sieciech. The conspirators were also joined by Magnus, the palatine of Wrocław (Trawkowski 1984). It is likely that this event may also have been inspired by the Bohemian duke Bretislav II, who still wanted to receive tribute for Silesia from the Poles after the death of Vratislav. Zbigniew's supporters put forward demands for the restoration of the succession rights of the elder brother and the removal of the Palatine from the ducal court. Władysław did not initially succeed in defeating the rebels, and the first of the opposition's demands was met. Thanks to Sieciech's diplomatic efforts, some of Zbigniew's supporters then went over to Herman's side. The young duke, having lost Silesia, fled to Kruszwica. There, probably in 1096, troops loyal to Władysław defeated the opposition, and Duke Zbigniew was imprisoned in the stronghold of Sieciech (Gallus Anonymous, book 2, ch. 5, p. 69). He probably regained his freedom as early as 1097, on the occasion of the consecration of Gniezno Cathedral (Gallus Anonymous, book 2, ch. 5, p. 70).

The second of the rebellions of the two sons, Zbigniew and the younger Bolesław the Wrymouth, began shortly afterwards, during the young dukes' expedition to Pomerania (Gallus Anonimus, book 2, ch. 7, p. 71). The brothers demanded that they be granted districts, which, thanks to Władysław's quick capitulation, they succeeded in obtaining. Zbigniew was granted Greater Poland and Bolesław received Silesia (although Władysław and his palatine retained power in the chief towns of the lands granted to his sons). From then on, the young Piast rulers were already able to issue their own money.

It is not known whether Bolesław III had ever minted cross deniers. Attempts may be made to connect with his person the Wrocław issues of cross deniers with the image of the head, dated to the turn of the 11th and 12th centuries. The duke reigned in Silesia from 1097, so there is some probability that he could have been their issuer. However, it should be noted that Bolesław III had already minted deniers with his name on them in Silesia at that time (Nakielski 2013), so the cross deniers with the depiction of St John's head could rather have been issues of the Bishop of Wrocław. Bolesław the Wrymouth, taking possession of Silesia and Lesser Poland after 1102, minted coins at the Kraków mint depicting the duke-knight and bearing his name (Śnieżko 2018). Cross deniers were probably produced by his older brother Zbigniew, but after losing the war in 1106 and leaving Greater Poland, he probably stopped minting them (Kędzierski 2005). The unique numismatic material from the Słuszków I hoard, which is chronologically linked mainly to the late 11th and early 12th centuries, supports such a time frame.

The third rebellion, probably beginning in 1100, was triggered by an alleged attempt by Sieciech to assassinate Bolesław the Wrymouth. The two sons marched from Wrocław against Władysław and his official. Peace talks took place at Żarnowiec, during which the old duke undertook to dismiss Sieciech. However, Władysław broke his promise and secretly went to join the count palatine Sieciech, who was supposed to be in his stronghold in Sieciechów at the time. This turn of events outraged the young dukes and the magnates associated with them. The brothers then decided to occupy their father's remaining districts: Bolesław took Lesser Poland, and Zbigniew occupied Mazovia. Herman pre-empted his elder son's attack and took Płock. The dispute was, however, prevented from beginning another military conflict thanks to the mediation of the Archbishop of Gniezno, Marcin. This resulted in an agreement according to which Sieciech was removed from the political life of the country and had to leave Poland (Gallus Anonimus, book 2, ch. 16, p. 81). It is to be assumed that it was around 1100 at the latest that he definitively ended his minting activities, although this may have been as early as 1097. Sieciech eventually returned to the country, but he never again held any important state functions.

Władysław Herman died in 1102, but even before his death, the first conflicts between his sons began to occur (Maleczyński 1975, 50-51). The country was divided into two independent parts. The district of the elder son, Zbigniew, included Greater Poland, Kuyavia and Mazovia, while the lands of the younger son, Bolesław, included Lesser Poland and Silesia (Fig. 20).



Fig. 20. Poland between 1002 and 1106/7 by Wýrozumski 1999: Blue colour - Duke Zbigniew district, Orange colour - District of Duke Boleslaw the Wrymouth, 1-Kalisz, 2-Śluzków (prepared by D.Wyczółkowski)

Zbigniew's supporters included Archbishop Marcin and part of the episcopate. Bolesław was supported by members of the Prawdzic and Turzym families (Maleczyński 1975, 54-55). Thanks to an efficient foreign policy, Bolesław managed over time to normalise relations with most of his formerly hostile neighbours, who had previously been bound by an alliance with Zbigniew, and by making several expeditions to Pomerania, he ravaged the lands of his older brother's pagan allies.

The showdown with Zbigniew took place at the end of 1106, when Bolesław swiftly defeated his elder brother's army. It was at this time that Zbigniew's minting came to an end in Greater Poland. As a result of losing the war, he recognised Bolesław's supremacy and received Mazovia from him as a fief. Unfortunately, it is not known whether Zbigniew managed to start minting activities during his short-lived rule in that district. At the turn of 1107 and 1108, Bolesław attacked and defeated Zbigniew under the pretext of him failing to supply troops for the Pomeranian expedition, and Zbigniew never ruled any district in the country again (Barański 2005, 172-208). Poland became a single state organism, although the supporters of Duke Zbigniew were still active for some time after his exile. In 1108, Zbigniew's supporters were said to have

defended themselves in one of the strongholds, and only capitulated in the face of the superior forces of Bolesław the Wrymouth and the Russo-Hungarian army (Gallus Anonimus, book 2, ch. 41, p. 107; Maleczyński 1975, 55). The production of cross deniers in Poland ceased during the independent reign of Bolesław the Wrymouth and they were replaced by ducal coins, minted at the Kraków mint.

2.7. The Słuszków II hoard

As already mentioned, fieldwork carried out in 2020 produced a new and unexpected find in the form of another hoard from Słuszków. The Słuszków II deposit is dated, like the Słuszków I hoard, to the early 12th century. During surface work connected with the search for the Słuszków I deposition site, several cross deniers were found using a metal detector. A trench of 1 m² was marked out at the site. In it, a ceramic vessel filled with coins was discovered. The pot was buried shallowly, about 30 cm below ground level, and the top of the vessel had been damaged by ploughing in the past. At the time of the discovery, the findspot was in an unused fragment of an arable field, near the Koscieliec - Dzierzbin road (Fig. 21).

Archaeological investigations carried out in 2021 revealed that the hoard of Słuszków II, had been hidden near a residential building. In its filling, fragments of early mediaeval vessels, animal bones, as well as one cross denier with a representation of a crosier, dated to the turn of the 11th and 12th centuries, were discovered. Also in the vicinity of where the silver was buried, a hearth where lead was melted was discovered. Lead lumps were deposited in burnt sand, which was under a layer of charcoal. Unfortunately, numerous modern objects and layers exposed near a vessel containing the treasure prevented the determination of a more precise relationship between early medieval objects and deposit.

The vessel was x-rayed using tomography prior to its exploration. From the analysis of the images, it can be concluded that the contents had been packed in at least three pouches, the outlines of which were captured on the tomographic image. Everything was placed in a basket made of bark. The vessel contained 6,700 artefacts, mainly coins and silver ingots.

Based on a preliminary analysis, it can be concluded that the assemblage of newly discovered coins resembles those previously known from the Słuszków I hoard. It consists mainly of the latest issues of cross deniers (Fig. 22). There are a few Type I deniers with a representation of a temple, and a few of Type II with a representation of a chapel as well as of Type IV with the letter **S**. There were also single examples of Type VI deniers with the inscription **ETO**, and examples with an image of St John's head and with a glove and a banner. The most numerous types of cross deniers found in the composition of the Słuszków II hoard are coins of types V, VI and VII (according to Marian Gumowski's 1939 classification), mostly dated to the turn of the 11th and 12th centuries.



Fig. 21. Trench with a vessel filled with coins and gold and silver objects. West side view (photo A. Kędzierski)

Among them were cross deniers with a simple cross of the CNP 858 variety - attributed to Władysław Herman (Kędzierski 2011b) and CNP 813, CNP 867-868 - to Duke Zbigniew (Kędzierski 2005), as well as large and small deniers of count palatine Sieciech (Suchodolski 1987, 13-44; Kędzierski 1998b). Against this background, the presence in the Słuszków II assemblage of a single fragment of a Kraków coin of Władysław Herman is interesting. It should be noted that in the surviving part of the Słuszków I hoard, no issue of the official coins of Polish dukes was recorded. Foreign coins, apart from some mainly older varieties of cross deniers, include German, Bohemian and Moravian deniers, Hungarian deniers and imitations of Danish coinage. The oldest of these can be dated to the turn of the 10th and 11th centuries. The latest of the foreign issues is a denier of Ladislaus I - King of Hungary (Huszár 1979, no. 24), minted after 1080. The latest coins in the assemblage include the above-mentioned fragment of a denier of Władysław Herman from the Kraków mint, also dated to after 1080. However, it seems that the latest coins in the newly discovered hoard, as well as in the Słuszków I hoard, are the cross deniers CNP 867-868, associated with Duke Zbigniew and dated to around 1105 (Kędzierski 2005). Unlike the previously discovered deposit, which had contained a larger number of silver items, but no gold ones, the Słuszków II hoard contained only two fragments of silver ornaments. Gold jewellery was, however, discovered in the latter, in the form of two wedding bands and two rings (Fig. 23).

One of the bands from the Słuszków II find belongs to a type of polygonal rings with 14 undecorated sides, a form that appears from the Roman period onwards. The second band is smaller. It has 20 indentations on its outer perimeter with an inscription in Cyrillic letters. According to Adrian Jusupović's reading of the inscription, it is an invocation "[Господ]и помъзи [ра]бесвое[и] Марии / *Lord help thy handmaid Maria*".¹⁰ The other two gold ornaments are rings with hoops made of thick, beaded wire, to which baskets of gold sheet decorated with gold granules have been soldered. Beads made of glass were attached to them. The settings of the beads are additionally decorated on the edges with gold granules. Due to the way they were made, these objects can be dated to the 11th-12th century (Duczko *et al.* 2022). The discovery of two large hoards in Słuszków and the presence in one of them of several entire gold ornaments,¹¹ unknown from other hoards from the reigns of Prince Władysław Herman and Duke Zbigniew, and probably related to the owners of the hoard, makes these one of the most interesting deposits from this area of Poland, certainly not hidden here by chance.



Fig. 22. Cross deniers from the Słuszków II hoard (photo A. Kędzierski)

10 For the identification and translation of the inscription, many thanks to Dr Adrian Jusupović, Professor at the Institute of History of the Polish Academy of Sciences; "Nauka w Polsce" portal <https://naukawpolsce.pap.pl/aktualnosci/news%2C85476%2Ckalisz-obraczki-i-pierscionki-wsrod-odnalezionych-sredniowiecznych-monet>.

11 In early mediaeval hoards from the Polish area, it is extremely rare to find gold jewellery. This is particularly the case when it consists of whole objects rather than gold scrap. Among the gold artefacts preserved in their entirety in other deposits are gold beads from the hoard from Borucin in the Aleksandrów district, dated to the mid-11th century (Gorlińska *et al.* 2015, no. 10). A ring, preserved in its entirety, was thought to be in the hoard from Kolbudy, Pruszcz County, which was probably hidden in the 10th century (Horoszko *et al.* 2016, no. 111).



Fig. 23. Gold rings from the Słuszków II hoard (photo A. Kędzierski)

3. Typology

3.1 Preliminary remarks

In the Słuszków I hoard, older cross deniers are scarce, while those from the end of the 11th and early 12th century are surprisingly numerous, which is unprecedented in other hoards. They are also of varieties previously unknown to science and not recorded in any older scientific studies. This chapter presents the author's new classification of the three most numerous types of cross deniers in the Słuszków hoard, varieties produced from around 1080 to the first years of the 12th century, when their minting probably ceased. The three types are: the examples with the image of a cross in a wreath of beads, those with a simple cross and a group with a crosier on the obverse. This typology is the basis for further consideration of the metrology, chronology and origin of these coins, presented in the following sections of the work.

3.2 Typological divisions of cross deniers to date

Among Polish scholars, the first classification of cross deniers was presented by Kazimierz Stronczyński (1883, 45-56, table IV). The author divided the coins into nine types with depictions of a simple cross, a beaded cross, a crosier, the right hand of God, an obol with a representation of a head, a banner and a crosier, as well as the head of St John - from the Wrocław mint, another with a presumed inscription *KAZ(imirus) POL(onie)* and a ninth with a count palatine mark (Fig. 24). Within the types, he distinguished varieties without regard to their chronology, except perhaps for the coins with a representation of a crosier.

Another attempt to classify cross deniers was the interesting typological division made by Walery Kostrzębski (1900, 258). This researcher divided them into four groups, bearing in mind the representations on the obverses. Within them, he distinguished groups called here types and varieties. The first section (I), which included coins with a simple cross on the obverse, was divided by the author into five types,¹² and these in turn were split into several or a dozen varieties, generally maintaining chronological order (Fig. 25). The second section (II) covered deniers with a beaded cross, where the oldest specimens (type A) bore the image of the Jerusalem cross, later ones depicted a patriarchal cross without dashes between the spheres (B), then specimens with a wreath of beads in the line of a quadrilateral around the cross (C) and a circle (D) were presented, and finally a cross with pointed ends in a circle of dots (E).

¹² The author did not include in his classification any of the earliest deniers issues with the representation of a simple cross with 'full' spheres between its arms, including the Type VI deniers of the common CNP 858 variety.

IV

Monety za panowania RYXY i KAŻMIRZA 1: 10034-1058 Wyłączny, a długo jeszcze potem powszechny obieg w Polsce mająca blisko do roku 1100

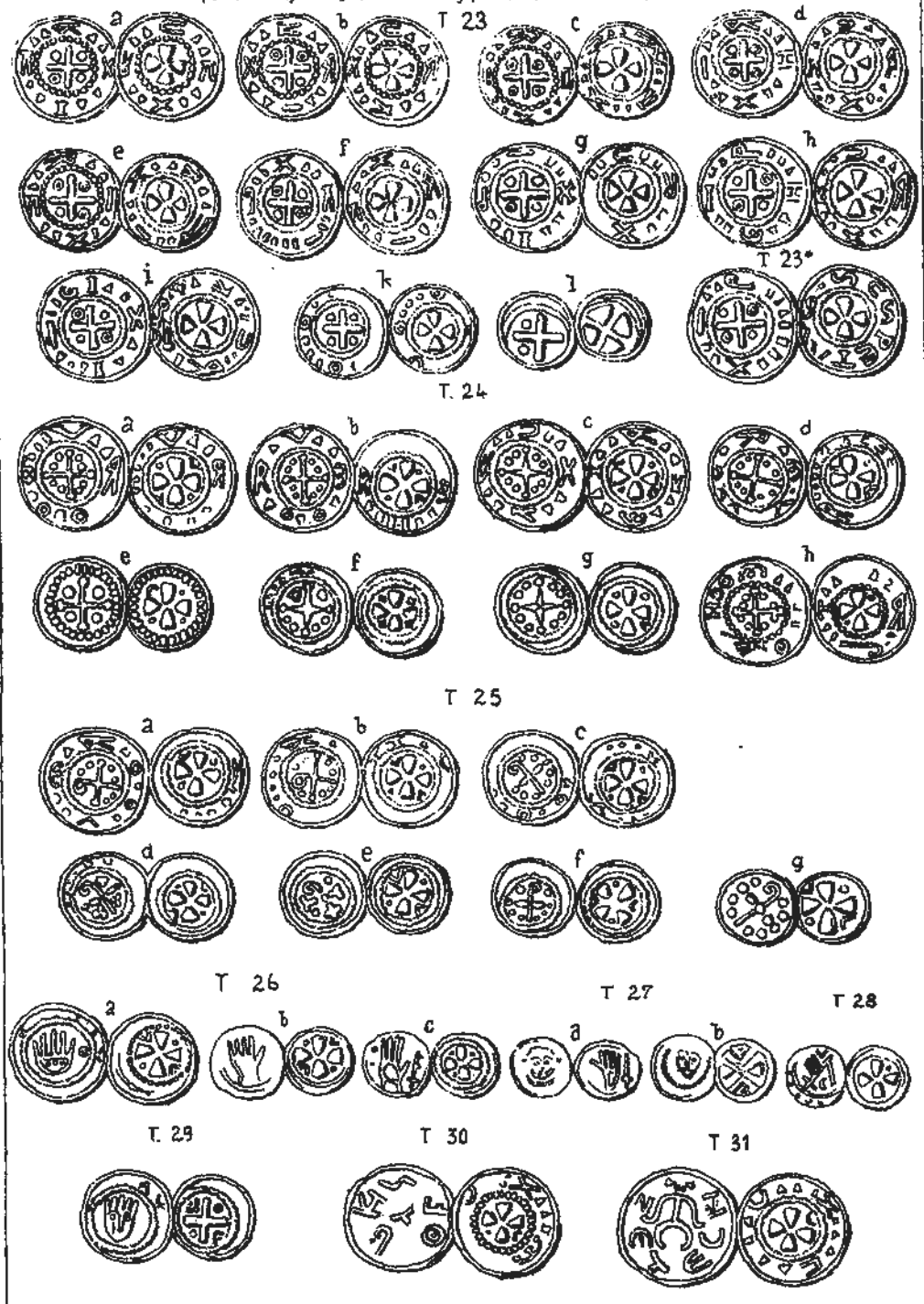


Fig. 24. Typology of cross deniers according to K. Stronczynski, T23-T31 (1883)

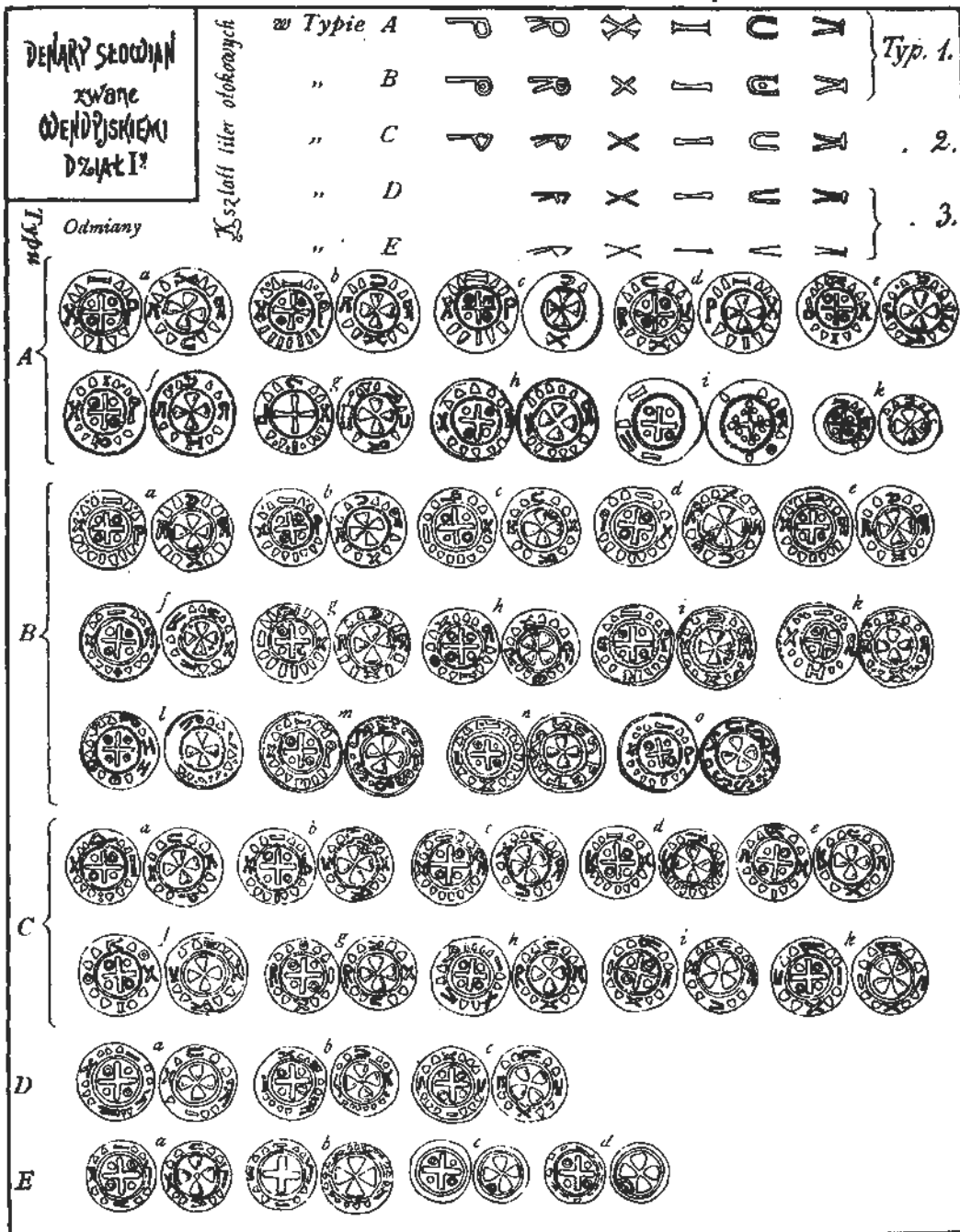


Fig. 25: Cross deniers of group I according to the typology of W. Kostrzębski (1900)

Cross deniers with a depiction of a crosier - group III (Fig. 26) - were divided into an older type crossed with a dash (A) and a later type in the form of a sphere with two triangles (B). The remaining types, as they are rare in the Polish lands, were assigned by the researcher to group IV. The author of this classification dealt mainly with later material and did not include a considerable number of varieties from the first half of the 11th century.

The most complete typology of cross deniers was developed by Marian Gumowski (1939). This is the most widely used classification of this type of coin in Poland to this day. The author divided deniers and cross obols into eight main types (Fig. 27).

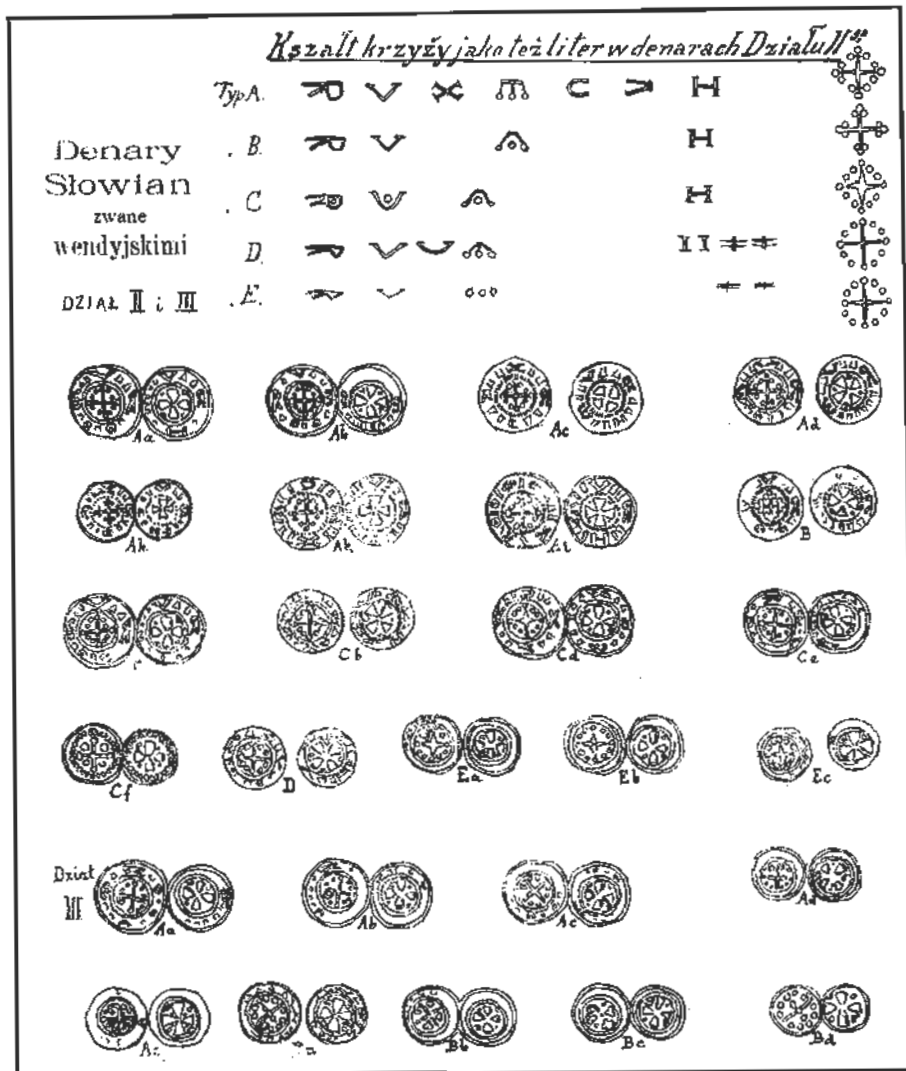


Fig. 26. Cross deniers according to the typology of W. Kostrzębski (1900) - groups II and III

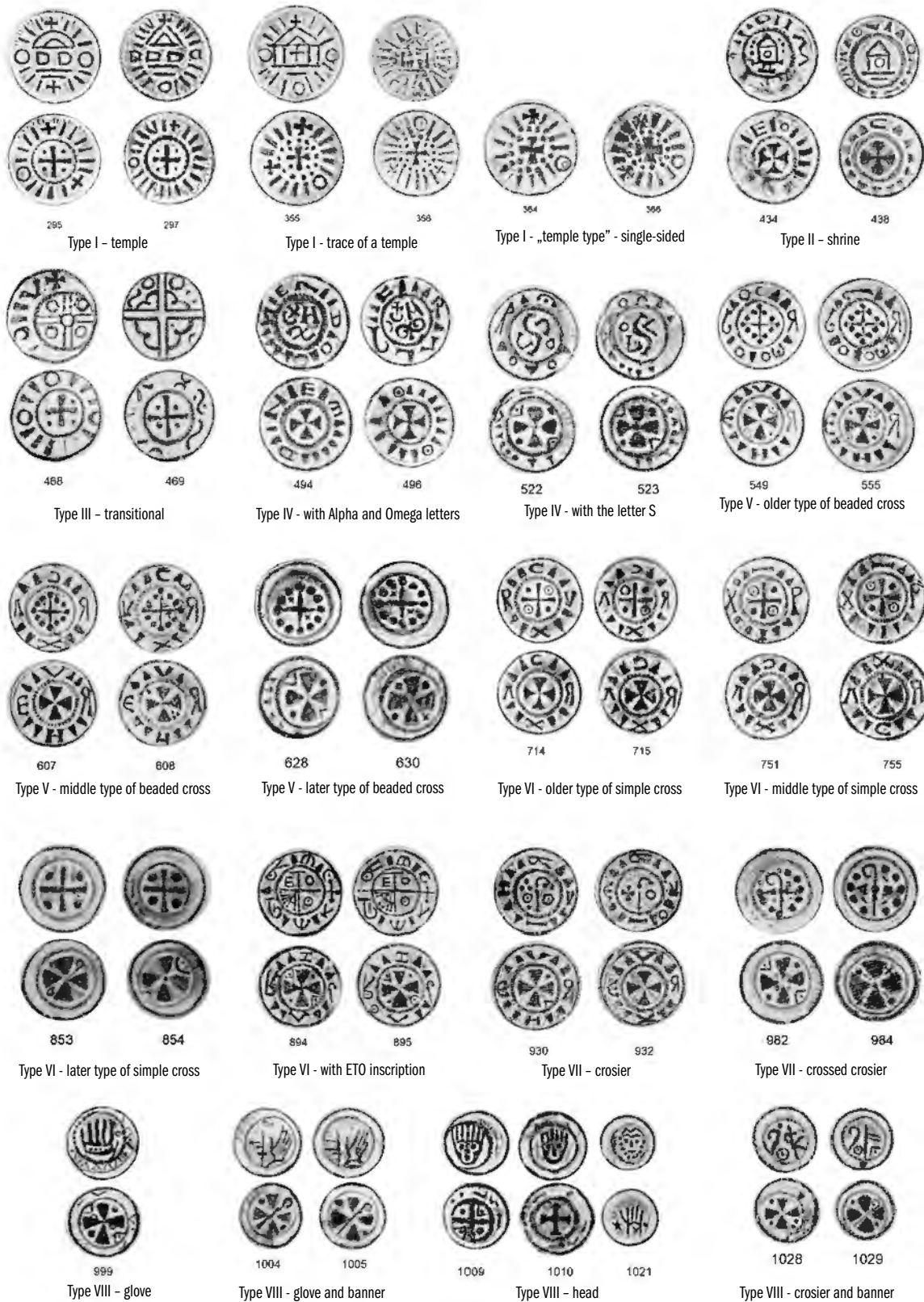


Fig. 27. Representations of example varieties of cross deniers according to CNP types by M. Gumowski (1939)

Gumowski divided Type V cross deniers into subtypes, depending on the form of the representation of the wreath of beads around the image of the cross. The older ones form the wreath of beads in the shape of a rectangle in the coin field, and the later ones in the form of a circle.

The specimens classified as Type VI have been graded into three subtypes: older, middle and later. This division is less clear than in the previously discussed type, and is determined primarily by the diameters of the coins and the widths and contents of the outer fields.

Type VII consists of deniers with the image of a crosier. On the older ones, at most single marks can be found next to it. The later issues depict a crosier crossed with a 'sceptre'.

Although this classification is in places vague and general,¹³ which is difficult to avoid with such a large source material, researchers have used it successfully to date. At the level of types, Gumowski seems to have divided the material appropriately. One may have some doubts about the creation of Type III, with coins not matching other types, but the others are selected properly. The classification of coins of Type V needs to be corrected, for which, in the light of the analysis of the historical material, an additional subtype - 5A - should be distinguished (Kędzierski 2000). Also cross deniers classified as Type VI need to be separated into issues with a cross and spheres between the arms of the obverse cross and into specimens with the letters **ETO** in the obverse field - subtype 6A. Similarly, cross deniers of Type VIII should be divided into specimens with a glove - VIIIA, a head - VIIIB and a crosier and banner VIIIC (Kędzierski 2016c). Some of the aforementioned corrections had already been postulated some sixty years ago by Ryszard Kiersnowski (1961).

In 2003, a new division of cross deniers was proposed by Edmund Kopicki (2003a; 2003b). He divided the material into 14 groups according to representation:

- 1 - top of a temple,
- 2 - temple,
- 3 - cross pattée,
- 4 - shrine,
- 5 - images different from the basic ones,
- 6 - simple cross,
- 7 - beaded cross,
- 8 - crosier,
- 9 - Alpha and Omega,

¹³ The latest Type VII deniers, which are numerous in Poland and Polabia, are defined in the CNP by only a few varieties.

- 10 - letter **S**,
- 11 - letter **E**, banner and **ETO** inscription,
- 12 - God's right hand,
- 13 - head,
- 14 - crosier and banner.

This classification puts Marian Gumowski typological scheme into order, separating some of the types that he had previously distinguished (for example, Type VI into specimens with a simple cross and specimens with a banner bearing an ETO inscription). Kopicki division (Kopicki 2003), although it systematises cross deniers better than Gumowski's classification (Gumowski 1939), did not catch on among researchers and numismatists. Perhaps this is due to the presentation of fewer varieties within types than in Gumowski's division.

Before Polish numismatists took up the subject, a classification of deniers and cross obols had been made by the German scholar Hermann Dannenberg (1876, 488-496). He distinguished 12 types of cross deniers:

- 1 - a temple on the obverse and a simple cross on the reverse,
- 2 - a shrine and a cross pattée,
- 3 - Alpha and Omega on one side and a cross pattée on the other,
- 4 - patriarchal cross with a wreath of beads and a cross pattée,
- 5 - a beaded cross or a crosier on one side and a cross pattée on the other,
- 6 - a simple cross and a cross pattée,
- 7 - a banner with tassels and the letters ECA on the obverse and a cross pattée on the reverse,
- 8 - a patriarchal cross with beads on one side and a double cross in a frame of four semicircles on the other,
- 9 - a glove on one side and a cross pattée on the other,
- 10 - a crosier and a banner on the obverse and a cross pattée with a crosier on the reverse,
- 11 - a head *en face* on one side and two arms of a cross pattée between two rows of beads and the letters V with a dot on the other side,
- 12 - a crown on the obverse and a cross with two arms with a sphere in the centre on the reverse.

Dannenberg's classification (Fig. 28) is very general. It takes into account the varieties of cross deniers known to the researcher, which were arranged inconsistently both in terms of metrology and associated chronology and in terms of the imagery on the coins.

Today this classification is rarely used, mainly by German researchers. It is impossible to use only this typology in the study of cross deniers hoards from the late 11th or early 12th centuries. However, it must not be forgotten that this was the first serious attempt to classify cross deniers, and was included in a fundamental work on early medieval German minting (Dannenberg 1876), where the cross deniers accounted for a small proportion of the material described.

Twenty years ago, Christoph Kilger, based on the typological descriptions of H. Dannenberg and M. Gumowski, presented a classification of cross deniers that was organised in terms of assigning the coins to the places of production that he distinguished (Kilger 2000). He divided the oldest ones with a representation of a temple into four groups: from Magdeburg (KN group 1), Bardowick and Bremen (KN group 2), Seligenstadt, Gittelde and Goslar (KN 3) and Halle-Giebichenstein (KN 4). He classified coins with the image of a chapel as creations of the mints at Magdeburg (MgHP) and Halle-Giebichenstein (MgHP 2-3). The specimens classified as Type III according to Gumowski - were considered to be the products of the Saale area (CNP 472 as group Sal? A, and CNP 473-475 as group Sal? B. Coins of Type IV were attributed by Ch. Kilger to the Merseburg workshop, and further separated into groups: older ones with the image of Alpha and Omega (group Sal C 1) and later ones with the letter **S** (group Sal C 2). He attributed deniers with the depiction of a simple cross on the obverse to the mints in the southern Saale region, in Naumburg and also to those in Poland (Sal D 1-4 - 5.1.4), placing in this set also a denier with the depiction of a simple cross on one side and a head with straggly hair on the other (CNP 1007-1013 as Sal D 5). He divided the deniers with the depiction of a crosier into older ones without crossing (Sal E 1-2) - from the workshops in Halle-Giebichenstein, Merseburg and Wallhausen - and into later ones with a 'sceptre' (Sal E 3-4), produced at the mints in Halle-Giebichenstein, Merseburg and also in Poland. Deniers and obols of Type VIII, with the depiction of a hand, a hand and a banner, and a crosier with a banner, were attributed to the Halle-Giebichenstein centre (Sal F). Coins with a representation of a head (Sal G) were also supposed to have originated from here. A large group of coins with the depiction of a cross in a wreath of beads was attributed by this author to the Meissen mint, separating the artefacts into two groups: with the depiction of a cross in a quadrangular wreath (Mol A 1-4) and those where the beads form a circle (Mol A 5). Due to the similarities of the reverse of the coins attributed to the Meissen workshop, the author also included cross deniers with the **ETO** inscription in the obverse field (Mol B 1-2) in this group.

Ch. Kilger's division is very interesting, as it was created taking into account the origin of cross deniers. However, the attribution of certain types and varieties, which are after all anonymous coins, to specific mint centres is questionable.

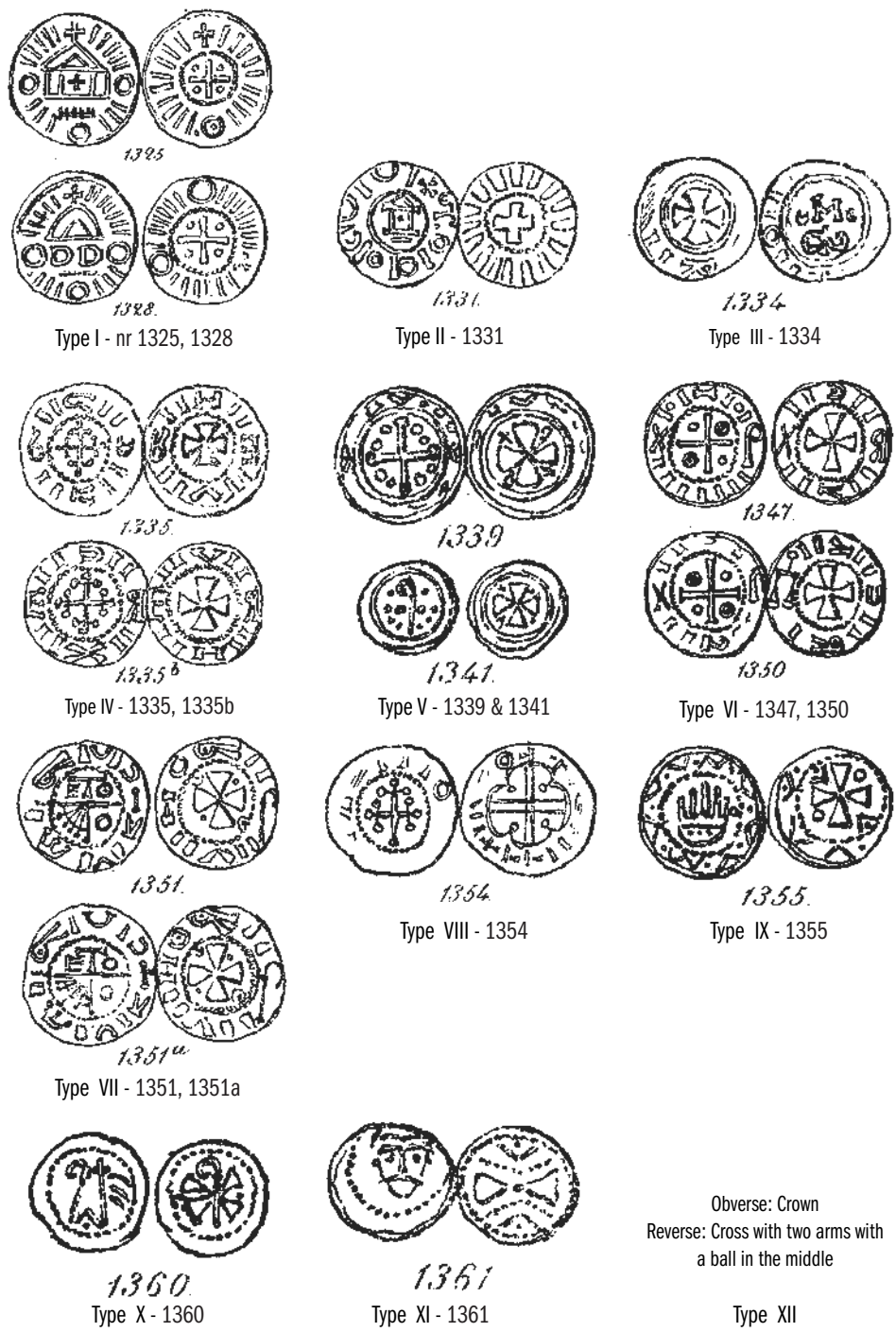


Fig. 28. Typology of cross deniers according to H. Dannenberg (1876)

3.3 New typology of cross deniers of types V, VI and VII

In the initial phase of researching the latest cross deniers from the Słuszków I hoard, the present work used the division proposed by Marian Gumowski, which is certainly the most complete attempt to classify this type of coins. However, the absence of many varieties of the latest cross deniers in his study necessitated creating a new classification of these coins at the level of groups (intermediate units between types and varieties), and especially of varieties, with Gumowski's main division into types remaining in use, apart from minor corrections.

In the material from Słuszków I, groups of varieties were distinguished, bringing together coins with similar morphological characteristics in the types concerned. The images on the obverses were considered to be of primary importance and they usually constituted the basis for distinguishing groups and varieties. This work however does not include the creation of a new classification for the remaining types of coins from the end of the 11th and beginning of the 12th century coming from the first hoard from Słuszków, but occurring in its composition in small numbers.¹⁴

The later varieties of deniers with the depiction of a cross within a wreath of beads on the obverse have been designated after Gumowski as Type V. I have divided these coins into six groups because of the arrangement of the beads around the cross:

- A - inner and outer wreath,
- B - incomplete wreath of beads (less than 12),
- C - full wreath of beads (12 beads in a wreath),
- D - large wreath of beads (more than 12 beads),
- E - wreath of 10 beads and the letter (sign) **V**,
- F - wreath of eight beads with two circles,
- G - wreath of 16 beads in the coin's outer field, in the centre a cross composed of dots

A small number of deniers with the depiction of a cross in a wreath of beads, similar to Type VII issues, were also included in Type V. The two arms of the cross on the obverse resemble the crossing of a crosier, such as on the later issues of Type VII cross deniers. Although the representation of the obverse is very reminiscent of the design of deniers with a crosier, it is formally a cross within a wreath of beads. To distinguish such coins from the other Type V coins, they were classified as VA (Kędzierski 2000).

¹⁴ The few cross deniers known from the deposit of Słuszków I with the representation of the letter **S**, hand, and banner were designated according to CNP varieties.

Coins depicting a simple cross on the obverse were designated, after M. Gumowski, as Type VI. Taking into account the marks between the arms of the simple cross on the obverse, as well as the shape of the high edge, they were divided into three groups of varieties:

- A - hollow or hollow and solid circles between the arms of the simple cross on the obverse, edge Type **a**,¹⁵
- B - hollow and solid circles between the arms of the simple cross. The group was separated on the basis of the high edge of Type **b** and **c**,
- C - solid circles between the arms of the simple cross, edge of Type **a**,
- D - no marks between the arms of the simple cross, Type **a** edge.

Type VII deniers (equivalent to CNP Type VII) bear the representation of a crossed crosier on the obverse. They are divided into two subtypes: VIIp (crook facing right) and VII (crook facing left). Cross deniers were further subdivided mainly by the size and shape of the curvature of the crook of the crosier, although some groups of varieties were also differentiated on the basis of the number and positioning of the beads next to the crosier, as well as the marks in the cross pattée on the reverse. The denier sub Type VIIp was divided into coin varieties:

- 7pA - with a representation of a crosier to the right with a wreath of five beads around the crosier and on the reverse a cross pattée with S9 marks,
- 7pB - with a representation of a crosier to the right with a small (s) and medium (m) crook on the obverse and a cross pattée with S9 marks on the reverse,
- 7pC - denier depicting a crosier with a large (l) crook on the obverse and a cross pattée with S9 marks on the reverse,
- 7pD - with depictions of crosiers with a rectangular crook on the obverse and a cross pattée with S9 marks on the reverse,
- 7pE - with a bead at the bottom of the crosier on the obverse and a cross pattée with S9 marks on the reverse,

¹⁵ The designation of the morphological elements of the cross deniers is given in the catalogue of the marks used. The patterns of representations shown there include some that occurred only on older varieties of deniers from the Służków I hoard, such as a quadrangular beaded wreath or a cross pattée with type "A" arms. The record was used in the description of deniers for the purposes of KBN Grant No. 0788/P1/94/06, *The Early Medieval Hoard of Coins from Służków near Kalisz. Polish origins of latter types of cross deniers (Wczesnośredniowieczny skarb monet z miejscowości Służków koło Kalisza. Polskie pochodzenie młodszych typów denarów krzyżowych)*, carried out by the author of the present work.

7pF - coins with the crosier to the right on the obverse and without marks or with marks other than S9 between the arms of the cross pattée on the reverse.

The cross deniers with the crosier facing to the left were divided into seven groups of varieties:

7A - with a crosier with a small (s) crook without marks beside it on the obverse and with a cross pattée with S9 marks on the reverse,

7B - with a crosier to the left with a medium sized (m) crook on the obverse and a cross pattée with S9 marks on the reverse,

7C - with crosiers with a large (l) crook on the obverse and with a cross pattée with S9 marks on the reverse,

7D - with a crosier with a large (l) crook with a Type 6a crossing on the obverse and a cross pattée with Type S9 markings on the reverse,

7E - coins struck with a damaged die with illegible upper part of the obverse and with a cross pattée with arms of Type 2F with S9 marks,

7F - with a dot at the bottom of the crosier on the obverse and with a cross pattée with S9 marks on the reverse,

7G - with crosiers pointing to the left on the obverse and without marks or with marks between the arms of the cross pattée other than S9 on the reverse.

3.3.1. Catalogue of the marks used to describe the cross deniers from the Słuszków I hoard

Below, the signs used for the description of deniers of types V-VII, applied in the analysis of the Słuszków I hoard¹⁶ are presented. The marks appearing on the obverses and reverses of the coins are presented separately, the main and supplementary marks are indicated, and the compositions of the marks are shown. These features include the shape of the cross: its structure and the shape of its arms (Fig. 29). In the case of the few coins of subType VA, on which the two arms are similar to the 'cross' known from the depictions on Type VII coins with a crosier, their schematic shape is shown (Fig. 29: 5-9). Also depicted in schematic renderings are the marks forming a circle of beads around

¹⁶ See footnote 4.

the cross on Type V deniers, consisting mainly of full circles (spheres), sometimes also of larger, 'empty' circles (Fig. 30). Further features included in the catalogue of marks are the points occurring between the arms of the cross on the obverse of Type V and VI cross deniers. These are usually spheres and circles, as well as crosses (Fig. 31). The obverses of Type VII cross deniers are described in four sections. First, crosiers were divided into five types based on the shape (Fig. 32) and size (s-small, m-medium, l-large) of the crook. The types of crossing of the crosier are then presented (Fig. 33), as well as the marks found on the crosier or inside its crook, and the rarer ones found on the outside. The last feature considered on Type VII coins was the Type of crosier crossing (Fig. 34). The next sections described the representations on the reverses of the deniers. The arrangement of the arms of the cross pattée (Fig. 36), the shape of its arms (Fig. 37), and the marks, occurring between the arms (Fig. 38), were analysed. The last feature considered in the catalogue was the representation of the types of raised edges of the rims of the cross deniers (Fig. 39).

Obverse

1. Shape of the cross

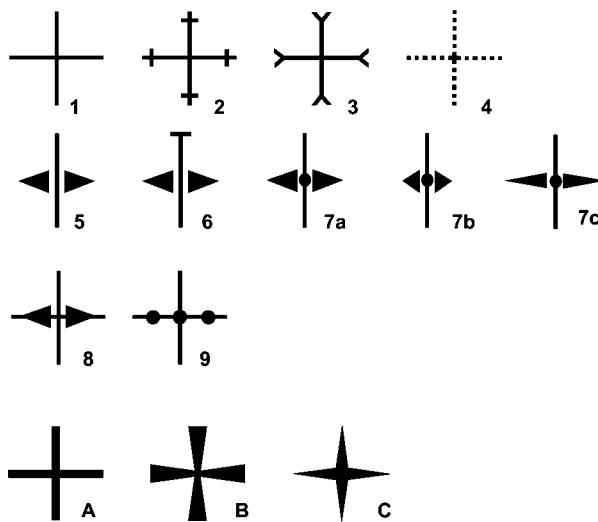


Fig. 29. Shape of the cross on the obverses of the cross deniers (by D. Wyczółkowski)

2. Ring/wreath of beads around the cross (for types V and VA)

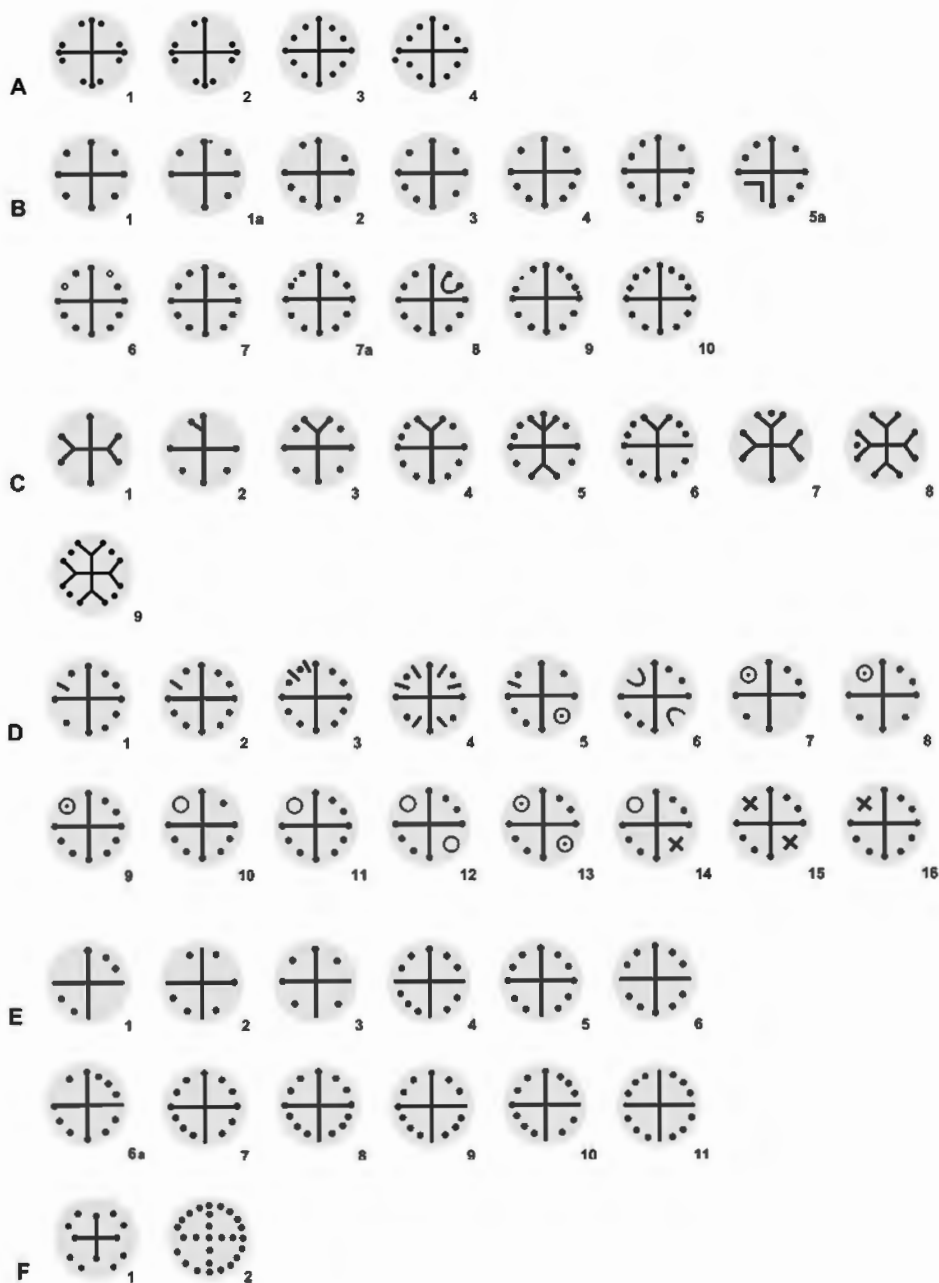


Fig. 30. Schematic arrangement of the bead band around the cross on the obverses of cross deniers (prepared by D. Wyczółkowski)

3. Marks between the arms of the cross

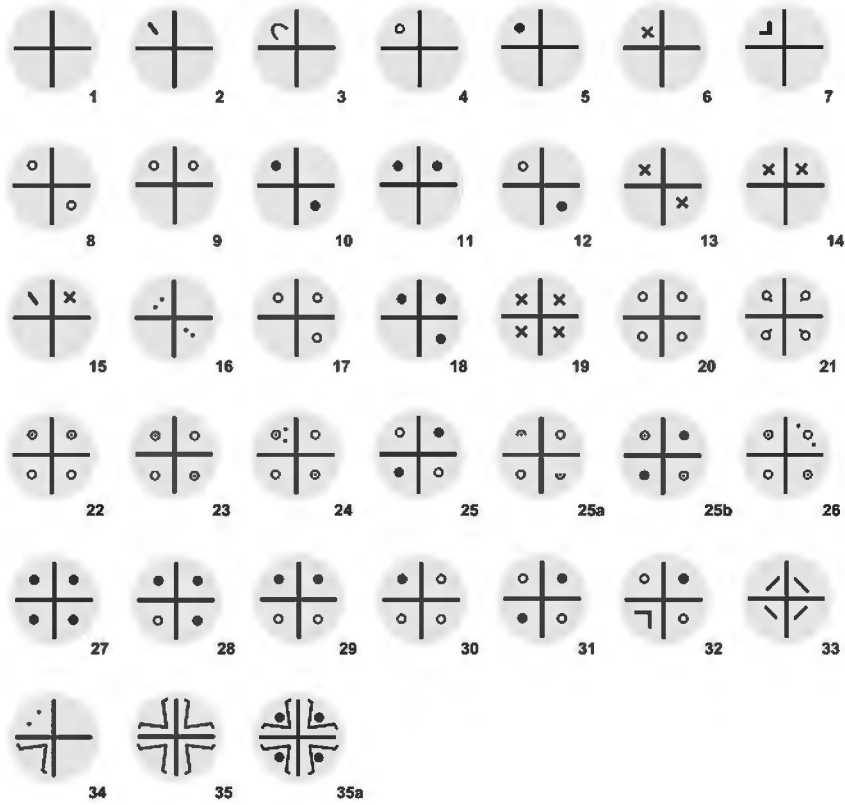


Fig. 31. Types of marks between the arms of the cross on the obverses of cross deniers and their arrangement (compiled by D. Wyczółkowski)

4. Size and shape of the crosier

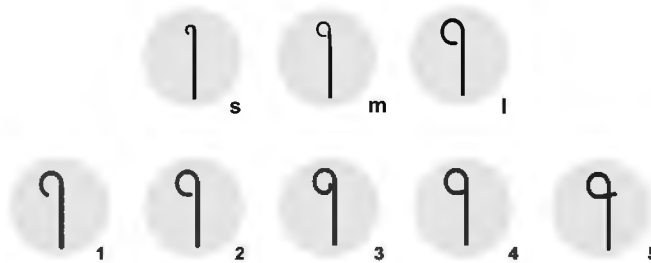


Fig. 32. Shape of the crosier on the obverses of the cross deniers (by D. Wyczółkowski)

5. Signs at the crosier

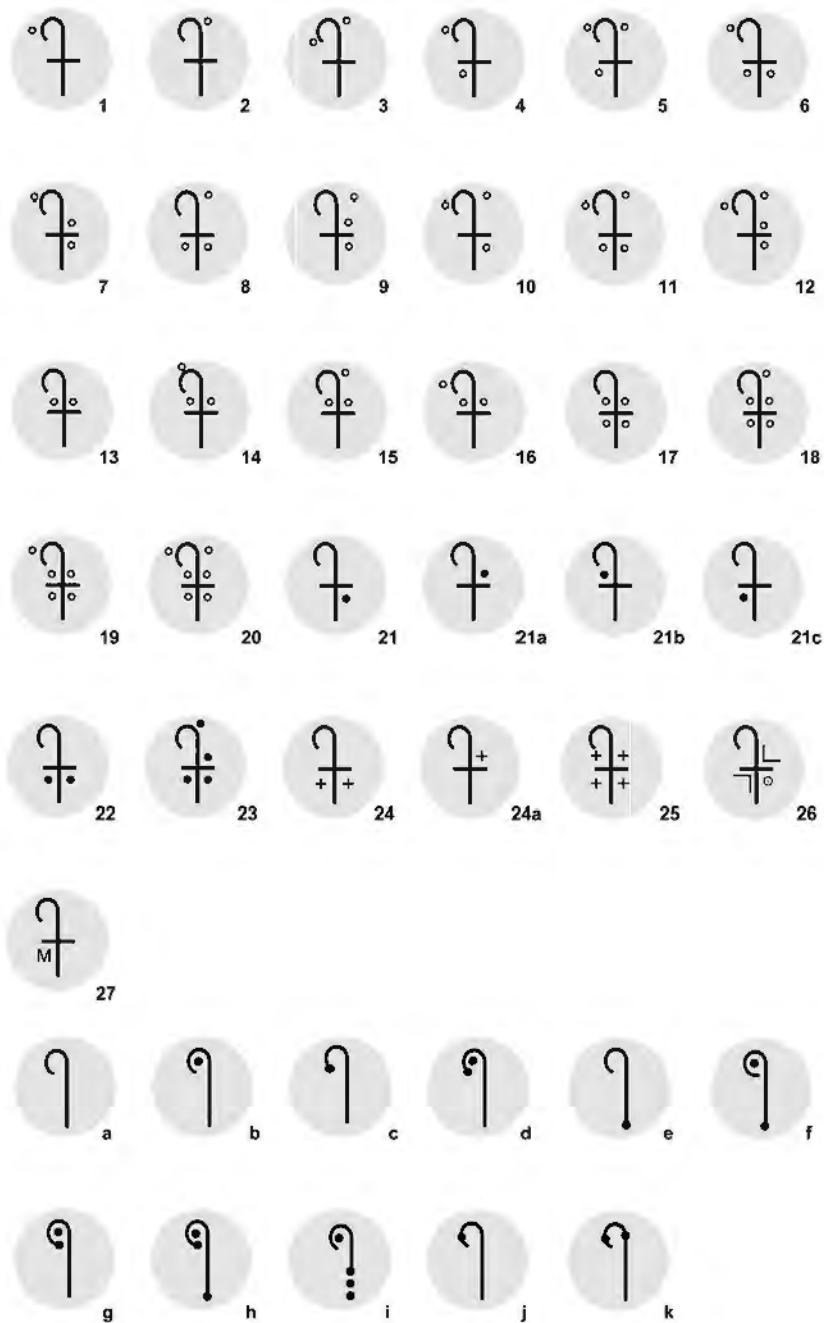


Fig. 33. Marks placed by the crosier on the obverses of the cross deniers - their type and distribution (marks inside and on the crosier a-k, marks outside the crosier 1-27) (compiled by D. Wyczółkowski)

6 Crossing of the crosier

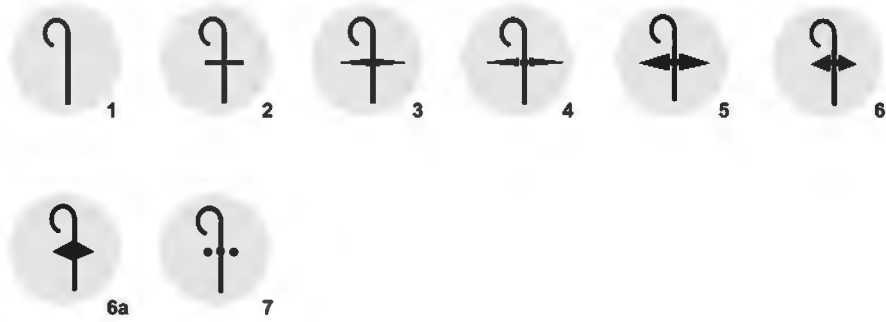


Fig. 34. Types of elements crossing the crosier on obverses of cross deniers
(compiled by D. Wyczółkowski)

7. Wreath around the crosier

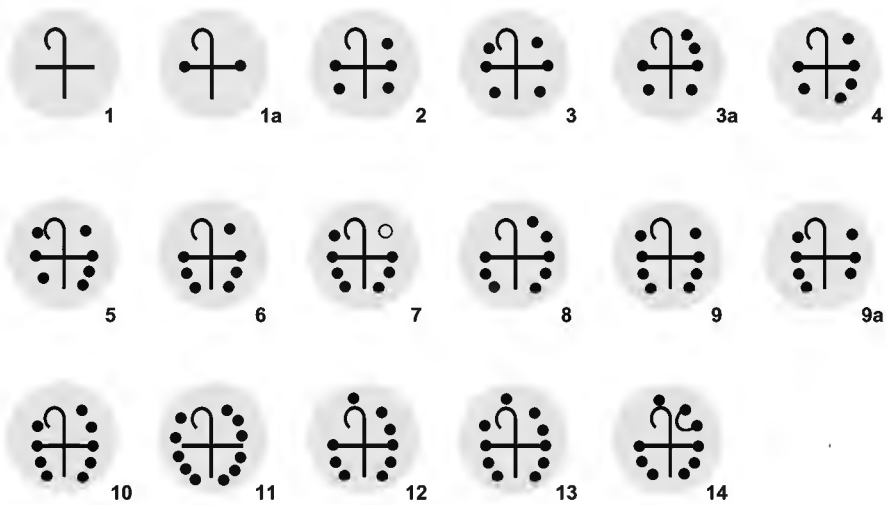


Fig. 35. Arrangement of the wreath around the crosier on the obverses of the cross deniers (compiled by
D. Wyczółkowski)

REVERSE:

8. Arrangement of arms of the cross pattée



Fig. 36. Arrangement of the arms of the cross pattée on the cross deniers reverses (prepared by: D. Wyczółkowski)

9. Shape of the arms of the cross

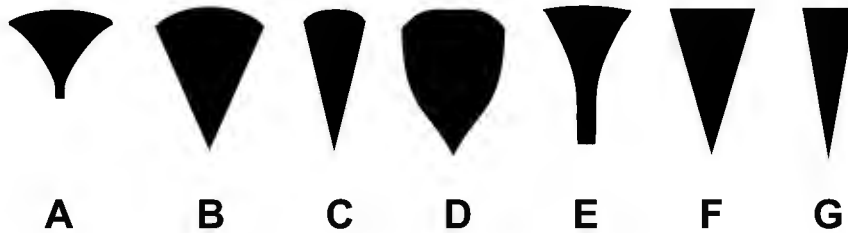
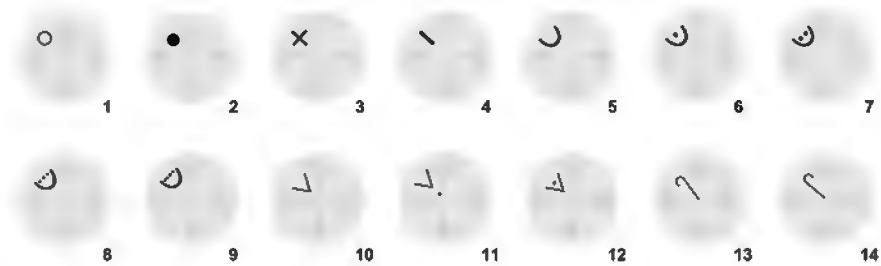


Fig. 37. Shape of the arms of the cross on the reverse of the cross deniers (by D. Wyczółkowski)

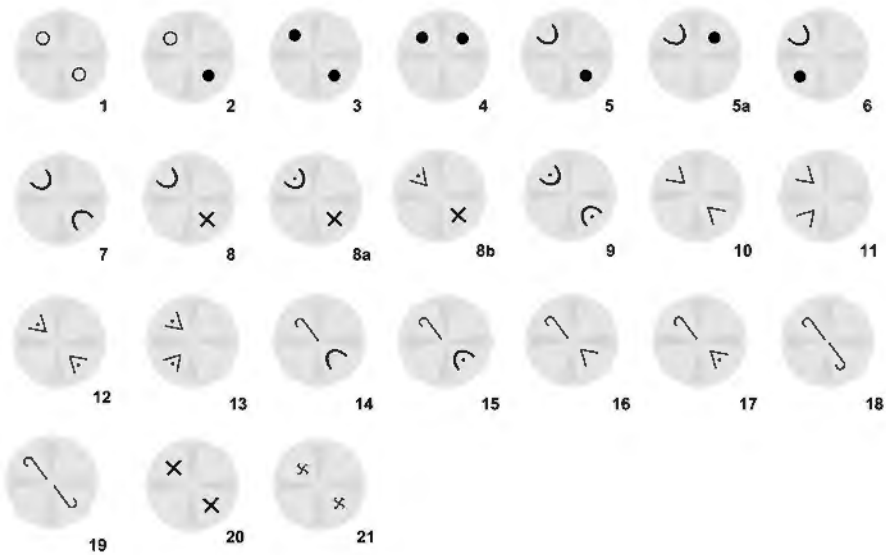
10. Marks between the arms of the cross pattée

01 - without signs

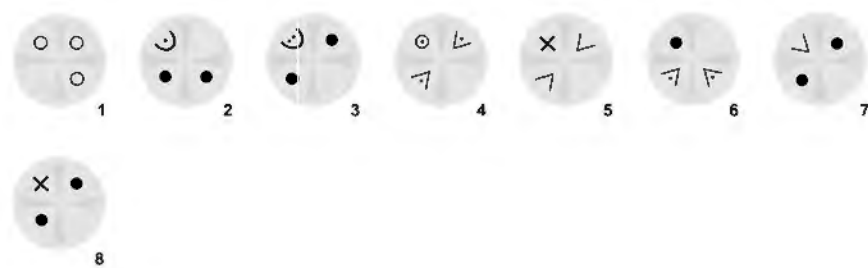
P - sign(s) in one corner



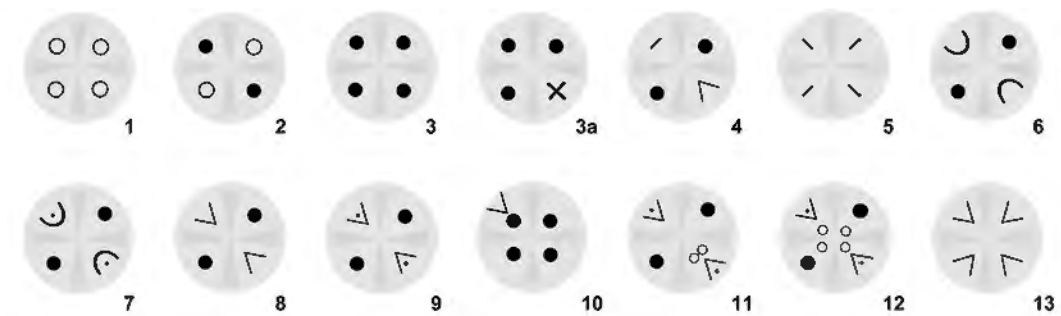
Q - marks in the two corners of the cross pattée



R - marks in the three corners of the cross pattée



S - marks in the four corners of the cross pattée



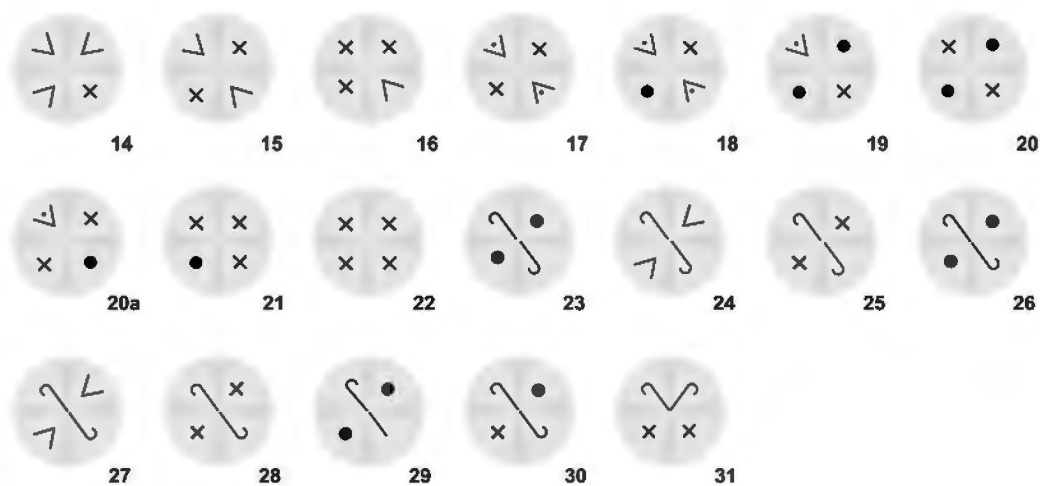


Fig. 38. Number and type of marks between the arms of the cross pattée on the reverse of cross deniers: 01 - no marks, P - mark(s) in one corner, Q - marks in two corners, R - marks in three corners, S - marks in four corners (compiled by D. Wyczółkowski)

11. Type of edge of cross deniers

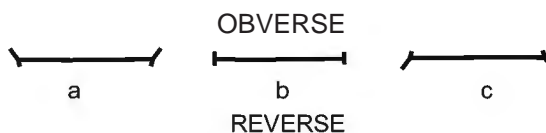


Fig. 39. Type of raised edge of cross deniers (compiled by A. Kędzierski)

3.3.2. Presentation of numismatic material from the Słuszków I hoard

This chapter presents the classification of the the hoard coins from the late eleventh and early twelfth centuries. They are designated by the code Sdm (**S**łuszków **d**enary **m**łodsze - Słuszków later deniers) according to types V, VI and VII marked with Arabic numerals, groups (capital letters) and subgroups (Arabic numerals) and varieties of cross deniers (small letters). Photographs of cross deniers within the varieties listed here are also presented. The photographs have been incorporated into the characteristics of each variety as an integral part of it and to illustrate the data contained in the tables immediately below them and the brief descriptions of the separated subgroups of cross deniers.¹⁷ The features concerning the images on the obverses and reverses of

¹⁷ Note: the images of the coins and the tables with coded features characterising the different varieties of deniers have not been individually numbered or included in the continuous numbering of the figures/tables used in the book, as their large number would make the rest of the work difficult to use. In the catalogue part, the identification of the coin data is therefore done by assigning them to types, groups and varieties of types.

the coins are described in the tables by numbers and letters. In the description of the coins, no attempt was made to take into account the depiction of pseudolegend marks in the obverse part of the coins was abandoned in the new classification of the later issues of cross deniers. Only a few of the varieties presented here contain a legible ‘inscription’. On some of the coins the pseudolegend marks have been partially destroyed by the subsequent formation after striking of the raised edge to the coin rim, and others, due to the size of the disc, have a much reduced outer field on which the pseudolegend marks have not been preserved. References to the classification of deniers presented in the CNP have also been included here.¹⁸ Each of the newly distinguished varieties of types V-VII also includes data on the number of whole specimens in the Słuszków I hoard, as well as weights and diameters: minimum, average and maximum within the subgroups, allowing a preliminary analysis of the material in terms of metrology. This description is supplemented by a commentary on the characteristic features of the particular sub-groups of coins.

3.4 Material

Varieties of cross deniers identified in the Słuszków I hoard

Legend

All coins are depicted at a scale of 2:1

Description of the columns in the coin metric table underneath the descriptions

Variety	Number of whole copies	Min. weight	Average weight	Max. weight	Min. Ø	Average Ø	Max. Ø

- 1 - cross shape
- 2 - wreath of beads around the cross
- 3 - marks between the arms of the cross
- 4 - shape of the crosier
- 5 - marks at the crosier
- 6 - type of crossing
- 7 - wreath of beads around the crosier
- 8 - arrangement of arms of the cross pattée
- 9 - shape of the arms of the cross pattée
- 10 - marks between the arms of the cross pattée

¹⁸ Where no counterpart was found for a cross denier in the Słuszków I hoard in the CNP, the coin was designated by reference to the obverse and reverse numbers given separately with the former before and the latter after the dash.

THE VARIETIES OF CROSS DENIERS IDENTIFIED IN THE SŁUSZKÓW I HOARD

A. Later varieties of Type V cross deniers

Group 5A - deniers with a wreath of 4 beads and an additional outer wreath of Type F1 (Fig. 30)

Sdm-5A1

The Sdm-5A1 variety of deniers is distinguished on the obverse by an unusual wreath of beads (F1) around the cross, arranged on the outer part of the coin's field. The reverse depicts a cross pattée with a characteristic shaping of the arms of the CG Type with S22 signs in the form of large crosses.



Sdm-5A1-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 672-673/654	1A	F1	1	2	CG	S22

Sdm-5A1-a	3	0,771	0,795	0,91	11,4	12,0	12,4
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Group 5B - deniers with an incomplete wreath of beads on the obverse of types B1, B3-5 and E2, E5 and E6 (Fig. 30)

Sdm-5B1

The Sdm-5B1 variety included very distinctive coins with a greatly reduced number of beads in the wreath - variant B1, a cross with A1 arms and V-shaped marks - Type '35'. On the reverse was depicted a cross pattée with Type D arms, probably with S9 marks.



Sdm-5B1	Obverse:			Reverse:		
Marks in the field	1	2	3	8	9	10
-CNP 652/ 672	1A	B1	35	2	D	S9 (?)

Sdm-5B1	14	0,654	0,812	1,032	11,4	11,8	12,9
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Sdm-5B2

The coin belonging to the Sdm-5B2 variety depicts on the obverse a wreath of beads of Type B1, like the deniers of the previous group with Type '35' marks, while on the reverse side a cross pattée of Type D with R8 marks between the arms.



Sdm-5B2-a	Obverse:			Reverse:		
Marks in the field	1	2	3	8	9	10
-CNP 624/642	1A	B1(?)	35	3(?)	D	R8 (?)

Sdm-5B2	1	0,93	0,93	0,93	13,2	13,2	13,2
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Sdm-5B3

Deniers of the Sdm-5B3 variety show large beads in a circle in the B3 variant with a Type 5 (?) mark between its arms. On the reverse is a cross pattée of the F-type arms with a large dot in the centre, with S9 marks between its arms.



Sdm-5B3-a	Obverse:			Reverse:		
Marks in the field	1	2	3	8	9	10
-CNP 651/652	1A	B3 (?)	5(?)	3	F	S9

Sdm-5B3	1	0,666	0,666	0,666	12,3	12,3	12,3
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Sdm-5B4

The coins of the Sdm-5B4 varieties depict a wreath composed of an incomplete number of beads (less than 12) around a cross with characteristic broad shoulders and clearly tapering at the ends of Type 1C. On the reverse, a cross pattée with S9 marks has been placed.



Sdm-5B4-a	Obverse:			Reverse:		
Marks in the field	1	2	3	8	9	10
-CNP 624	1C	B5	1	1	B	S9



Sdm-5B4-b	Obverse:			Reverse:		
Marks in the field	1	2	3	8	9	10
-CNP 624	1C	B5	1	2	B	S9



Sdm-5B4-c	Obverse:			Reverse:		
Marks in the field	1	2	3	8	9	10
-CNP 624	1C	B3	1	2	B	S9

Sdm-5B4	10	0,662	0,831	1,006	12,8	13,1	13,4
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Sdm-5B5

The coin included in the Sdm-5B5 variety depicts on the obverse a cross with wide arms of Type 1A with an incomplete number of beads. On the reverse, a cross pattée with Type 1B arms and S9 marks



Sdm-5B5-a	Obverse:			Reverse:			
Marks in the field	1	2	3	8	9	10	
-CNP 624	1A	B3	5	1	B	S9	
Sd-5B5-a	1	0,861	0,861	0,861	12,6	12,6	12,6

Sdm-5B6

The obverse of the coin depicts a cross with Type 1A arms in a circle of E5 (?) Type beads. The depiction on the reverse side is interesting: a cross pattée with Q16 marks. The die of this reverse was used to strike Type VI deniers of the Sdm-6C7-a variety.



Sdm-5B6-a	Obverse:			Reverse:		
Marks in the field	1	2	3	8	9	10
-CNP 655/851-852	1A	E5 (?)	1	2	D	Q16

Sdm-5B6-a	1	0,819	0,819	0,819	11,8	11,8	11,8
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Sdm-5B7

Coins of the Sdm-5B7 variety depict on the obverse an incomplete wreath of beads (E2) around a Type 1C cross. The reverse depicts a Type 1D cross pattée with S3a marks.



Sdm-5B7-a	Obverse:			Reverse:		
Marks in the field	1	2	3	8	9	10
-CNP 624/635	1C	E2 (?)	1	3	D	S3a

Sdm-5B7	2	0,771	0,907	1,044	12,9	13,35	13,8
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Sdm-5B8

Coins of the Sdm-5B8 variety have an obverse similar to specimens included in the Sdm-5B7 variety subgroup, but the reverse shows S3 marks between the arms of the cross pattée.



Sdm-5B8-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 624/672	1C	E5 (?)	1	1	D	S3

Sdm-5B8-a	28	0,647	0,846	1,024	12,5	13,1	14
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Sdm-5B9

The presented cross denier bears the representation of a cross with broad arms of Type 1A placed in a wreath of beads of variant B4. The reverse depicts a cross pattée with D-type arms with the rarer markings S22.



Sdm-5B9-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 624/631	1A	B4 (?)	1	3	D	S22

Sdm-5B9-a	1	0,855	0,855	0,855	13	13	13
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Sdm-5B10

The coin depicts a Type 1A cross composed of thin arms with a wreath of E6a (?) beads. On the reverse is depicted a cross pattée with arms of Type B-D with S3 marks.



Sdm-5B10-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/672	1A	E6(?)	1	1-2	BD	S3

Sdm-5B10-a	1	0,739	0,739	0,739	11,5	11,5	11,5
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Group 5C - deniers with a full wreath of beads on the obverse - Type B7 marks (Fig. 30)

Sdm-5C1

Coins of the Sdm-5C1 group of varieties bear depictions of crosses of the 1A and 1AC variant with a wreath of beads of the B7 variant without marks between its arms. The reverse bears depictions of cross pattée of types BF and BD without marks between its arms. The reverse of the denier Sdm-5C1-b is identical to the other side of the coin Sdm-6C3-a.



Sdm-5C1-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/864	1AC	B7	1 (?)	1-2	BF	01



Sdm-5C1-b	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/ 864	1A	B7	1	2	BD	01

Sdm-5C1	6	0,826	0,903	0,985	12,4	12,9	13,6
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Sdm-5C2

A variety with the depiction of a cross with very thin and long arms surrounded by a wreath of Type B7 beads. The reverse shows in a large field a cross pattée of Type 1BF with S9 characters.



Sdm-5C2-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/652	1AC	B7(?)	1	1	BF	S9

Sdm-5C2-a	1	0,974	0,974	0,974	13,1	13,1	13,1
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Sdm-5C3

The coin of the Sdm-5C3 variety bears the depiction of a cross with tapering arms (type C) in a wreath of beads in the B7 variant without marks between its arms. The reverse depicts an E-type cross pattée without marks.



Sdm-5C3-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/864	1C	B7	1	1	E	01

Sdm-5C3-a	1	0,799	0,799	0,799	12,8	12,8	12,8
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Sdm-5C4

Coins of the Sdm-5C4-a variety depict on the obverse a cross with 1C arms without marks with a B7 wreath of beads. The reverse depicts a cross pattée with 1B arms with rare S3 marks.



Sdm-5C4-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/672	1C	B7	1	1	B	S3

Sdm-5C4-a	2	0,949	1,023	1,097	12,6	12,7	12,8
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Sdm-5C5

The deniers of group Sdm-5C5 depict crosses with tapering arms (1C) with a wreath of beads of Type B7 without marks. The reverse depicts a Type 1B bachelor cross with S9 marks.



Sdm-5C5-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/652	1C	B7	1(?)	1	B	S9

Sdm-5C5-a	16	0,64	0,783	0,931	10,8	11,4	12,1
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Sdm-5C6

The coins of the Sdm-5C6 varieties depict a cross with arms tapering towards the ends 1C with an additional mark between its arms. The reverse shows a cross pattée of Type B and BD with the marks S9 or P12 for the Sdm-5C6-c variety.



Sdm-5C6-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/652	1C	B7 (?)	5	1	B	S9



Sdm-5C6-b	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/652	1C	B7	5	2	B	S9



Sdm-5C6-c	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/652 or 655/858 (?)	1C	B7	5 (?)	2	BD	S9 or P12 (?)

Sdm-5C6	39	0,684	0,808	0,98	12	12,7	13,4
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Sdm-5C7

The two varieties of cross deniers of subgroup Sdm-5C7 bear depictions of crosses with broad arms of Type 1A in a B7 wreath of beads. The reverses depict a B-armed cross pattée with S8-S9 and S9 marks.



Sdm-5C7-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/652	1A	B7 (?)	1 or 2	1	B	S8-S9



Sdm-5C7-b	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/652	1A	B7 (?)	1 (?)	1	BD	S9

Sdm-5C7	3	0,823	0,904	0,937	12,6	12,8	12,9
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Sdm-5C8

The coins of the Sdm-5C8 variety has a broad outer field and a small central field. On the obverse it depicts a cross with very broad arms in a A4-B7 wreath of beads. On the reverse, a B-type cross pattée with S9 markings is visible.



Sdm-5C8-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 620	1A	A4-B7	1	1	B	S9

Sdm-5C8	4	0,867	1,003	1,173	12,6	12,9	13,3
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Sdm-5C9

Sdm-5C9 coins depict a cross in the standard B7 beaded wreath, but with a Type '5' mark between its arms (obverse similar to the Sdm-5C6-b variety). The reverse features a B-type cross pattée with S22 marks.



Sdm-5C9-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 620/631	1C	B7	5	2	B	S22

Sdm-5C9-a	3	0,81	0,864	0,978	12,8	13,2	13,9
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Sdm-5C10

The obverse of Sdm-5C10 coin varieties show the most common type of wreath - B7 around a cross with 1A arms. They are distinguished by the marks S20 between the arms of the Type 1B and 1BD cross pattée on the reverse. Examples of both varieties are often poorly-struck and generally produced with worn dies, as are some of the latest issues of cross deniers with a representation of a crosier.



Sdm-5C10-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10

-CNP 655/648	1A (?)	B7	1(?)	1	B	S20
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Sdm-5C10-b	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/648	1A	B7	1 (?)	3	BD	S20

Sdm-5C10	123	0,67	0,835	1,243	11,8	12,9	13,7
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Sdm-6C11

The coins are distinguished by a Type 1A broad-armed cross within a wreath of large beads on the obverse. On the other side, a cross pattée with BD arms with S20 characters is depicted.



Sdm-5C11-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/648	1A	B7 (?)	1 (?)	1	BD	S20

Sdm-5C11-a	54	0,682	0,826	1,029	11,5	12,3	12,9
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Sdm-5C12

Sdm-5C12 coins have Type '19' marks in a B7 beaded wreath on the obverse. The reverse features a cross pattée with B-type arms with faintly legible S28 marks.



Sdm-5C12-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 664-5	1C	B7	19	2	B	S28

Sdm-5C12-a	106	0,6	0,848	1,186	11,2	12,2	13,2
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Sdm-5C13

Another variation, the Sdm-5C13 variety is represented by specimens with a Type 1C cross on the obverse, with Type '19' marks in a wreath of B7 beads. On the reverse, a cross pattée with arms of Type D with marks of Type 'S9' is depicted.



Sdm-5C13-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 632/620	1C	B7	19	1	D	S9

Sdm-5C13-a	5	0,632	0,752	0,873	11,4	11,8	12,2
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Sdm-5C14

Coins included in the Sdm-5C14-a variety bear on the obverse a depiction of a cross with 1C arms with '19' marks. The reverse bears a depiction of a 1BD-armed cross pattée with S22 marks.



Sdm-5C14-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 631	1-C	B7	19	1	BD	S22

Sdm-5C14	3	0,692	0,768	0,808	12,8	13,1	13,4
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Sdm-5C15

This variety of coins is characterised by the marks in the form of two small circles between the arms of the cross on the obverse in a wreath of beads Type B7. On the other side is depicted a cross pattée with broad arms of Type BD with S20 marks.



Sdm-5C15-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 650/649	1A	B7	7	1	BD	S20

Sdm-5C15-a	63	0,575	0,824	0,99	11,5	12,4	12,9
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Group 5D - deniers with a large wreath of beads on the obverse - Type B10, C9 marks (Fig. 30)

Sdm-5D1

Coins of these varieties have obverses showing a Type 3A or 1AC cross (variety Sdm-5D1-a) with a wreath of C9 or B10 beads (variety Sdm-5D1-a) with split ends. The reverse shows a cross pattée with arms 3-4BF and 3-4BG with S3 characters.



Sdm-5D1-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/672	1AC or 3A (?)	B10 or C9 (?)	1	3-4	BF	S3



Sdm-5D1-b	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/672	3A	C9	1	3-4	BF	S3

Sdm-5D1	4	0,791	0,913	1,05	11,9	12,1	12,5
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Sdm-5D2

The Sdm-5D2 coins depict a 1A cross composed of thin arms with a wreath of B10 beads, composed of 16 beads. Their reverse shows a Type 1-2B cross pattée with S3 marks.



Sdm-5D2-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 655/672	1A	B10	1	1-2	B	S3

Sdm-5D2	2	0,852	0,885	0,918	11,7	12,0	12,4
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Group E - deniers with a wreath of beads Type 5a (Fig. 30)

Sdm-5E1

Coins of the Sdm-5E1 variety have a characteristic depiction of a wreath of beads type B5a on the obverse. On the other side, a BD-armed cross pattée with Q3 characters is depicted.



Sdm-5E1-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
CNP none	1C	B5a (?)	1	12	BD	Q3

Sdm-5E1	6	0,62	0,755	0,835	12,9	13,2	13,4
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Group F - deniers with a cross inscribed within a wreath of eight beads and two circles of types D12 and D13 (Fig. 30)

Sdm-5F1

Coins included in the Sdm-5F1 variety depict a Type 1A broad-armed cross with the marks '8' in a wreath of eight beads and two Type D12 circles on the main side. The reverse shows a cross pattée of Type 1-2BD with the marks S22 between its arms.



Sdm-5F1-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 646	1AC	D12	8	1-2	BD	S22

Sdm-5F1-a	24	0,654	0,856	1,125	12,4	13,3	14,1
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Sdm-5F2

Deniers of the Sdm-5F2-a variety bear on the obverse the depiction of a cross with arms 1C with a D12 wreath of beads. On the other side, a cross pattée with 1-2BD arms with the marks S22 is depicted.



Sdm-5F2-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 646	1C	D12	1	2	BD	S22

Sdm-5F2-a	19	0,666	0,804	1,025	12,4	12,8	13,1
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Sdm-5F3

Coins of the Sdm-5F3 variety have the same obverse as specimens of the Sdm-5F1 variety. However, the reverse depicts a Type 1B cross pattée with S20 marks between its arms.



Sdm-5F3-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 648	1A	D12	8	1	B	S20

Sdm-5F3-a	26	0,773	0,848	0,957	12,4	12,9	13,4
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Sdm-5F4

Coins included in the subgroup of varieties Sdm-5F4 depict wreaths of beads of Type D12-13 around a Type 1C cross on the obverse. On the other side, a cross pattée of Type B with S20 marks between its arms has been depicted.



Sdm-5F4-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 648	1C	D12-13	1	1	B	S20



Sdm-5F4-b	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 648	1C	D12-13	1	3-4	B	S20

Sdm-5F4	290	0,602	0,834	1,064	11,8	12,6	13,4
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Sdm-5F5

The Sdm-5F5 variety depicts a Type 1B cross with wide arms with a wreath of beads of Type D12 and the marks '8'. On the other is depicted a Type 1-2B cross pattée with Q18 marks.



Sdm-5F5-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
-CNP 659	1B	D12	8	1-2	B	Q18

Sdm-5F5-a	29	0,707	0,869	1,007	11,6	12,1	12,8
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Group G - denier with a cross composed of dots in a wreath of beads of Type F2 (Fig. 30)

Sdm-5G1

A unique specimen on which the cross on the obverse is composed of dots, with a wreath of beads of Type F2 around them. The reverse bears a Type 1BF cross pattée without marks.



Sdm-5G1-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
CNP none/864	4A	F2	1	1	BF	01

Sdm-5G1-a	1	0,91	0,91	0,91	12,5	12,5	12,5
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V. Later cross deniers of subtype A

Sdm-5A-A1

The coin classified as subtype Sdm-5A-A1 bears on the obverse the depiction of a Type '9' cross in the most common B7 beaded wreath with a Type '5' mark. On the reverse is depicted a 3BF cross pattée with S9 marks.



Sdm-5A-A1-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
CNP none	9	B7 (?)	5	3	BF	S9

Sdm-5A-A1	1	0,942	0,942	0,942	12,9	12,9	12,9
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Sdm-5A-A2

The coin categorised as Sdm-5A-A2-a bears a slightly different depiction of the cross in the '7b' variant. As above, it is inscribed within a B7 beaded wreath, without additional marks. The reverse depicts a BF-armed cross pattée with a P2 mark. It is identical to the other side of the coin of the Sdm-6D1-a variety.



Sdm-5A-A2-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
CNP none	7b	B7	1	3	BF	P2

Sdm-5A-A2-a	1	0,932	0,932	0,932	12,3	12,3	12,3
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Sdm-5A-A3

The coin of the Sdm-5A-A3 variety on the obverse depicts a Type 7a cross without marks (?) in a wreath of 'B7' beads. On the reverse side is depicted a cross pattée of Type B1 without marks between the arms.



Sdm-5A-A3-a	Obverse:			Reverse:		
Markings in the field	1	2	3	8	9	10
CNP none/864	7a	B5 (?)	1	1	B	01

Sdm-5A-A3-a	1	0,88	0,88	0,88	12,9	12,9	12,9
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B. Later varieties of Type VI

Group 6A - deniers with hollow or hollow and solid circles Type 20, 22, 23, 25, 25a, 29, 30, 31 between the arms of the cross on the obverse (Fig. 31).

Sdm-6A1

The coin is distinguished by the unusual Type 25a marks between the arms of the simple cross on the obverse. On the other side, a cross pattée 1-2B is depicted without marks between the arms.



Sdm-6A1-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 840	1A-B	25a	1-2	B	01	

Sdm-6A1	2	0,850	0,860	0,871	12,8	13,15	13,5
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Sdm-6A2

On the obverse of the coins of the subgroup of varieties Sdm-6A2, the marks of Type '22' are placed between the arms of the simple cross Type 1A-B. The reverse depicts a cross pattée with arms BD and BF without marks. The imagery on the coins is not very neat. Also notable is the continuous circular rim with transverse lines around the central field on the coin of the Sdm-6A2-b variety.



Sdm-6A2-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 836	1A	22 (?)	2	BD	01



Sdm-6A2-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 836	1A	22 (?)	1	BF	01 (?)

Sdm-6A2	2	0,882	0,956	1,031	12,6	12,7	12,8
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Sdm-6A3

The subgroup of deniers varieties Sdm-6A3 depicts on the obverse a simple cross with 1A-B arms. In the outer field are the characteristic marks of the legend, some of which resemble the letter N. The reverse shows a cross pattée of types B and B-D arms without the marks between them.



Sdm-6A3-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843 (?)	1AB	25 (?)	2	B	01



Sdm-6A3-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843 (?)	1AB	25 (?)	1	B	01



Sdm-6A3-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843 (?)	1AB	25 (?)	3-4	B	01

Sdm-6A3-a	25	0,790	0,920	1,082	13,0	13,7	14,2
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Sdm-6A4

The subgroup of varieties Sdm-6A4 comprises deniers on the obverses of which a simple cross is depicted with signs of the types '20' and '30' (?) between its arms. The reverse depicts a cross pattée of Type 1-2B with a P10 mark.



Sdm-6A4-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 837	1A-B	20 (?)	1-2	B	P10



Sdm-6A4-b	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 837	1A-B	30 (?)	1-2	B	P10	

Sdm-6A4	10	0,671	0,745	0,854	12,5	13,2	14,2
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Sdm-6A5

Deniers of varieties of the Sdm-6A5 subgroup bear on the obverse a representation of a simple cross with the poorly legible Type '30-31' marks. A distinguishing feature of the coins of this variety is the inclusion on the reverse of a distinctive arc with two-three dots (P7-8) between the arms of the type B and BF of the cross pattée.



Sdm-6A5-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 848	1A-B	30-31	3-4	B	P7-8	



Sdm-6A5-b	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 848	1A-B	30-31	1	BF	P7-8 (?)	

Sdm-6A5	17	0,758	0,837	0,99	11,8	12,2	12,7
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Sdm-6A6

The subgroup of the Sdm-6A6 variety is represented by coins bearing the Type '29' and '30' marks on the obverse. The reverse depicts a 4B cross pattée with a broad arc (mark P5) between its arms and having a point in its centre, characteristic of the large Sieciech deniers of Type I/1 (Suchodolski 1987, 16-18).



Sdm-6A6-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 836/1480	1A-B	30	4	B	P5



Sdm-6A6-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 836/1480	1A-B	29 (?)	4	B	P5

Sdm-6A6	2	0,917	0,918	0,919	12,3	12,7	13,1
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Sdm-6A7

The coins included in the subgroup of varieties Sdm-6A7 were determined by the presence of faint Type '31' marks between the arms of the simple cross in a double circular rim to the central field on the obverse. The reverses of the deniers of these varieties allude to the deniers associated with Sieciech due to the placement of a broad arc (mark P6) between the arms of the cross pattée.



Sdm-6A7-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 847	1A-B	31	2	B	P6



Sdm-6A7-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 847	1A-B	31	4	BD	P6

Sdm-6A7	6	0,531	0,866	1,004	11,8	12,4	13,2
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Sdm-6A8

Cross deniers of the Sdm-6A8 variety depict on the obverse a cross with broad arms with Type '31' marks. On the reverse, the P10 and P5-10 marks were placed between the arms of the Type 1B cross pattée. Coins of the Sdm-6A8-a variety have an identical reverse die to the Sdm-7G5-a coins.



Sdm-6A8-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 846	1A-B	31 (?)	1-2	B	P10



Sdm-6A8-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 846	1A-B	31 (?)	1-2	B	P5-10

Sdm-6A8	24	0,658	0,867	1,057	11,5	12,5	13,1
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Sdm-6A9

The coin categorised as of the Sdm-6A9-a variety is characterised by a broad outer field and a small field. On the obverse it depicts a simple cross with Type '20' signs. On the reverse is depicted a 2DF cross pattée with a P2 mark. The coin is made in a different style to most later issues of cross deniers.



Sdm-6A9-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
CNP 846/861	1A	20	2	DF	P2

Sdm-6A9	1	0,953	0,953	0,953	13,1	13,1	13,1
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Sdm-6A10

Deniers included in the Sdm-6A10 variety depict a Type 1A simple cross on the obverse with the rare '32' characters. On the reverse, between the arms of the cross pattée 1B are Q8a marks (which were rarely used).



Sdm-6A10-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
CNP 861	1A	32a (?)	1	B	Q8a

Sdm-6A10	28	0,703	0,847	1,046	11,4	11,9	12,7
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Sdm-6A11

The specimens included in the Sdm-6A11 variety depict on the obverse a simple cross with broad arms with '31' signs. The reverse depicts a cross pattée with arms of Type 1B with the rarely met Q15 marks.



Sdm-6A11-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 846/851	1A-B	31	1	B	Q15	

Sdm-6A11	6	0,66	0,760	0,826	12,4	12,7	13,1
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Sdm-6A12

The first of a small series of coins from the last two decades of the 11th century, bearing Type '20' marks on the obverse and Type 'S9' marks between the arms of a Type 2B cross pattée on the reverse. Such marks in the arms of the cross pattée are known primarily from Type V and VII coins. The coins of the subgroup of varieties Sdm-6A12 is made in a different style to most of the latest issues of cross deniers.



Sdm-6A12-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
CNP 840/849	1A	20	2	B	S9	

Sdm-6A12	1	0,679	0,679	0,679	13,1	13,1	13,1
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Sdm-6A13

The coin depicts on the obverse the characters '23' between the arms of a simple cross with 1A-B arms. The reverse depicts a cross pattée with arms 1C with S9 marks.



Sdm-6A13-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 849	1A-B	23	1	C	S9

Sdm-6A13	3	0,856	0,975	1,143	12	12,2	12,3
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Sdm-6A14

One of the most distinctive cross deniers, which is distinguished both by its 'fabric' - which has no equivalent in known numismatic material - and by the shape of the cross: on the obverse, whose arms clearly taper towards the ends (form 'C') with marks '23' between the arms. The reverse depicts a cross pattée with poorly profiled arms - Type 'G' with 'S9' marks between them.



Sdm-6A14-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 869/849	1C	23	1	G	S9

Sdm-6A14-a	1	0,94	0,94	0,94	12,3	12,3	12,3
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Group 6B - deniers with edge types b and c (Fig. 39)

Sdm-6B1

On the obverse, the coin bears a simple cross with wide arms with the marks Type '31' between its arms. The reverse bears the P2 mark between the arms of a Type 2B cross pattée.

This variety of coin has a characteristic form of a high edge of Type b-c, with the edge of the obverse turned either inwards or at a right angle, and the edge of the reverse turned outwards - the opposite of the previously presented specimens.

It is also worth noting the pseudo-legend in the outer field, consisting of 'almond-shaped' marks, somewhat reminiscent of those found on large Sieciech deniers of Type I/1 (Suchodolski 1987, 16-18).



Sdm-6B1-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 839	1A	31	2	B	P2

Sdm-6B1	2	0,911	1,043	1,176	12,9	13,2	13,5
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Sdm-6B2

The coins categorised as varieties Sdm-6B02 depict a Type 1A-B cross with Type '28' marks on one side. The reverse depicts a cross pattée of types 3B and 4B (with a dot in the centre) without any marks between the arms.



Sdm-6B2-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 838	1A-B	28 (?)	3	B	01



Sdm-6B2-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 838	1A-B	28 (?)	4	B	01

Sdm-6B2	4	0,832	0,871	0,968	13,0	13,2	13,4
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Sdm-6B3

Coins of the subgroup of varieties Sdm-6B3 on the obverse bear depictions of a simple cross with 1A arms with signs of form '20'. On the reverse, a cross pattée of Type 2B is depicted with no marks between the arms.



Sdm-6B3-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 836	1A	20 (?)	1-2	B	01 (?)



Sdm-6B3-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 836	1A	20 (?)	2	B	01

Sdm-6B3	15	0,749	0,912	1,039	12,9	13,4	13,7
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Sdm-6B4

Deniers classified in the subgroup of varieties sdm-6B4 depict a simple cross on one side with signs of types '20' or '23' (variety sdm-6B4-a). The reverse side depicts a Type 2B cross pattée with the mark 'P2' and 'P13' between its arms.



Sdm-6B4-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 834	1A	20 or 23	2	B	P2



Sdm-6B4-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 834	1A	20 (?)	1-2	B	P13

Sdm-6B4	27	0,851	0,954	1,239	12,9	13,9	14,2
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Sdm-6B5

The cross deniers of the subgroup of varieties Sdm-6B5 depict on the obverse a simple cross of types 1A and 1A-B with the signs 25b, these are inscribed in a characteristic circular rim composed of oval beads. The reverse depicts the representation of a cross pattée without any marks between its arms.



Sdm-6B5-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 845	1A	25b (?)	3	B	01



Sdm-6B5-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843	1A	25b	2	B	01



Sdm-6B5-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843	1A-B	25b	1-2	BG	01



Sdm-6B5-d	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843	1A	31	2	D	01

Sdm-6B5	9	0,846	0,971	1,046	13	13,6	14,2
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Sdm-6B6

The varieties of these coins have obverses struck with a completely destroyed die, which makes it difficult to recognise the depiction on this side of the coin. It apparently depicts a Type 1A simple cross with the markings of Type '31' between its arms. The reverse depicts a cross pattée of types B and B-G, with no marks between their arms. In the outer fields of the reverses, the Π sign is often present among the elements of the pseudo-legends.



Sdm-6B6-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843	1A(?)	31 (?)	2	BG	01



Sdm-6B6-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843	1A(?)	31 (?)	2	B	01



Sdm-6B6-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 843	1A-B	31 (?)	4	B	01

Sdm-6B6	18	0,621	0,946	1,166	12,2	13,4	14,0
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Sdm-6B7

Coins classified in the subgroup of varieties Sdm-6B7 bear on the obverse the representation of a simple cross of Type 1A with the signs '31'. The reverse bears the depiction of a Type 2B cross pattée with a dot between the arms (P5).



Sdm-6B7-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 844	1A	31	2	B	P5

Sdm-6B7	20	0,802	0,938	1,123	12,7	13,2	14,00
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Sdm-6B8

The only variety in the Sdm-6B group with mark type 35a between the arms of the simple cross 1A-B on the obverse. On the other side is depicted a 1-2B cross pattée with mark P13.



Sdm-6B8-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 851	1A-B	27	1-2	B	P13

Sdm-6B8	18	0,772	0,966	1,245	12,8	13,5	14,2
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Sdm-6B9¹⁹

The three deniers included in the subgroup of the Sdm-6B9 variety bear on the obverse the image of a simple cross with prominent dots and the letters V between the arms, similar to those on deniers of the Sdm-5B2-a, Sdm-6B8-a and Sdm-6C3-a varieties. The reverse depicts a D-type cross pattée with Q16 marks. Interestingly, there is an identical representation of the other side of the coin on a denier of the Sdm-5B6-a variety.



Sdm-6B9-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 851-852	1A	35	1	D	Q16

Sdm-6B9	3	0,612	0,952	1,252	12,3	12,9	13,9
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Group 6C - deniers with Type a edges (Fig. 39) with marks of Type '27' (spheres) between the arms of a simple cross on the obverse (Fig. 31)

Sdm-6C1

Coins of the subgroup of varieties Sdm-6C1 bear on the obverse side the marks of Type '27' between the arms of a simple cross with broad arms. On the other side, a depiction of a cross pattée of types BD, BG and BF is shown without any marks between its arms.



¹⁹ In the first edition of the 2021 monograph, this variety was designated Sdm-6C7-a

Sdm-6C1-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
CNP 860	1A	27	1	BD	01



Sdm-6C1-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
CNP 860	1A	27	1	BG	01



Sdm-6C1-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
CNP 860	1A	27	1	BF	01

Sdm-6C1	19	0,604	0,980	1,124	11,5	12,5	13,2
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Sdm-6C2

Coins of the sub-group of varieties Sdm-6C2 bear a cross with the marks of Type '27' on the obverse and a cross pattée Type B-F and B-D on the reverse without marks between the arms. The fields of the coins occupy practically their entire surfaces, hence the outer field is very narrow and the outer field legend invisible.



Sdm-6C2-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 853/864	1A	27	2	BF	01	

Sdm-6C2	5	0,651	0,748	0,853	11,4	11,5	11,9
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Sdm-6C3

The coin, categorised as a sub-group of the Sdm-6C3 variety, bears on the obverse a representation of a simple cross with slightly broadening arms with characteristic Type '35' marks. The reverse bears a cross pattée of Type 2BD with no marks between the arms. The reverse of the coin of the Sdm-6C3-a variety is the same as that on the Sdm-5C1-b coins.



Sdm-6C3-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 853/864	1B	35	2	BD	01	

Sdm-6C3	1	0,734	0,734	0,734	11,5	11,5	11,5
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Sdm-6C4

This variety of cross denier on the obverse depicts in a small field a simple cross with marks of Type '27' inscribed in a continuous circular rim. On the reverse, a cross pattée with the rare Q10-12 signs is depicted in a large field.



Sdm-6C4-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
CNP 854/850	1A-C	27	2	B	Q 10-12	

Sdm-6C4	1	0,839	0,839	0,839	12,4	12,4	12,4
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Sdm-6C5

The coin, categorised as the Sdm-6C5-a variety, depicts on the obverse a simple cross with broad arms, tapering at the ends 1A-C. The reverse depicts a cross pattée with G-shaped arms and with the P10 mark rotated by 90 degrees. The coin's large field completely occupies the outer fieldt. The imagery of the coin is barbarised.



Sdm-6C5-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 860/none	1A-C	27	1	G	Q23	

Sdm-6C5	1	1,052	1,052	1,052	12,9	12,9	12,9
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Sdm-6C6

Coins included in the Sdm-6C6 variety depict on the obverse a Type 1A simple cross with '27' marks. The reverse depicts a G-armed cross pattée and S9 characters. On these coins there is a continuous circular rim to the central field that is less frequently used on the later varieties of cross deniers.



Sdm-6C6a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 860/849	1A	27	1	G	S9	

Sdm-6C6-a	6	0,873	0,995	1,255	11,9	12,3	12,6
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Sdm-6C7

A cross denier classified in subgroup Sdm-6C7-a on the obverse depicts a Type 1A simple cross. The reverse bears a Type 1F cross pattée with S7 marks²⁰.



²⁰ In Kędzierski 2021 it was a variety Sdm-6C6-b

Sdm-6C7-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 860/849	1A	27	1	F	S7

Sdm-6C6	1	0,7	0,7	0,7	11,7	11,7	11,7
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Sdm-6C8

The obverses of the deniers of the subgroup of varieties designated as Sdm-6C8 refer to the frequently-occurring CNP 858 variety, which is characterised by a simple cross with marks of Type 27 inscribed within a circular solid rim. In the outer field outside this, in the case of coins struck centrally, the signs of a pseudo-legends are visible. The reverse depicts a cross pattée with B and BF arms without marks between them.



Sdm-6C8-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/ 864	1A-B	27	1-2	B	01



Sdm-6C8-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/ 864	1A-B	27	2	BF	01



Sdm-6C8-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
~CNP 858/ 864	1A-B	27	2	B	01



Sdm-6C8-d	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
~CNP 858/ 864	1A-B	27	2	B	01



Sdm-6C8-e	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
~CNP 858/ 864	1A-B	27	4	B	01

Sdm-6C8	148	0,595	0,809	1,15	12	12,7	13,9
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Sdm-6C9

Like the previous issues, the Sdm-6C9 coins correspond to the CNP 858 variety - the most commonly-occurring issue of later Type VI cross deniers in hoards from Poland. They are distinguished on the obverse by the depiction of a cross with four dots (variant '27') inscribed within a circular solid rim. The reverse depicts a cross pattée with arms of Type B, B-D and BF with the signs P5-P10, P5-P11, P6-P12, P10 and P12. In the narrow outer fields the single letters X, R, C can be observed - probably referring to older issues with the legend CRVX.



Sdm-6C9-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858	1A-B	27	1	B	P5-P10



Sdm-6C9-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858	1A	27	1	B	P6-P12



Sdm-6C9-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858	1A-B	27	1	B	P5-P11



Sdm-6C9-d	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858	1A	27	3	B	P5-P10



Sdm-6C9-e	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
CNP 858	1A	27	1	B	P10



Sdm-6C9-f	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/858 and 860	1A-B	27	2	BF	P10



Sdm-6C9-g	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/844	1A	27 (?)	1	B	P12 (?)

Sdm-6C9	1101	0,529	0,806	1,354	11,1	12,5	14,1
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Sdm-6C10

The coin included in the sub-group of varieties Sdm-6C10 depicts on the obverse a simple cross of Type 1A with the signs of Type '27'. It is distinguished by the inclusion on the reverse of the Q3 (?) characters in the arms of the cross pattée Type 1B.



Sdm-6C10-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 858/840	1A	27 (?)	1	B	Q3 (?)	

Sdm-6C10	1	0,815	0,815	0,815	12,4	12,4	12,4
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Sdm-6C11

The coin categorised in the sub-group of varieties Sdm-6C11 depicts on the main side a Type 1A simple cross with faint '27' marks between its arms. The other side depicts a D-armed cross pattée with Q8b marks (only occasionally found on cross deniers).



Sdm-6C11-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 853 and 867-868/861	1A	27	4	D	Q8b	

Sdm-6C11	1	1,169	1,169	1,169	12,1	12,1	12,1
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Sdm-6C12

The pieces classified in the Sdm-6C12 variety subgroup bear depictions on the obverse that are quite similar to the common deniers of the Sdm-6C9 variety (=CNP 858). They are distinguished from them by the depictions on the reverse of a broad arc with dots in the centre placed between the arms of the cross pattée. The coin of the Sdm-6C13-a variety placed in this set has an identical reverse with a large Sieciech denier (Type I/2 according to S. Suchodolski).



Sdm-6C12-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/848	1A-B	27	3	BD	P9



Sdm-6C12-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/848	1A-B	27	3	BD	P9



Sdm-6C12-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/848	1A	27	1 (?)	BG	P7

Sdm-6C12	17	0,802	0,937	1,082	12,0	12,5	13,2
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Sdm-6C13

The obverse of the coin included in the Sdm-6C13-a variety refers to the previously described coins Sdm-6C9 and Sdm-6C12. On its reverse, depicted between the arms of a cross pattée with a dot in the centre are marks of Q5 (>) type. These are extremely rare on this kind of coin, but among them there are examples with a broad arc, similar to the depiction on the reverse of the large Sieciech deniers of Type I/1 (Suchodolski 1987).



Sdm-6C13-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 858/863	1A	27	3	B	Q5 (?)	

Sdm-6C13-a	1	0,956	0,956	0,956	12,5	12,5	12,5
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Sdm-6C14

The Sdm-6C14 coin group is closely related through die combinations to the coins of the Sdm-6C12 variant group. The obverse shows the depiction of a simple cross with the signs of Type '27', while the reverse shows a cross pattée with a dot in the middle (the arrangement of the arms in the variant '3') and a broad arc (P5) resembling the depiction of the reverse of the large Sieciech deniers of Type I/1 (Type I/1 according to S. Suchodolski).



Sdm-6C14-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 858/1480	1A-B	27	3	B	P5	



Sdm-6C14-b	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 858/1480	1A-B	27	4	BF	P5	



Sdm-6C14-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/1480	1A-C	27	4	BC	P5



Sdm-6C14-d	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/1480	1A-B	27	2	BF	P5



Sdm-6C14-e	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/1480	1A	27	3	B	P5



Sdm-6C14-f	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/1480	1B	27	3	F	P5

Sdm-6C14	23	0,672	0,914	1,062	12,0	12,7	13,2
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Sdm-6C15

Coins included in the Sdm-6C15-a variety depict on the obverse a cross with broad arms with the markings of Type '27' surrounded by a circle of oval beads. On the reverse is depicted a cross pattée with B-D arms with a broad arc composed of beads between its arms.



Sdm-6C15-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 860/1480	1A	27	3	BD	P5

Sdm-6C15	4	0,892	0,975	1,06	12,4	12,5	12,7
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Sdm-6C16

Coins of the subgroup of varieties Sdm-6C16 bear on the obverse a representation of a simple cross with the marks Type '27'. The reverse depicts a cross pattée of the B and B-F types with a wide arc (almost semicircular) of the P5 and P6 types between its arms.



Sdm-6C16-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858/858 and 1480	1A-B	27	2	B	P5



Sdm-6C16-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10

-CNP 858/858 and 1480	1A	27	1-2	B	P6
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Sdm-6C16-c	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 858/858 and 1480	1A-B	27	1	BF	P5	

Sdm-6C16	3	0,948	0,912	0,992	12,6	13,1	13,5
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Sdm-6C17

Coins of the Sdm-6C17 subgroup of varieties were distinguished by the presence on the reverse of a large dot in the centre of the cross pattée and a broad P5-type arc.



Sdm-6C17-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 858/1480	1A-B	27	3	B	P5	



Sdm-6C17-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 860/1480	1B	27	3	G	P5

Sdm-6C17	5	0,805	0,890	0,983	12,3	13,0	13,8
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Sdm-6C18

The obverses of the coins included in the above subgroup of varieties are characterised by the placement of slightly smaller simple crosses on the obverse than in the case of coins Sdm-6C9, Sdm-6C12 and Sdm-6C14, which makes them somewhat similar to the specimens designated Sdm-6C20 (-CNP 813). The reverses of the coins included in this group show a cross pattée with marks similar to Sieciech's Type I/1 deniers: with a dot in the centre (the arrangement of the arms of a Type '3' cross pattée) and with a broad arc (P5) between the arms.



Sdm-6C18-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813 and 858/1480	1B	27	3	BD	P5



Sdm-6C18-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813/1480	1B	27	3	B	P5



Sdm-6C18-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813/1480	1B	27	3	B	P5



Sdm-6C18-d	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813/1480	1B	27	3	B	P5



Sdm-6C18-e	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813 and 858/1480	1B	27	3	BD	P5



Sdm-6C18-f	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813/1480	1B	27	3	D	P5

Sdm-6C18	15	0,783	0,936	1,118	12,6	13,2	13,7
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Sdm-6C19

Three specimens were included in the two varieties of cross deniers discussed here. On the obverses is a small simple croo inscribed in as relatively small field, and on the reverse a cross pattée alluding to the issues of Sieciech by placing between the arms a broad arc, but here with an additional dot (Q6 type mark).



Sdm-6C19-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813/1480	1B	27	3	B	Q6



Sdm-6C19-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813/1480	1B	27	3	B	Q6

Sdm-6C19	3	0,955	0,998	1,026	13,1	13,4	13,6
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Sdm-6C20

This form comprises the most numerous subgroup of varieties in the Słuszków I hoard. On the obverse, the coins bear the image of a simple cross with the signs of Type '27' in a small field, while on the reverse they bear a cross pattée with arms of types B, B-D and E (variety Sdm-6C20-c) without signs between its arms. The outer fields are very broad, with clearly visible pseudo-legendary marks with characteristic circles and 'keys'. Most of the coins in the Sdm-6C20 variety have a continuous solid rim around the central field on both faces, while on the reverse in specimens of the Sdm-6C20-d variety, this is composed of beads.



Sdm-6C20-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813	1B	27	3	B	01



Sdm-6C20-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813	1B	27	1	BD	01



Sdm-6C20-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813	1B	27	1	E	01



Sdm-6C20-d	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813	1B	27	1	B	01

Sdm-6C20	1916	0,557	0,891	1,357	11,2	13,3	14,4
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Sdm-6C21

These coins are characterised by a simple cross with outwardly expanding short arms on the obverse, making them somewhat similar to Sdm-6C20 specimens (-CNP 813). On the reverse, deniers of the Sdm-6C21 varieties have a P5/10 and P10 mark between the arms of the Type 1B and 3B cross pattée, the same as on the Sdm-6D4 coins (-CNP 867-868).



Sdm-6C21-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813 and and 858/858	1B	27	3	B	P5/10



Sdm-6C21-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813 and 858/858	1B	27	1	B	P10

Sdm-6C21	30	0,7	0,876	1,15	11,9	12,5	13,3
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Sdm-6C22

Coins of the Sdm-6C22-a variety are distinguished on the obverse by a simple cross with short arms, referring to the specimens of the subgroup of the Sdm-6C20 variety. On the reverse, a broad P5 arc, similar to the crosses of the Sdm-6C14 varieties, is visible between the arms of the Type 1B cross pattée.



Sdm-6C22-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 813/846	1B	27	1	B	P5/P10

Sdm-6C22	2	0,766	0,899	1,033	12,4	12,5	12,6
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Sdm-6C23

Coins of the Sdm-6C23 variety are characterised by large fields, occupying most of the surface of the flans. On the obverse they depict a simple cross Type 1A-B with four spheres between its arms. On the reverse is a cross pattée of types 1B, 2B and 1D with a P10 mark between its arms. The specimens of these varieties have (as have the examples discussed below), very narrow outer fields generally devoid of any visible markings.



Sdm-6C23-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858 and 860/858	1A-B	27	2	B	P10



Sdm-6C23-b	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858 and 860/858	1A-B	27	2	B	P10



Sdm-6C23-c	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 858 and 860/858	1B	27	1	B	P10



Sdm-6C23-d	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 858 and 860/858	1B	27	1	D	P10	

Sdm-6C23	18	0,631	0,878	1,154	11,4	12,1	12,9
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Group 6D - varieties of deniers without marks (type '1') between the arms of the simple cross on the obverse (Fig. 31)

Sdm-6D1

This is a very interesting variety of cross deniers. The obverse depicts a simple cross without marks. The reverse bears a cross pattée with BF-shaped arms (a type rather infrequently met) with a P2 mark between them. Both faces have a relatively small field and a fairly wide outer field with clearly visible pseudo-legendary marks, unusual for a late variety of cross deniers. The coin has the same reverse die as the Sdm-5A-A2-a coin.



Sdm-6D1-a	Obverse:			Reverse:		
Markings in the field	1	3	8	9	10	
-CNP 867-868/839	1A	1 (?)	3	BF	P2	

Sdm-6D1-a	2	0,750	0,811	0,872	11,8	12,0	12,2
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Sdm-6D2

The coin classified as a subgroup of the variety Sdm-6D2 bears on the obverse a simple cross of Type 1A-B, without marks between the arms. On the reverse is a D-type cross pattée with the rare type Q10 marks. Pseudo-legendary marks are visible in the narrow outer field.



Sdm-6D2-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 867	1A-B	1 (?)	2	D	Q10

Sdm-6D2-a	1	0,794	0,794	0,794	12,6	12,6	12,6
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Sdm-6D3

The single coin, classified as belonging to a subgroup of variety Sdm-6D3, has on the obverse a simple cross without marks between its arms in a border composed of oval beads, somewhat similar to those on specimens classified as the variety Sdm-6C11-a. The reverse shows a cross pattée with D-type arms without marks between them.



Sdm-6D3-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
CNP 868	1A	1	2	BD	01

Sdm-6D3-a	1	1,012	1,012	1,012	11,7	11,7	11,7
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Sdm-6D4

The obverse of the coins of subgroup Sdm-6D4 shows a simple cross with 1A arms, with no dots between the arms of the inscribed within a broad continuous circular rim. On the other side, a cross pattée with BD and D arms with the P10 mark is depicted. There are no marks forming a pseudo-legend in the narrow outer fields²¹, making the coins of this subgroup the most ascetic deniers in terms of appearance.



Sdm-6D4-a	Obverse:		Reverse:		
Markings in the field	1	3	8	9	10
-CNP 867-868	1A	1	2	BD and D	P10

Sdm-6D4-a	1486	0,61	0,889	1,334	11,1	12,1	13,1
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²¹ Only on specimens characterised by a large die offset can small and slender wedges be seen.

TYPE VII - CROSS DENIERS WITH CROSIERS

Subtype '7p' - deniers with a crossed crosier to the right

Group 7pA - deniers depicting on the obverse a crosier to the right with a Type '2' wreath of five beads around the crosier (Fig. 35) and a cross pattée with S9 marks on the reverse (Fig. 38).

Sdm-7pA1

The denier of the subgroup Sdm-7pA1-a depicts on the obverse a Type l2p crosier without additional marks, with a type '6-7' crossing element with a characteristic wreath of only five beads. On the reverse is depicted a Type 2B cross pattée with S9 marks.



Sdm-7pA1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 991 var.	l2p	a21b (?)	6-7	2	2	B	S9

Sdm-7A1	1	0,734	0,734	0,734	12,6	12,6	12,6
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Group 7pB - deniers with a depiction of a crosier to the right with a small (s) and medium (m) crook on the obverse and a cross pattée with S9 marks on the reverse (Fig. 38)

Sdm-7pB1

Coins of Sdm-7pB1 show a depiction of a crosier to the right with a small crook without marks beside it. The reverse bears a cross pattée with B and BF arms with S9 marks.



Sdm-7pB1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10

-CNP 990-991	s2p	a	6	10 (?)	1	B	S9
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Sdm-7pB1-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 990-991	s2p	a	6	10	3	B	S9



Sdm-7pB1-c	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 990-991	s4p	a	6	10 (?)	3	BF	S9

Sdm-7pB1	17	0,67	0,881	1,203	11,4	12,0	12,5
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Sdm-7pB2

The coin of the subgroup Sdm-7pB1 depicts on the obverse a crozier with a medium-sized closed crook without any marks beside it. The reverse depicts a cross pattée of Type 3BG with S9 markings.



Sdm-7pB2-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 990-991	m4p	a	6	5 (?)	3	BG	S9

Sdm-7pB2	1	0,753	0,753	0,753	12,5	12,5	12,5
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Sdm-7pB3

This group is characterised by the depiction of a crozier with a small crook with a mark and mark of Type c next to it. On the reverse is a cross pattée of Type 3-4BD and with S9 marks.



Sdm-7pB3-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 990-991	s2p	d	5-6	10	3-4	BD	S9

Sdm-7pB3	239	0,59	0,875	1,259	10,5	11,8	13,1
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Sdm-7pB4

The coins of the subgroup of varieties Sdm-7pB4 on the obverse depict a curved m3p crozier, without marks, with the Type '6' crossing in a Type '10' wreath of beads (characteristic of the latest deniers). The reverse depicts a 3-4B cross pattée with S9 marks.



Sdm-7pB4-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 990-991	m3p	a	6	10	3-4	B	S9

Sdm-7pB4	231	0,668	0,913	1,124	11,9	12,6	13,7
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Sdm-7pB5

The denier of the sub-variety Sdm-7pB5 is distinguished by a crosier of medium size crook Type 2-4p with the marks Type d. On the reverse is depicted a cross pattée 3-4B with the marks S9.



Sdm-7pB5-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~CNP 990-991	m2-4p	d	6	10 (?)	3-4	B	S9

Sdm-7pB5	3	0,927	1,076	1,259	12,4	12,6	12,8
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Group 7pC - deniers depicting on the obverse a crosier to the right with a large crook and a cross pattée with S9 marks on the reverse (Fig. 38)

Sdm-7pC1

The subgroup of varieties Sdm-7pC1 includes specimens distinguished by the depiction of a crosier with a large crook of Type 2-4 p with a Type b mark next to it. On the reverse was depicted a cross pattée with B and B-D arms with S9 marks.



Sdm-7pC1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
CNP 990-1	l2-4p	b	6	10	1-2(?)	B	S9



Sdm-7pC1-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
CNP 990-1	l2-4p	b	6	10	2	BD	S9

Sdm-7pC1	7	0,731	0,867	1,072	11,3	12,2	12,9
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Sdm-7pC2

Nineteen specimens were included in the Sdm-7pC2 subgroup. The obverse shows a crozier with a large crook with Type d marks beside it. On the reverse is depicted a cross pattée with distinctive 3BF arms with S9 marks.



Sdm-7pC2-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 990-1	l2-4p	d	5-6	10	3	BF	S9

Sdm-7pC2	19	0,701	0,821	0,98	11,2	11,7	12,3
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Sdm-7pC3

The coin of the Sdm-7pC3 variety on the obverse depicts a crozier with a large, closed 4p crook with b21a marks. The coin shows an unusual Type '3' crossing of the crozier. The reverse depicts a 1B cross pattée with S9 marks.



Sdm-7pC3-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 989-990	l4p	b21a	3	10	1	B	S9

Sdm-7pC3	1	0,805	0,805	0,805	12,4	12,4	12,4
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Sdm-7pC4

Cross deniers of the Sdm-7pC4-a variety on one side depict a crosier with a closed, large crook with a mark Type j (rarely seen on cross deniers). On the reverse is depicted a Type 4B cross pattée with S9 marks.



Sdm-7pC4-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 990-1	l4p	j	5-6	10	4	B	S9

Sdm-7pC4	5	0,742	0,870	1,139	11,2	12,1	13,1
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Group 7pD - deniers with depictions of crosiers with a rectangular crook on the obverse and a cross pattée with S9 marks on the reverse (Fig. 38)

Sdm-7pD1

The two cross deniers categorised in the subgroup of the Sdm-7pD1 varieties were struck with a crudely engraved die. The obverse depicts a crosier to the right with an angular crook similar to a rectilinear version of Type 4p. The reverse depicts a cross pattée with BF and BD arms with S9 characters.



Sdm-7pD1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 991-3	m4p	a	6	10	2	BF	S9



Sdm-7pD1-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
CNP 991-3	m4p	a	6	10	2	BD	S9

Sdm-7pD1	2	0,805	0,994	1,184	11	11,6	12,3
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Group 7pE - deniers with the marks ‘e, f, h, i’ (Fig. 33) by the crozier on the obverse and a cross pattée with the marks S9 on the reverse (Fig. 38)

Sdm-7pE1

A unique coin belonging to the 7pE1-a variety, made differently from other Type VII deniers. The obverse is particularly noteworthy for the depiction of the crozier, the lower part of which is made of dots, as is the Type ‘1a’ crossing. The wreath of beads has been reduced here to two marks. The reverse bears a cross pattée with BG-type arms with S9 marks.



Sdm-7pE1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
CNP 994 var.	m3p	i	7	1a	1	BG	S9

Sdm-7pE1-a	1	0,692	0,692	0,692	12,2	12,2	12,2
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Sdm-7pE2

Variety Sdm-7pE2 is distinguished by the crozier shape with an open crook of Type ‘m1p’ and f-type (?) markings. Attention is drawn to the rare single-element crossing of Type ‘3’. On the reverse there is a depiction of a cross pattée with arms of Type ‘2B’ with marks of type ‘S9’.



Sdm-7pE2-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 989	mp (?)	f (?)	3	10	2	B	S9

Sdm-7pE2-a	2	0,862	0,866	0,871	13,0	12,5	13,0
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Sdm-7pE3

Coins included in the subgroup of varieties Sdm-7pE3 on one side depict a ml4p crossier with a large crook and e or f-type marks. The other side depicts a cross pattée 1-2BD with S9 characters.



Sdm-7pE3-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~CNP 989-990	ml4p (?)	e or f (?)	6-7	2	1-2	BD	S9

Sdm-7pE3	4	0,812	0,870	0,976	11,5	12,1	13,1
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Sdm-7pE4

Coins of the Sdm-7pE4 variety differ from the rest of Type VII by their specific style of design. On the obverse is a depiction of a crossier with a large crook and the marks f and f23 next to them. On the reverse is a cross pattée with arms of Type 3-4BF and B with S9 marks.



Sdm-7pE4-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~CNP 989-990 var.	l4p (?)	f23	7 (?)	8	3-4	BF	S9



Sdm-7pE4-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 989 var.	l4p	f	7	2	3-4	B	S9

Sdm-7pE4	3	0,87	0,972	1,094	12,6	12,9	13,3
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Group F - deniers with crozier to the right on the obverse and with signs other than S9 between the arms of the cross pattée on the reverse (Fig. 38)

Sdm-7pF1

Sdm-7pF1 is distinguished by a reverse uncommon in other varieties of Type VII deniers with a P10 mark between the arms of the cross pattée, which links this coin to later varieties of Type VI coins.



Sdm-7pF1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
CNP 993/858	sl3p	B	6	10	1-2	BD	P10

Sdm-7pF1	2	0,84	0,892	0,945	11,1	11,1	11,1
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Sdm-7pF2

One of the few Type VII deniers varieties to show combinations of the reverse die with coins of other types. The obverse is similar to varieties of the 7pB2-a group, with the depiction of a slender crosier with a small Type 2p crook. The reverse is very distinctive: it depicts a cross pattée and a crosier on the reverse (as on some Type V and VIII cross deniers - with the representation of a beaded cross and a glove on the obverse).



Sdm-7pF2-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
CNP 992	s2p	a	5-6	10	1	C	S29

Sdm-7pF2	9	0,840	0,905	0,981	11,7	12,2	12,5
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Sdm-7pF3

The coin, included in the subgroup Sdm-7pF3, is characterised by a very rare variant of the Type 'l3p' wreath, composed here of large beads. The crosier has a large crook (l) of Type 3p. On the other side is depicted a cross pattée with D-F arms, probably with S3 markings.



Sdm-7pF3-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
CNP 990/672 var.	l3p (?)	a	6	3a	2	DF	S3 (?)

Sdm-7pF3	1	0,841	0,841	0,841	12,0	12,0	12,0
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Sdm-7pF4

Cross deniers included in the subgroup of varieties Sdm-7pF4 on the obverse depict a crosier with a closed crook with the 'j' mark. It is identical to the obverse of the denier of variety Sdm-7pC4. Attention is drawn to the reverse, which depicts a 2F cross pattée with asymmetrically arranged arms and S20 marks (the latter are known mainly from Type V cross deniers).



Sdm-7pF4-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 990/633	l4p	j	5-6	10	2	F	S20

Sdm-7pF4	3	0,724	0,972	1,109	11,4	12,2	12,7
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Sdm-7pF5

The Sdm-7pF5-a variety is represented by one specimen. It is distinguished by the careless design of the die. The obverse depicts a crosier with a large crook with b21a marks. The reverse shows a cross pattée with arms 1DF, without marks (?).



Sdm-7pF5-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 989-990 (?)	l4p	b21a (?)	6ab	10 (?)	1	DF	01 (?)

Sdm-7pF5	1	0,778	0,778	0,778	11,8	11,8	11,8
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Subtype '7' - cross deniers with a crossed crosier to the left

Group 7A - cross deniers with a tightly curved crosier on the obverse and a cross pattée with S9 marks on the reverse (Fig. 38)

Sdm-7A1

Cross deniers of the Sdm-7A1 variety are distinguished by a crosier with a small crook (s) of the '2 and 4' type, without marks in the centre. On the reverse is depicted a cross pattée with 1B-D and 1B arms with S9 marks.



Sdm-7A1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-7	s2-4	a	5-6	10	1	BD	S9



Sdm-7A1-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 986-7	s2-4	a	5-6	10	1	B	S9



Sdm-7A1-c	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 986-7	s2-4	a	5-6	10 (?)	3	B	S9

Sdm-7A1	321	0,554	0,811	1,260	11,4	12,5	13,4
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Sdm-7A2

The subgroup of varieties Sdm-7A2 includes coins with crosses with a tightly-coiled crook of types '2', '2-4' and '4' with a dot in the centre (type b and b21 mark). On the reverse is a cross pattée of type B, BC, BD, BE with S9 marks.



Sdm-7A2-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
CNP 986-987	s2	b	5	10	1	B	S9



Sdm-7A2-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	s2	b	6	10	1-2	BD	S9



Sdm-A2-c ²²	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	sm2-4	d	6	10 (?)	1	BF	S9



22 In the first edition of the 2021 monograph, this variety was designated Sdm-7B2-m

Sdm-7A2-d	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-7/990	s2	b	6	10	1	B	S9



Sdm-7A2-e	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986	s2-4 (?)	b (?)	5-6	10	3-4	BD	S9



Sdm-7A2-f	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	s2-4 (?)	b	6	10	3	BC	S9



Sdm-7A2-g	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	sm4	b	6	10	2(?)	B	S9



Sdm-7A2-h	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	s4	b	6	10	2	BE	S9



Sdm-7A2-i	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	s4	b21	6	10	1-2	B	S9

Sdm-7A2	367	0,614	0,901	1,237	11,1	12,5	13,6
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Group B - cross deniers with a crosier to the left with a medium-sized (m) crook on the obverse and a cross pattée with S9 marks on the reverse (Fig. 38)

Sdm-7B1

Coins included in the subgroup of the Sdm-7B1 variety are distinguished by a crossed crosier with a medium-sized crook without marks next to it, in a wreath of '10' beads. Only on the coins of the Sdm-7B1-e variety is there an A21 type mark directly above the crossing. On the revers is a cross pattée with type B and D arms.



Sdm-7B1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986	m1-2	a	5-6	10	1	D	S9



Sdm-7B1-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 986-987/990	m2	a	6	10	3	B	S9



Sdm-7B1-c	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 986-987/990	m4	a	6	10	3	B	S9



Sdm-7B1-d	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m4	a	6	10	2	B	S9



Sdm-7B1-e	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m4	a21	6	10	1	B	S9

Sdm-7B1	749	0,576	0,870	1,363	11,2	12,3	13,6
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Sdm-7B2

The cross deniers identified as sub-group Sdm-7B2 have on the obverse in a wreath of beads of Type '10' a representation of a crozier with a medium-sized crook with crossings of types '5-6' and '6'. In the centre of the crook are the marks b, c and d, j. The reverse depicts a cross pattée with S9 marks.



Sdm-7B2-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m2-4	c	6	10	3	B	S9



Sdm-7B2-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m3	b or c	6	10	1	B	S9



Sdm-7B2-c	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m3	b or c	6	10	3	B	S9



Sdm-7B2-d	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m2-4	b	5-6	10 (?)	1	B	S9



Sdm-7B2-e	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m2 (?)	b	6	9a (?)	2	B	S9



Sdm-7B2-f	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 986-987	m3(?)	b	5-6	10 (?)	1	BD	S9



Sdm-7B2-g	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m3	c	6	10 (?)	2	B	S9



Sdm-7B2-h	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 986-987	m3	c	5-6	10	2	B	S9



Sdm-7B2-i	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 986-987	m3	c	5-6	10	1	B	S9



Sdm-7B2-j	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986/991	m4	b	5-6	10 (?)	1	B	S9



Sdm-7B2-k	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m4	b	5-6	10 (?)	1	B	S9



Sdm-7B2-l	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	m2-4	b	5-6	10(?)	1	BD	S9



Sdm-7B2-m ²³	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 986-7/990	m2	b	6	10	3-4	BD	S9



Sdm-7B2-n	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 986-987	m3-4	b22	5-6	10 (?)	1	BG	S9



Sdm-7B2-o	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 986-987	m5	j	5-6	10	1	B	S9

Sdm-7B2	2287	0,436	0,870	1,328	10,4	12,3	13,7
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²³ In the first edition of the 2021 monograph, this variety was designated Sdm-7A2-c

Sdm-7B3

The coin representing the Sdm-7B3 variety bears on the obverse a depiction of a slender crosier made with a fine line with a medium-sized crook of Type '4'. On the other side, between the arms of a cross pattée there is a depiction, also engraved with a fine line, of elongated S9-type characters, unknown in this form from other varieties of Type VII deniers.



Sdm-7B3-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 987	m4	b	6	10	4	B	S9

Sdm-7B3	2	0,905	0,944	0,983	12,6	12,8	13,1
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Group C - cross deniers with crosiers with a large crook on the obverse and a cross pattée with S9 marks on the reverse (Fig. 38)

Sdm-7C1

The Sdm-7C1 varieties are distinguished by the depiction on the obverse of a crosier with a large crook of types '2-4' and '4', without any marks beside it. The second side depicts a cross pattée of Type B, B-D, B-F with S9 characters.



Sdm-7C1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-7	l2-4	a	5	10	2	BC	S9



Sdm-7C1-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-7	l2-4	a	6	10	1	BF	S9



Sdm-7C1-c	Obverse:				Reverse:		
Markings in the field	l4	5	6	7	8	9	10
- CNP 986-7	4	a	5-6	10	1	B	S9



Sdm-7C1-d	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-7	l4	a	5-6	10	1	BD	S9

Sdm-7C1	61	0,618	0,859	1,069	11,8	12,3	12,9
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Sdm-7C2

The above varieties of deniers depict on the obverse a crozier with a large Type '3' crook with the mark of Type c. On the reverse is depicted a cross pattée with S9 signs.



Sdm-7C2-a	Obverse:				Reverse:		
Markings in the field	14	5	6	7	8	9	10
- CNP 986-987	3	c (?)	6	(?)	1	B	S9



Sdm-7C2-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	12	c (?)	6	(?)	3	B	S9



Sdm-7C2-c	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	13(?)	c (?)	5	9 (?)	3	B-G	S9



Sdm-7C2-d	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987	l4(?)	c (?)	5-6	9	1	BG	S9

Sdm-7C2	61	0,618	0,859	1,069	11,8	12,3	12,9
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Group D - deniers with a large curved crossier with a Type 6a crossing (Fig. 34) on the obverse and a cross pattée with Type S9 marks on the reverse (Fig. 38)

Sdm-7D1

Cross deniers of the Sdm-7D1 variety on the obverse depict a crossier with a large crook and distinctive Type 6a crossing. On the reverse is depicted a cross pattée of Type B with S9 characters.



Sdm-7D1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986	l4	c	6a	9	1	B	S9

Sdm-7D1	26	0,692	0,907	1,07	11,7	12,2	12,7
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Group E - deniers struck with a damaged die with an illegible upper part of the obverse and a 2F-armed cross pattée with S9 marks (Figs 37 and 38)

Sdm-7E1

The deniers classified in subgroup Sdm-7E1 on the obverse are distinguished by a design depicting a crossed crossier and a fragment of a wreath. The obverse die has been made extremely carelessly. The reverse of this type of coin is equally crude, with a Type 2F cross pattée and S9 marks. Due to their small diameter, these coins may belong to the latest issues of Type VII cross deniers.



Sdm-7E1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 985/986	?	a (?)	6	10 (?)	2	F	S9

Sdm-7E1-a	16	0,718	0,836	1,026	10,9	11,4	12,4
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Group 7F - cross deniers with a dot at the bottom of the e and f type crozier on the obverse (fig. 33) and with a cross pattée with S9 marks on the reverse (fig. 38)

The deniers of the subgroup of varieties Sdm-7F1 depict a crozier with a medium-sized crook of Type '2' with a dot at the bottom (marks e, f and f21), in a wreath of beads Type '9' and '10'. On the reverse is depicted a cross pattée with B and B-D arms with S9 characters.



Sdm-7F1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 985/986	m2	e	6	10	1	B	S9



Sdm-7F1-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 985/986	m2	f	7	9-10 (?)	1	B	S9



Sdm-7F1-c	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
-CNP 985/986	m2	f21c	7	9	2	B	S9



Sdm-7F1-d	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 985/986	sm2	f (?)	6	9-10 (?)	4	B	S9

Sdm-7F1	11	0,764	0,874	1,043	12,2	12,8	13,4
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Group 7G - deniers with left-facing crosiers on the obverse and without marks or with marks other than the S9 type on the reverse (Fig. 38)

Sdm-7G1

The coin, representing a subgroup of the Sdm-7G1 variety, is characterised by an incomplete wreath of beads of variant '3' around the representation of a crozier with a Type '1' crook. Also of interest are the S6 markings, occurring between the arms of the cross pattée on the reverse of this denier, otherwise associated rather with older varieties of cross deniers.



Sdm-7G1-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 997	m1	a	6	3	1	BG	S6

Sdm-7G1	1	0,972	0,972	0,972	12,4	12,4	12,4
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Sdm-7G2

The coin categorised as the Sdm-7G2-a variety has a somewhat similar depiction of the crozier on the obverse to that on the Sdm-7C2-d specimens, but without the marks between the arms of the cross pattée on the reverse.



Sdm-7G2-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987/860	m2-3	c	6	9	1	B	01

Sdm-7G2-a	1	0,789	0,789	0,789	11,3	11,3	11,3
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Sdm-7G3

This variety of coins included two deniers depicting a crozier with a large '4' type crook tilted heavily to the left on the obverse and a 1D cross pattée without marks on the reverse.



Sdm-7G3-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-987/860	m14(?)	a	6	10	1	D	01

Sdm-7G3	2	0,74	0,869	0,999	11,7	11,8	11,9
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Sdm-7G4

This variety differs very much from the others in the style of execution and the unusual arrangement of the beads on the crozier (variant k). Its crook is partially closed (type 2-4). On the reverse is depicted a cross pattée without marks between the arms.



Sdm-7G4-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP ?/860	m2-4	k	6	3	1	B	01

Sdm-7G4	3	0,789	0,917	1,082	11,3	12,0	12,5
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Sdm-7G5

For deniers of the Sdm-7G5-a variety, the slender representation of a crozier with a crook of Type '3' on the obverse is characteristic. On the other side there is a 2B cross pattée with the P5 mark in the form of a thinly marked arc between its arms. It is identical to the reverse of the coin Sdm-6A8-a.



Sdm-7G5-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 986-987/846	sm3	c	6	10	2	B	P5

Sdm-7G5	13	0,738	0,982	1,149	11,7	12,3	13,0
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Sdm-7G6

The deniers included in the subgroup of varieties Sdm-7G6 depict on the obverse a crozier with crook 'sm1-2'. On the reverse is depicted a cross pattée with broad arms of types BD and D with Q3 characters.



Sdm-7G6-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-7/672	sm1-2	b	5-6	3a	2	D	Q3



Sdm-7G6-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-7/672	m1-2 (?)	b (?)	5-6	9	1-2	BD	Q3

Sdm-7G6	11	0,668	0,854	1,147	11,9	12,4	13,1
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Sdm-7G7

Cross deniers classified in the sub-group of varieties Sdm-7G7 depict on the obverse a crozier with a Type '4' crook without marks. The reverse depicts a cross pattée with the distinctive S20 and S21 marks (most commonly found on Type V cross deniers with the depiction of a beaded cross).



Sdm-7G7-a	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
- CNP 986-7/648	m4	a (?)	5-6 (?)	?	1	BD	S20



Sdm-7G6-b	Obverse:				Reverse:		
Markings in the field	4	5	6	7	8	9	10
~ CNP 986-7/648 var.	m4(?)	a (?)	5-6	10 (?)	2	BD	S21

Sdm-7G7	2	0,692	0,717	0,742	12,4	12,6	12,9
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4. Metrology

4.1 Overview of Saxon and Polish coin weights and purity

The most important task of the metrological research in this work is to compare the weights of coins and the content of pure silver within the identified groups of cross deniers of Types: V - with a beaded cross; VI - with a plain cross and VII - with a crosier on the obverse, from the last two decades of the 11th and early 12th centuries.²⁴ These issues in the first part of the chapter are also compared with slightly older varieties of cross deniers, as well as with other German and Polish coins (deniers of the Piast rulers and Sieciech with his mark on the obverse) from the second half of the 11th century.

To begin with, it is possible to trace the development of the silver alloy and weights of pure bullion of the coins from Saxony coins of the second half of the 10th century onwards, when the production of cross deniers began (Table 1).²⁵

The Saxon coins presented above (Zwicker *et al.* 1991; Table 1) show a continuing downward trend in both coin weights and the amount of silver contained in them from the second half of the 10th to the beginning of the 12th century. The small number of coins examined in terms of silver content gives results that in themselves are unreliable, but the trend is evident (Fig. 40).

Among the material presented above are three coins (Table 1: 17- 19): the first produced at Ballenstedt (weight 0.88 g, purity 700/1000, pure silver weight 0.616 g) and two at Bardowick (weight 0.855 g, purity 663/1000, pure silver weight 0.541 g), which chronologically are close to the latest varieties of cross deniers. The average weight of these three specimens is 0.863 g, purity 675/1000, and the weight of pure silver is 0.566 g.

24 An important problem in the study of metrology is to determine the weight of the mark (Polish: *grzywna*) - the large unit of weight according to which coins were produced. This would make it possible to clearly trace the issuing policy of the owners of the mint workshops. For the period of the late eleventh and early twelfth centuries of interest to us, however, there are no written sources on the use and size of the *grzywna* either in Poland or Saxony. Therefore, in this work, due to the multiplicity of mints producing cross deniers, an attempt to establish the mass of the large weight unit used in the production of the artefacts of interest has been abandoned.

25 Results of metallographic studies of German coins based on the work: Zwicker *et al.* 1991. The analyses were carried out using a different TXRF (total reflection of X-rays) method, which makes comparison with the studies carried out for the artefacts from Słuszków using an EDS PV spectrometer difficult. Analyses of this type also carried out in Poland, including for the National Museum in Kraków (Ostachowicz *et al.* 2001), show slightly different results, demonstrating the presence in trace amounts of elements absent when examined on the EDX PV spectrometer.

Table 1. Saxon coins from 10th to 12th centuries: weights of coins, purity, and weights of pure metal based on analysis by U. Zwicker, N. Gale, and Z. Stos-Gale (Zwicker *et al.* 1991)

No.-Phase	Typology	Mint	Chronology	Weight (g)	Purity	Weight of Ag (g)
1-A	Dbg 639*	Magdeburg	983-996	1.41	900	1.269
2-BC	Dbg 648	Magdeburg	approx. 1025	1.55	913	1.415
3-BC	Dbg 773	Emden	1020-1051	0.67	386	0.258
4-BCD	Dbg 1299b	Jever ?	1011-1059	0.86	890	0.765
5-BCD	Dbg 591	Jever	1011-1059	0.93	400	0.372
6-BCD	Dbg 589a	Luneburg	1011-1059	1.17	777	0.868
7-CD	Dbg 668	Goslar	1046-1056	1.62	919	1.489
8-CD	Dbg 668	Goslar	1046-1056	1.51	870	1.313
9-CD	Dbg 668a	Goslar	1046-1056	1.25	850	1.062
10-D	Dbg 595	Jever	1059-1071	0.73	472	0.344
11-D	Dbg 595	Jever	1059-1071	0.73	475	0.346
12-D	Dbg 595	Jever	1059-1071	0.70	840	0.555
13-DE	Dbg 454	Bardowick	2 nd half of the 11 th century.	0.75	498	0.588
14-DE	Schul. I	Bardowick	1050-1080	0.90	610	0.549
15-DE	Schul. I	Bardowick	1050-1080	0.75	300	0.225
16-DE	Schul. I	Bardowick	1050-1080	0.84	610	0.512
17-E	Dbg 651/1578	Ballenstedt	approx. 1100	0.88	700	0.616
18-E	Schul. II	Bardowick	1080-1150	0.99	476	0.471
19-E	Schul. II	Bardowick	1080-1150	0.72	850	0.612

*Key: Dbg - Dannenberg 1876-1905; Schul. - Schulenburg 1947; Phases: A - up to the year 1000, B - 1000-1025, C - 1025-1050, D - 1050-1075, E - after 1080

The metric values of cross deniers dated from the second half of the 10th century to around 1080 follow a similar pattern to their German deniers contemporaries (cf. Table 1). Although again only a small number of artefacts were available, we see a tendency towards a reduction in the weight of coins and the weight of pure silver, although the analyses of some individual cross deniers sometimes do not conform to such a process (cf. items 40-D and 41-D of Fig. 41). In the case of the cross deniers examined, the trend of a stronger decrease over time in their actual silver weight than in their alloy weight is more clearly discernible (other Saxon coins from this period intended for the local market showed a more proportional decrease in both quantities - cf. Fig. 41), although these observations may of course change with more coin analyses.

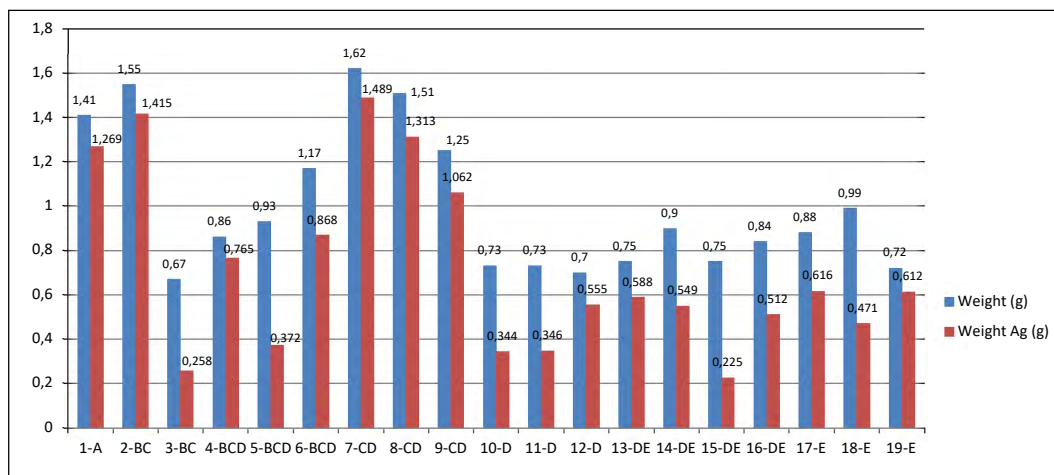


Fig. 40. Weight (g) of alloy (coin) and pure silver of Saxon coins from the second half of the 10th to the beginning of the 12th century (**Phases: A** - before year 1000, **B** - 1000-1025, **C** - 1025-1050, **D** - 1050-1080, **E** - after 1080) (compiled by A. Kędzierski)

Table 2. Saxon cross deniers from the second half of the 10th century to roughly 1080 - weights, purity, and weights of pure metal based on analysis by U. Zwicker, N. Gale, and Z. Stos-Gale (Zwicker *et al.* 1991) and analysis of deniers from Słuszków performed in CL IAE PAN

No./phase	Typology	Mint	Chronology	Weight (g)	Purity 000/1000	Weight of Ag (g)
Type I deniers						
↓						
20-A	CNP 309	Magdeburg	2 nd half of the 10 th century.	1,45	886	1,285
21-A	CNP 360-361	Magdeburg	2 nd half of the 10 th century.	1,44	904	1,302
22-A	CNP 327	Magdeburg	2 nd half of the 10 th century.	1,42	799	1,134
23-A	CNP 358	Magdeburg	2 nd half of the 10 th century.	1,2	900	1,08
24-A	CNP 360	Magdeburg	2 nd half of the 10 th century.	1,51	810	1,299
Type I deniers (average)				1,404	860	1,22
Type II deniers						
↓						
25-B	CNP 407	Magdeburg	1 st quarter of the 11 th century.	1,26	916	1,154
26-B	CNP 400	Magdeburg	1 st quarter of the 11 th century.	1,19	898	1,068
27-B	CNP 431-452	Magdeburg	1 st quarter of the 11 th century.	0,786	844	0,663

Type II deniers (average)				1,078	886	0,961
Type III deniers ↓						
28-B	CNP 538-541	Saxony	1 st quarter of the 11 th century.	1,21	728	0,881
Type IV deniers ↓						
29-C	CNP 748-755	Saxony	2 nd quarter of the 11 th century.	1,05	770	0,808
30-C	~CNP 785	Saxony	2 nd quarter of the 11 th century.	1,13	450	0,508
31-C	CNP 709	Saxony	2 nd quarter of the 11 th century.	1,23	500	0,615
Type IV deniers (average)				1,136	573	0,643
Type V deniers ↓						
32-D	~CNP 612-619	Saxony	3 rd quarter of the 11 th century.	0,834	719	0,599
33-D	~CNP 612-619	Saxony	3 rd quarter of the 11 th century.	0,76	320	0,243
34-D	~CNP 638	Saxony	3 rd quarter of the 11 th century.	0,83	734	0,609
Type V deniers (average)				0,808	591	0,483
Type VI deniers ↓						
35-D	~CNP 793-794	Saxony	3 rd quarter of the 11 th century.	0,76	554	0,421
36-D	~CNP 793-794	Saxony	3 rd quarter of the 11 th century.	0,829	594	0,492
37-D	~CNP 843	Saxony	3 rd quarter of the 11 th century.	0,873	484	0,426
38-D	~CNP 843	Saxony	3 rd quarter of the 11 th century.	0,959	435	0,417
39-D	~CNP 843	Saxony	3 rd quarter of the 11 th century.	0,904	321	0,29
40-D	CNP 836-840	Saxony	3 rd quarter of the 11 th century.	1,062	474	0,503
Type VI deniers (average)				0,897	477	0,424
Type VII deniers ↓						
41-D	CNP 967	Saksonia	3 rd quarter of the 11 th century.	0,918	735	0,674

Items listed in bold - analyses of the **Central Laboratory** IAE PAN

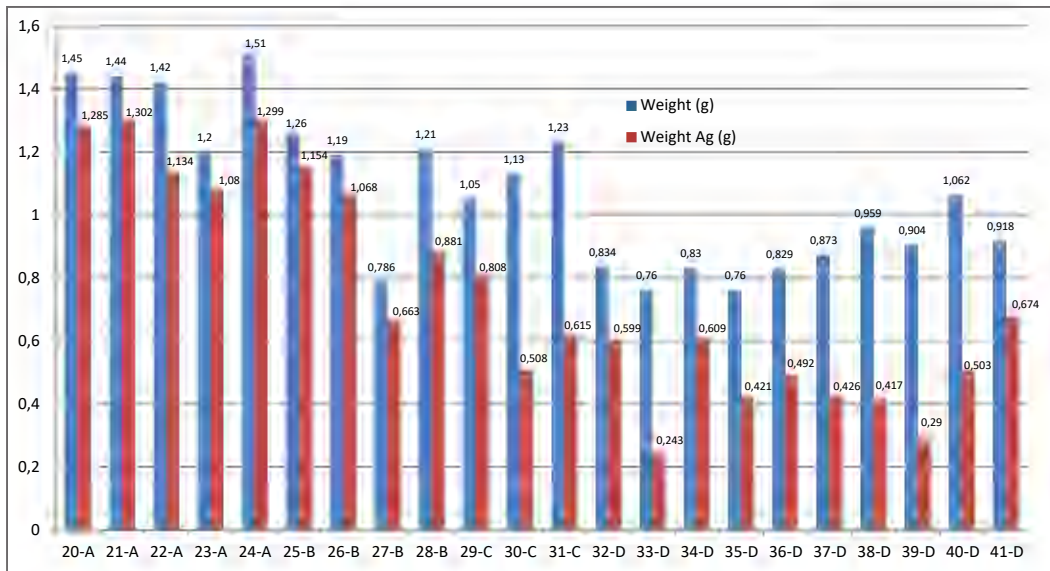


Fig. 41. Weights of the alloy and pure silver of the cross deniers types: I, II, V-VII, dated from the second half of the 10th century to circa 1080 (prepared by: A Kędzierski)

After observing changes in the metrology of Saxon coins, it is worthwhile to study this issue in Polish numismatic material from the 11th century. The earliest Polish minting of Bolesław I and Mieszko II cannot be taken into account in metrological analyses, due not only to their issue in small numbers, but also to the low technical level of Polish workshops from the times of the first Piast rulers in the first quarter of the 11th century. This explains, among others, large differences in the sizes of individual specimens. The review of alloy and pure bullion weights of Polish coins will begin with the deniers of Bolesław II - the first Polish ruler who produced silver coins on a larger scale. Such artefacts include his ducal deniers of Type I (according to S. Suchodolski's typology, cf. 1973, tab. IX), minted at the end of the third quarter of the 11th century, and royal deniers from the beginning of the last quarter of the 11th century. A comparative analysis of the metric data will be aided by also taking into consideration coins of his brother, Władysław Herman, reigning in the last two decades of the 11th century, and the much rarer issues of Sieciech Type I and II (according to S. Suchodolski's typology, cf. 1987, tabl. I), dating from the last years of the 11th century, and depicting the sign and name of the governor on the obverse.

The research of S. Suchodolski on the metrology of early medieval Polish coins (1973: 40-44 and 132-134) showed that the average weight of the ducal deniers of Bolesław II produced up to 1076 is 0.7 g,²⁶ with an average purity of 450/1000, which yielded an average of 0.315 g of pure

26 For better guidance, the paper relies on coin weights without adding the 5% value associated with losses due to coin cleaning; similarly, purity of 1000/1000 (rather than 960/1000) was used in the calculations as defining pure silver in the early Middle Ages. An average arithmetic weight was used in the calculations, due to operations often carried out on small coin assemblages.

silver (Fig. 42). Slightly later coins of the ruler from the royal period 1076-1079 show a slightly higher average weight of 0.711 g, but with poorer purity, averaging 214/1000 (0.152 g of pure Ag in the coin). The average weight of deniers of the only type produced by Władysław Herman is 0.6 g, with a purity of 600/1000 (an average of 0.36 g of silver bullion). However, it should be noted that neither the deniers of Bolesław II nor of Władysław Herman were issued according to a uniform mint rate during their reigns (Suchodolski 1973, 34-35).

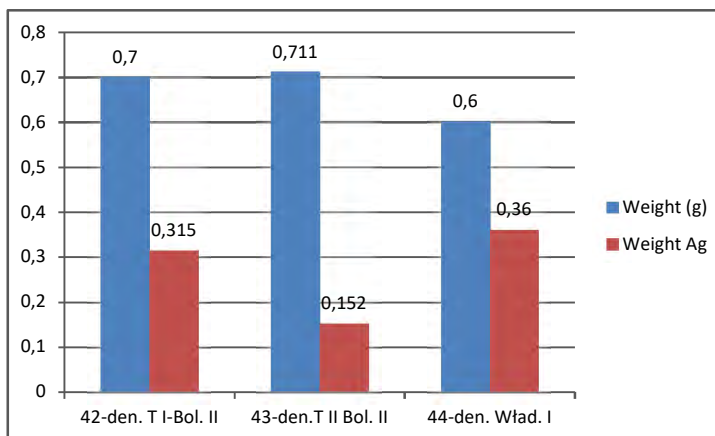


Fig. 42. Weight of the alloy and pure silver of the Piast coins from the second half of the 11th century (prepared by: A Kędzierski)

The trend relating to the alloy and pure silver weights of the coins of Bolesław II and Władysław Herman presents a different course than in the case of the Saxon artefacts. While it is still possible to speak of a tendency for the weight of coins to decrease over time, the weight of pure silver in the coins increases. This, as can be seen, is primarily related to the monetary policy of the Polish rulers of the time, rather than to the time of production.

Apart from the issues of the Piast monarchs, the large deniers of Sieciech with his mark and name on the obverse undoubtedly also belong to the Polish minting of the late 11th century. The Słuszków I hoard contains almost all the known specimens of Type I - 120 pieces.²⁷ Of these, 87+3 coins belong to the first variety (hereinafter I/1) - the oldest. Examined in terms of alloy composition, two fragments of these coins had purity of 607/1000 and 706/1000, giving an average of 656/1000. The average weight of 87 whole specimens of Type I/1 was 0.989 g, with 0.649 g of pure silver for the two coins analysed. Similar calculations can be made for 23 specimens of Type I/5 Sieciech coins²⁸ from the first Słuszków hoard. These weighed on average 0.903 g at the

²⁷ The newly discovered Słuszków II hoard included four Sieciech Type I deniers.

²⁸ The remaining Type I artefacts of varieties: 2, 3 and 4 occur together in only eight specimens and their metrological analyses cannot be reliable, although average weights and average content of pure silver have been calculated (on the basis of metallographic studies of coins from the Słuszków hoard

518/1000 purity known from the metallographic analysis of one specimen, giving 0.467 g of pure silver for this artefact (Fig. 43).

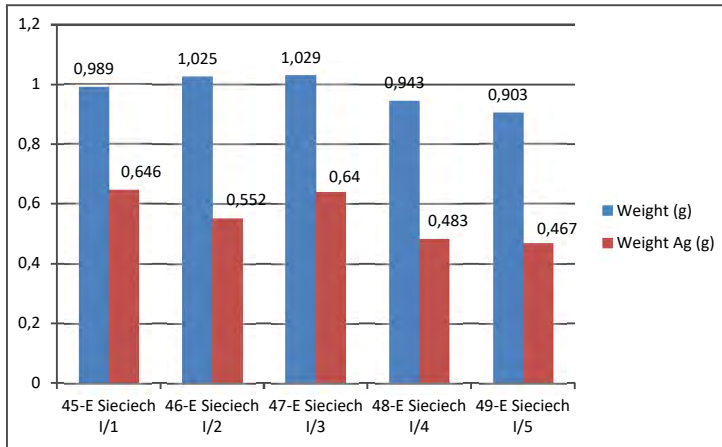


Fig. 43. Weight of alloy and pure silver of Sieciech's large Type I deniers (compiled by A. Kędzierski)

All the values obtained, relating to both the alloy weight and the silver weight of the Sieciech Type I deniers, are far superior in this respect to the contemporary issues of Władysław Herman, not to mention older artefacts associated with the minting of King Bolesław II.

Sieciech Type II monogrammed coins are also known to have been discovered mainly in Lesser Poland. We have information about 33 whole specimens and two halves. The specimens weigh an average of 0.918 g (Fig. 44), and the specimen from the Służków assemblage examined for silver content (half of a coin of Type II/12 according to S. Suchodolski) had a purity of 337/1000.

Sieciech's coins with the monogram are clearly inferior in quality to specimens included in Type I, but in weight they are also superior to their counterparts issued by Władysław Herman.

The origin of some of the cross deniers issues - Types IV and VIII - is known at least at the level of the countries in which they were issued (unlike some of the later cross deniers of Types V, VI and VII). Saxon issues include cross deniers with the letter S (Type IVB) and specimens with a banner and a glove on the obverse (Type VIIIA). On the other hand, deniers with the image of a head of the CNP 1010 variety (Type VIIIB) are discovered mainly in Silesia and less frequently in Greater Poland, which indicates their Polish origin (Kędzierski 2002). Subjected to metallographic analyses, cross deniers linked to German mints of Types IVB and VIIIA (CNP 518 and CNP 1001) show on average a higher weight of pure silver than deniers depicting a Type VIIIB head (CNP 1010). The CNP 1001 coins have an exceptionally high pure silver content (values found on the basis of the average weight of two specimens from Służków and the metal analysis performed on one of them; cf. Fig. 45).

carried out at the Central Laboratory of the IAE PAN in Warsaw) for the above extremely rare varieties of Sieciech deniers (cf. Fig. 43).

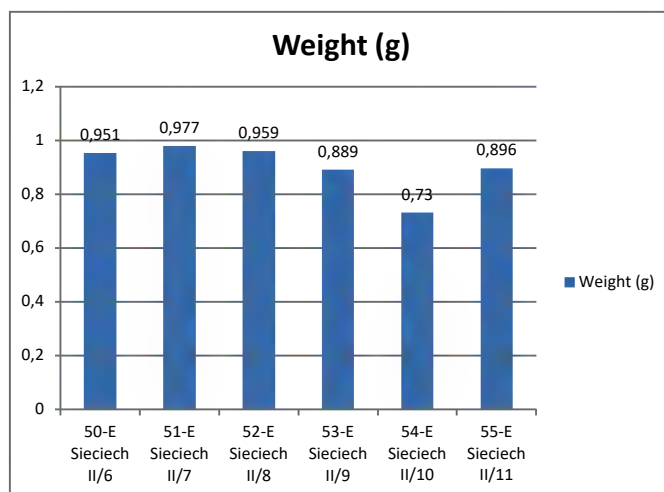


Fig. 44. Weight of Siciech's large Type II deniers (after Suchodolski 1987, 27) (compiled by A. Kędzierski)

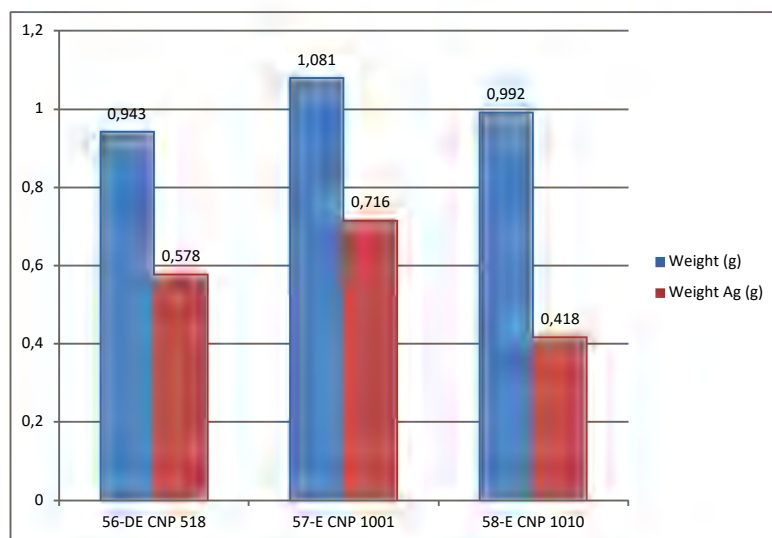


Fig. 45. Weight of the alloy and pure silver of the cross deniers CNP 518, CNP 1001, CNP 1010 (prepared by: A. Kędzierski)

Having presented the available metrological data, it is possible to try again to compare German and Polish coins produced in the last quarter of the 11th century (Tables 3 and 4).

The metric data of the four German deniers are fairly even. The weights of pure silver in the coin alloys oscillate between 0.471 and 0.716 g. The highest silver content is present in the Type VIII coins CNP 1001 (Table 3: 57-E), which are found extremely rarely in Poland.

The silver content of Polish artefacts from the second half of the 11th century is lower than that of the German coins presented above. Only the large deniers of Siciech contain a similar amount

of silver to the specimens from Saxony, the others are inferior to them - especially the deniers of Bolesław II the Bold (Table 4).

Table 3. Saxon coins from the last quarter of the 11th century - weight, purity, and weight of pure metal based on analysis by U. Zwicker, N. Gale, and Z. Stos-Gale (Zwicker *et al.* 1991) and analyses of deniers from Słuszków performed in the CL IAE PAN

Lp./phase	Typology	Mint	Chronology	Weight (g)	Purity	Weight of Ag (g)
17-E	Dbg 651/1578	Ballenstedt	approx. 1100	0.88	700	0.616
18-E	Schul. II	Bardowick	1080-1150	0.99	476	0.471
19-E	Schul. II	Bardowick	1080-1150	0.72	850	0.612
57-E	CNP 1001	Germany -(Magde- burg-Halle)	approx. 1090	1.081	663	0.716

Content in bold - CL IAE PAN analysis

It would be interesting to compare the purchasing power of silver in Poland and Saxony. Looking at the results of metallurgical studies, one gets the impression that even at the end of the 11th century, the silver contained in the coins was valued higher in the east. This was probably influenced by the different potentials both in terms of sourcing the raw material and the technological level of western minting workshops. These differences resulted in a flow of silver raw material from the west to the east - to Poland, as is clearly shown by the numerous finds of German coins in Poland against the isolated discoveries of early mediaeval Polish deniers in Germany (although the origin of some of the earliest issues of cross deniers considered to be German rather than Polish may be mistaken).

Observing the alloy weights and the pure bullion content of the large Sieciech deniers from Lesser Poland (coins with a monogram on the reverse) and issues from Greater Poland (coins with a cross pattée on the reverse), we also see major differences. It seems that in terms of chronology these coins are close to each other. The differences in weight and silver purity may indicate that in Lesser Poland the silver bullion was of a greater value than in Greater Poland, and that the coins produced in southern Poland (also by the ruling Piast family), were intended primarily for the local market, as can be seen from the distribution of finds of isolated Kraków deniers of Bolesław the Bold and Władysław Herman.

Table 4. Polish coins from the second half of the 11th century - weights, purity, and weights of pure metal

Lp/phase	Typology	Mint	Chronology	Weight (g)	Purity	Weight of Ag (g)
43-D	Type II deniers of Bolesław the Bold	Kraków	1076-1079	0.711	214	0.152
44-E	Deniers of Władysław Herman	Kraków	1080-1102	0.600	600	0.360
45-49-E Pal I	Sieciech Type I deniers	Kalisz?	after 1090	0.973	578	0.562
50-55-E Pal II	Sieciech Type II denier	Lesser Poland	after 1090	0.918	337*	0.309
58-E CNP 1010	Cross denier CNP 1010	Silesia	after 1090	0.992*	412*	0.418

* Single coin/single metallurgical analysis; data for Kraków deniers of Bolesław the Bold and deniers of Władysław Herman according to S. Suchodolski (1973, 40-44 and 132-134), large deniers of Sieciech and cross denier CNP 1010 - analysis in the CL IAE PAN.

4.2 Metric analysis of the latest cross deniers

Types V-VII from the Słuszków I hoard

After this review of the weights and purity of Saxon and Polish coins of known origins, we may proceed to a metric analysis of the latest cross deniers of Types V, VI and VII from the Słuszków I hoard, which formed the main part of it.

Metric data will be presented here: weight and diameter of coins. These are included in tables, bringing together artefacts from the separate groups and varieties of cross deniers with a high edge within the types distinguished by Marian Gumowski.

Metallographic analyses were used to calculate the actual amount of silver in the coins. Due to the possibility of intentional increasing of the silver fineness on the surface of the coins by the makers, where possible the results used here were obtained in microscopic “craters” in the coins, made for the purpose of the research, were used. The sample results obtained for the silver should be treated as estimates, due to the imperfection of non-destructive analyses. This can be seen from the results of the metallographic examination of two fragments inv. nos. 12660 and 12661), coming from one large Sieciech Type I denier (cf. Fig. 115). In addition, the results obtained may not reflect the actual silver content, due, for example, to the coating of the cross deniers, so that the surface or near-surface data obtained in such a case will be quite different from those from the interior of the object (cf. Chapter V - *Provenance*).

Histograms were also used to trace the distribution of the weights of the numerically large varieties of cross deniers in the range from 0.5 to 1.5 g in intervals of 0.1 g. Their analysis helped to determine the theoretical weight, i.e., the weight that coins produced at the nominal rate should have attained (Suchodolski 1976). The weight interval of coins that would most likely correspond to the theoretical weight of a given variety, was not automatically taken to be the range comprising the largest number of specimens, on the assumption that the mint's activities were nevertheless going in the direction of increasing the minting rate. Therefore, more often than not, the range adjacent on the right (i.e., which concentrates heavier specimens) of the dominant one, seemed to determine the metric pattern of coins, intended by the issuer.

A. Later varieties of Type V cross deniers

In the first Słuszków deposit there were 893 whole specimens of the later issues of Type V deniers with the representation of a beaded cross on the obverse. They have been classified in the new typology into seven groups, 35 subgroups and 44 varieties. Coin weights range from 0.575 to 1.243 g and diameters from 10.8 to 14.0 mm.

Group Sdm-5A: F2 beaded wreath deniers

Only three coins were included in the Sdm-5A group of varieties, distinguished by the unusual representation on the obverse (a wreath of four beads inside and an additional one on the outside). The weights of the coins range from 0.771 to 0.812 g and the diameters from 11.4 to 12.4 mm (Table 5).

Table 5. Weights and diameters of coins of the Sdm-5A1-a group of varieties

Variety	Number	Weight min.	Average weight	Weight max	∅ min.	Average ∅	∅ max.
Sdm-5A1-a	3	0.771	0.795	0.812	11.4	12.0	12.4

Group 5B: cross deniers with beaded wreaths of Types B1, B3, B4, B5, B7 and E2, E5 and E7

A much more numerous group of varieties - 60 whole specimens - is represented by specimens included in the Sdm-5B group, depicting an incomplete wreath of 5-11 beads. Coins of this group were classified into 10 subgroups and 12 varieties. The average weight from this collection is 0.842 g and the diameter is 12.7 mm (Table 6).

Table 6. Weights and diameters of coins of the Sdm-5B group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	ø min.	Average ø	ø max.
Sdm-5B1-a	14	0.654	0.812	1.032	11.4	11.8	12.9
Sdm-5B2-a	1	0.93	0.93	0.93	13.2	13.2	13.2
Sdm-5B3-a	1	0.666	0.666	0.666	12.3	12.3	12.3
Sdm-5B4-a	4	0.662	0.796	0.899	13	13.1	13.2
Sdm-5B4-b	3	0.861	0.903	0.958	12.8	12.8	12.9
Sdm-5B4-c	3	0.913	0.967	1.006	13	13.3	13.4
Sdm-5B5-a	1	0.861	0.861	0.861	12.6	12.6	12.6
Sdm-5B6-a	1	0.819	0.819	0.819	11.8	11.8	11.8
Sdm-5B7-a	2	0.771	0.907	1.044	12.9	13.5	13.8
Sdm-5B8-a	28	0.647	0.846	1.024	12.5	13.1	14.0
Sdm-5B9-a	1	0.855	0.855	0.855	13.0	13.0	13.0
Sdm-5B10-a	1	0.739	0.739	0.739	11.5	11.5	11.5
TOTAL	60		0.842		AVERAGE	12.7	

Two cross deniers from the Sdm-5B group were subjected to metallographic analysis, so that their purity and approximate pure bullion content are known (Table 7).

Table 7. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-5B

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
188	V	Sdm-5B8-a	64.6	0.88	0.598
240	V	Sdm-5B8-a	39.11	0.905	0.353
average			51.85	0.892	0.475

Data in the table: Ag (%) purity of silver, Weight (g) weight of coins in grams, Ag (g) weight of pure silver in grams.

The analysed coins contained 0.598 and 0.353 g of pure silver, which is more than the average in the royal deniers of Bolesław the Bold. The better quality coin is similar in the content of pure silver to the large deniers of Sieciech, and the worse to the ducal coins of Władysław Herman (Suchodolski 1973, 133; cf. table 4).

Group Sdm-5C: cross deniers with a wreath of beads B7

This group included 429 whole coins, distinguished by the ‘full’ wreath of 12 beads around the cross on the obverse. This is the most numerous group of later issues of Type V cross deniers. The coins occurred in 15 subgroups and 20 varieties. Their weights ranged widely from 0.575 to 1.243 g (average 0.835 g), while their diameters ranged from 10.8 to 13.9 mm (average 12.4 mm) (Table 8).

Among the artefacts discussed are two large subgroups: Sdm-5C10 and Sdm-5C12, for which histograms have been prepared showing the weight distributions of the coins in 0.1g increments.

The Sdm-5C10 variety subgroup included 123 specimens with weights ranging from 0.67 to 1.243 g and diameters ranging from 11.8 to 13.7 mm. The largest number of artefacts fell within the 0.8 to 0.9 g range (44.3%). Also the adjacent range, comprising weights from 0.7 to 0.8 g, contains a large number of cross deniers (32.2%), while the range from 0.9 to 1 g only contains fewer pieces (15.3%). Only single examples of coins weighing less than 0.7 g and more than 1 g are found. It is likely that the deniers were intended to reach weights in the 0.8 to 0.9 g range, but a large proportion of the issue was struck at a higher rate, as shown by the fairly numerous pieces weighing between 0.7 and 0.8 g (Fig. 46).

The larger subgroup of varieties are the Sdm-5C12 cross deniers, comprising 106 whole specimens. The weights of these artefacts range from 0.6 to 1.186 g, while the diameters range from 11.3 to 13.5 mm. This group is dominated by coins with weights between 0.8 and 0.9 g (34.9%), with an arithmetic mean of 0.848 g. The two adjacent ranges also contain a significant number of coins - 0.7 to 0.8 g - 29.2% and 0.9 to 1.0 g - 23.5%, respectively (Fig. 47).

Table 8. Weights and diameters of coins of the Sdm-5C group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	∅ min.	Average ∅	∅ max.
Sdm-5C1-a	5	0.826	0.904	0.985	12.4	12.9	13.6
Sdm-5C1-b	1	0.83	0.83	0.83	12	12	12
Sdm-5C2-a	1	0.974	0.974	0.974	13.1	13.1	13.1
Sdm-5C3-a	1	0.799	0.799	0.799	12.8	12.8	12.8
Sdm-5C4-a	2	0.949	1.023	1.097	12.6	12.7	12.8
Sdm-5C5-a	16	0.64	0.783	0.931	10.8	11.4	12.1
Sdm-5C6-a	26	0.732	0.840	0.98	12.1	12.5	13
Sdm-5C6-b	12	0.695	0.741	0.777	12.5	13.1	13.4
Sdm-5C6-c	1	0.754	0.754	0.754	12.4	12.4	12.4
Sdm-5C7-a	1	0.904	0.904	0.904	12.9	12.9	12.9
Sdm-5C7-b	2	0.823	0.88	0.937	12.6	12.7	12.9

Variety	Number	Weight min.	Average weight	Weight max.	ø min.	Average ø	ø max.
Sdm-5C8-a	4	0.867	1.003	1.173	12.6	12.9	13.3
Sdm-5C9-a	3	0.806	0.864	0.978	12.8	13.2	13.9
Sdm-5C10-a	23	0.715	0.910	1.243	12.1	12.9	13.7
Sdm-5C10-b	100	0.67	0.823	1.028	11.8	12.4	13.1
Sdm-5C11-a	54	0.682	0.825	1.029	11.5	12.3	12.9
Sdm-5C12-a	106	0.6	0.848	1.186	11.2	12.2	13.5
Sdm-5C13-a	5	0.632	0.752	0.873	11.4	11.8	12.2
Sdm-5C14-a	3	0.692	0.768	0.808	12.8	13.1	13.4
Sdm-5C15-a	63	0.575	0.824	0.99	11.5	12.4	12.9
Total	429		0.835	average		12.4	

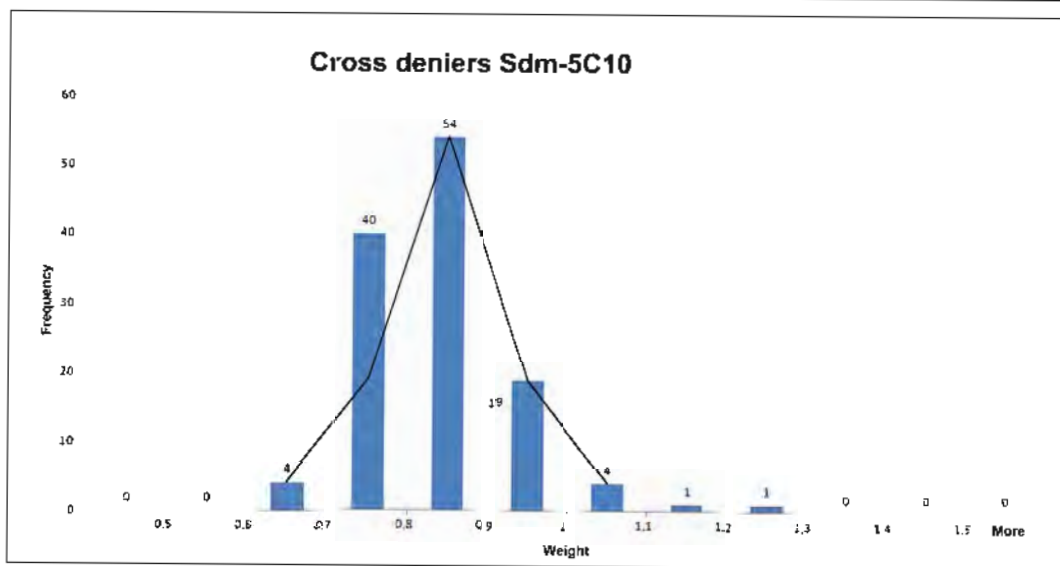


Fig. 46. Distribution of the weights of cross deniers of the Sdm-5C10 subgroup of varieties (compiled by A. Kędzierski)

In the Sdm-5C group of varieties, metallographic analyses were carried out on eight specimens. Their weight ranges from 0.76 to 1,186 g. The estimated silver weight of the artefacts varies even more: from 0.297 to as much as 0.945 g. The latter figure is more reminiscent of the silver content of coins from the early rather than the late 11th century. However, if we average the weight of pure silver within the group of Sdm-5C varieties (0.448 g), we find that the analysed material far exceeds the weight of pure silver of Piast deniers from the second half of the 11th century, although it does not exceed the average result obtained for large Sieciech Type I deniers. The result obtained is lower than for the coins definitely considered to be Saxon (Type IV with the letter S and Type VIII with a glove and a banner).

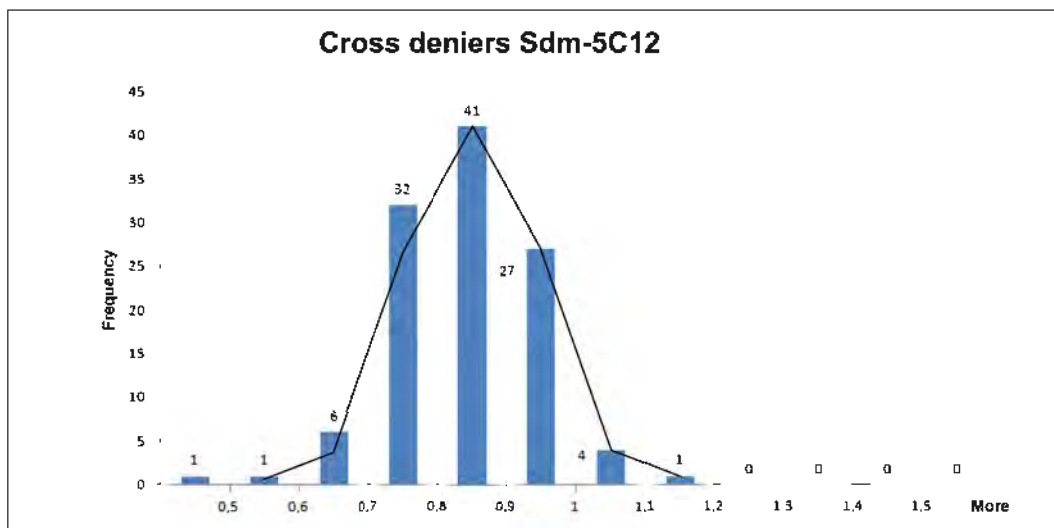


Fig. 47. Distribution of the weights of cross deniers of the Sdm-5C12 subgroup of varieties (compiled by A. Kędzierski)

Table 9. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-5C

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
12454b	V	Sdm-5C6-a	49.55	0.844	0.418
12430b	V	Sdm-5C10-b	52.68	0.76	0.297
731b	V	Sdm-5C10-b	39.14	0.793	0.310
12306b	V	Sdm-5C11-a	38.21	0.876	0.335
12345b	V	Sdm-5C11-a	31.35	0.901	0.282
981b	V	Sdm-5C11-a	79.66	1.186	0.945
12362b	V	Sdm-5C11-a	64.75	0.897	0.581
12390b	V	Sdm-5C15-a	54.16	0.76	0.417
average			51.18	0.896	0.448

Group Sdm-5D: B10 and E10 deniers with a wreath of beads

Six coins were included in this group, distinguished by a wreath of 13 or more beads. The weights of these coins are between 0.791 and 1.05 g (mean 0.904 g) and the diameters between 11.7 and 12.5 mm (mean 12.1 mm) (Table 10).

Table 10. Weights and diameters of coins of the Sdm-5D group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	∅ min.	Average ∅	∅ max.
Sdm-5D1-a	3	0.791	0.895	1.05	11.9	12.1	12.5
Sdm-5D1-b	1	0.97	0.97	0.97	12.2	12.2	12.2
Sdm-5D2-a	2	0.852	0.885	0.918	11.7	12.05	12.4
Total	6		0.904		average	12.1	

Group Sdm-5E: B8a varieties of cross deniers with beaded wreaths

The coins, six in number, are distinguished by a wreath of 10 beads and the letter **V** around and next to the cross on the obverse. This type of markings near the cross on the obverse is unique. Weights range from 0.62 to 0.835, while diameters range from 12.9 to 13.4 mm (Table 11).

Table 11. Weights and diameters of coins of the Sdm-5E group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	∅ min.	Average ∅	∅ max.
Sdm-5E1-a	6	0.62	0.755	0.835	12.9	13.2	13.4

Group Sdm-5F: D12 and D13 coins with a wreath of beads

This is the most numerous group of varieties of later V-type deniers, apart from the Sdm-5C group, there being 388 whole specimens (Table 12). On their obverses they depict a cross with two circles and eight beads. The lightest coin of the collection weighs 0.600 g and the heaviest 1.064 g (arithmetic mean 0.837 g). The diameters of the cross deniers range from 11.6 to 13.4 mm (arithmetic mean 12.6 mm).

Table 12. Weights and diameters of coins of the Sdm-5F group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	∅ min.	Average ∅	∅ max.
Sdm-5F1-a	24	0.654	0.856	1.125	12.4	13.3	14.1
Sdm-5F2-a	19	0.666	0.804	1.025	12.4	12.8	13.1
Sdm-5F3-a	26	0.773	0.848	0.957	12.4	12.9	13.4
Sdm-5F4-a	211	0.600	0.834	1.064	11.8	12.5	13.2
Sdm-5F4-b	79	0.702	0.833	0.940	12.0	12.7	13.4
Sdm-5F5-a	29	0.707	0.869	1.007	11.6	12.1	12.9
Total	388		0.837		average	12.6	

A histogram of the weight distribution was made for the most numerous subgroup of Sdm-5F4 varieties. Most specimens are characterised by weights between 0.8 and 0.9 g (53.1%) with an arithmetic mean of 0.834 g. A fairly high proportion are deniers in the 0.7-0.8 g weight range (28.9%), which may indicate an increase in the minting rate in their production (Fig. 48).

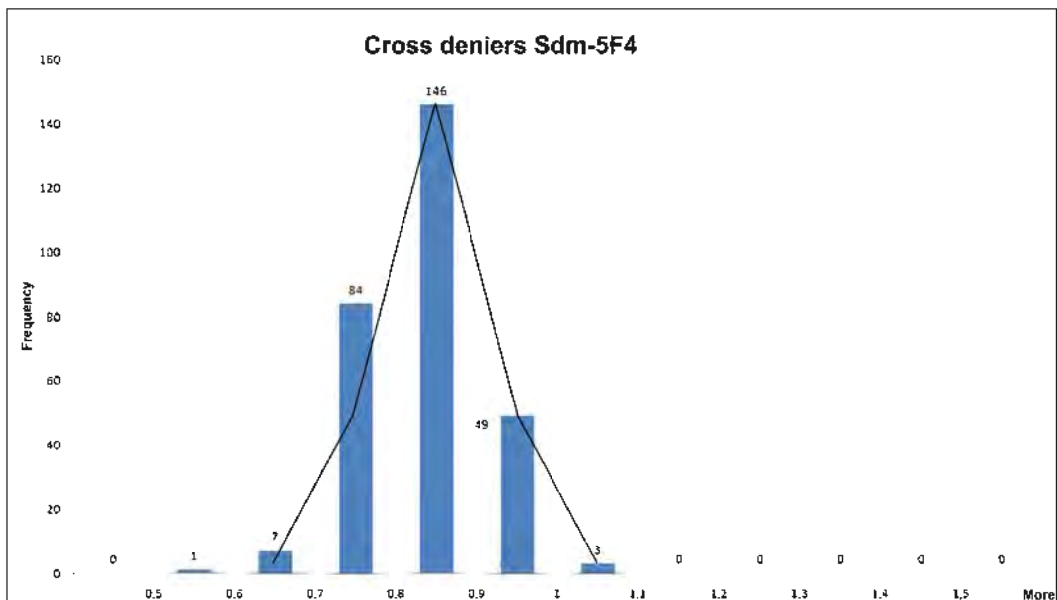


Fig. 48. Distribution of weights of cross deniers of the Sdm-5F4 varieties (compiled by A. Kędzierski)

Seven coins from the Sdm-5F group of varieties were subjected to metallographic analysis (Table 13).

Table 13. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-5F.

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
12507	V	Sdm-5F1-a	77.26	0.762	0.589
12509	V	Sdm-5F1-a	70.59	0.763	0.539
12378	V	Sdm-5F4-a	68.69	0.94	0.646
12388	V	Sdm-5F4-a	73.40	0.796	0.584
12446	V	Sdm-5F4-a	66.15	0.877	0.580
12464	V	Sdm-5F4-a	56.08	0.871	0.488
12468	V	Sdm-5F4-a	60.37	0.743	0.448
average			67.50	0.822	0.553

Coins included in the Sdm-5F group of varieties show very similar parameters in terms of estimated content of pure silver, of which there is from 0.448 to 0.646 g (average 0.553 g) in the artefacts. These values are similar to good quality large Sieciech Type I deniers and Saxon coins, including cross deniers of Types IV and VIII minted there (CNP 526 and CNP 1001).

Group Sdm-5G: F2 beaded wreath cross deniers

This subgroup included only one cross denier with a unique representation of the obverse: a cross composed of dots and a wreath of 16 beads. It is a coin weighing 0.91 g and 12.5 mm in diameter (Table 14).

Table 14. Weight and diameter of coin from the Sdm-5G group of varieties.

Variety	Number	Weight min.	Average weight.	Weight max.	∅ min.	Average ∅	∅ max.
Sdm-5G1-a	1	0.91	0.91	0.91	12.5	12.5	12.5

Subtype VA-A: Type B7 beaded rim cross deniers with Type 7a cross

These deniers depict a cross, the two arms of which are similar to the crossed crozier on later issues of Type VII cross deniers. The arithmetic mean weight of such cross deniers is 0.918 g and the diameter is 12.7 mm (Table 15).

Table 15. Weights and diameters of coins of the Sdm-5A-A group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	∅ min.	Average ∅	∅ max.
Sdm-5A-A1-a	1	0.942	0.942	0.942	12.9	12.9	12.9
Sdm-5A-A2-a	1	0.932	0.932	0.932	12.3	12.3	12.3
Sdm-5A-A3-a	1	0.88	0.88	0.88	12.9	12.9	12.9
Total	3		0.918		average	12.7	

B. Later varieties of Type VI

There were 5082 whole specimens of the later issues of Type VI cross deniers with a simple cross on the obverse, struck in the period after c. 1080 to c. 1105. The deniers are assigned to four groups, 49 subgroups and 101 varieties. The weights of the coins of this group range from 0.529 to 1.357 g and the diameters from 11.1 to 14.4 mm.

Group A - group of varieties of cross deniers with hollow or hollow and full circles between the arms of a simple cross on the obverse of the Types 20, 22, 23, 25, 30, 31 and 31a and with a Type a edge (edge leaning outwards on the obverse and inwards on the reverse)

The first group of varieties of Type VI deniers included 127 cross deniers occurring in 14 sub-groups in 22 varieties, often numbering only one or a few pieces. These coins are characterised by a wide variation in both weights - from 0.531 to 1.143 g, with an average of 0.889 g - and diameters - from 11.8 to 14.2 mm, with an average of 12.6 mm (Table 16).

Table 16. Weights and diameters of coins of the Sdm-6A group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	∅ min.	Average ∅	∅ max.
Sdm-6A1-a	2	0.850	0.860	0.871	12.8	13.1	13.5
Sdm-6A2-a	1	0.882	0.882	0.882	12.8	12.8	12.8
Sdm-6A2-b	1	1.031	1.031	1.031	12.6	12.6	12.6
Sdm-6A3-a	16	0.79	0.912	1.034	13.0	13.6	14.2
Sdm-6A3-b	8	0.856	0.926	1.082	13.6	13.8	14.0
Sdm-6A3-c	1	0.993	0.993	0.993	13.3	13.3	13.3
Sdm-6A4-a	7	0.671	0.745	0.854	12.6	13.3	14.2
Sdm-6A4-b	3	0.705	0.743	0.816	12.5	13.1	13.5
Sdm-6A5-a	16	0.758	0.839	0.99	11.8	12.2	12.7
Sdm-6A5-b	1	0.798	0.798	0.798	12.5	12.5	12.5
Sdm-6A6-a	1	0.917	0.917	0.917	12.3	12.3	12.3
Sdm-6A6-b	1	0.919	0.919	0.919	13.1	13.1	13.1
Sdm-6A7-a	5	0.786	0.933	1.004	12.1	12.5	13.2
Sdm-6A7-b	1	0.531	0.531	0.531	11.8	11.8	11.8
Sdm-6A8-a	7	0.725	0.814	0.973	12.1	12.5	13.0
Sdm-6A8-b	17	0.658	0.889	1.057	11.5	12.5	13.1
Sdm-6A9-a	1	0.953	0.953	0.953	13.1	13.1	13.1
Sdm-6A10-a	27	0.703	0.848	1.046	11.4	11.9	12.7
Sdm-6A11-a	6	0.660	0.760	0.826	12.4	12.7	13.1
Sdm-6A12-a	1	0.679	0.679	0.679	13.1	13.1	13.1
Sdm-6A13-a	3	0.856	0.975	1.143	12.0	12.2	12.3
Sdm-6A14-a	1	0.94	0.940	0.94	12.3	12.3	12.3
Total	127		0.889		average	12.6	

In this group of varieties, metallographic studies have been carried out on two cross deniers of the Sdm-6A5-a and Sdm-6A5-b variants. Due to the representations of the reverse, on which there is a wide arc with dots, they are associated with the Sieciech's mint. However, the pure silver content of these coins is noticeably lower than that of the large Sieciech Type I deniers with his mark (tab. 17).

Table 17. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from subgroup Sdm-6A5.

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
04352b	VI	Sdm-6A5-a	45.28	0.805	0.364
10622b	VI	Sdm-6A5-a	42.37	0.798	0.338
		average	43.82	0.801	0.351

Group B - group of varieties of cross deniers with Type b edge (high edge at right angle on obverse and reverse and Type c (edge leaning inwards on obverse and outwards on reverse))²⁹

The 139 deniers were distinguished on the basis of specific technological characteristics, related to a differently shaped high edge than in other coins. The group of varieties consists of eight subgroups and 16 varieties. Coin weights range from 0.621 to 1.245 g and diameters from 12.2 to 14 mm (Table 18).

Table 18. Weights and diameters of coins of the Sdm-6B group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	∅ min.	Average ∅	∅ max.
Sdm-6B1-a	2	0.911	1.043	1.176	12.9	13.2	13.5
Sdm-6B2-a	1	0.968	0.968	0.968	13.2	13.2	13.2
Sdm-6B2-b	29	0.658	0.927	1.128	12.6	13.4	13.9
Sdm-6B3-a	13	0.749	0.918	1.039	12.9	13.5	13.8
Sdm-6B3-b	2	0.826	0.879	0.932	13.2	13.2	13.2
Sdm-6B4-a	2	0.851	0.854	0.858	12.9	13	13.1
Sdm-6B4-b	25	0.874	0.963	1.239	13.4	13.9	14.2
Sdm-6B5-a	2	0.926	0.965	1.005	13.0	13.2	13.5
Sdm-6B5-b	4	0.846	0.960	1.028	13.4	13.8	14.2
Sdm-6B5-c	2	1.031	1.038	1.046	13.2	13.3	13.4
Sdm-6B5-d	1	0.892	0.892	0.892	13.6	13.6	13.6
Sdm-6B6-a	5	0.621	0.8758	1.016	12.2	13.3	13.7

²⁹ See Fig. 39 (Chapter 3 - *Typology*).

Variety	Number	Weight min.	Average weight	Weight max.	ø min.	Average ø	ø max.
Sdm-6B6-b	3	0.956	1.035	1.166	13.1	13.5	13.8
Sdm-6B6-c	10	0.801	0.955	1.085	13.2	13.4	14.0
Sdm-6B7-a	20	0.802	0.938	1.123	12.7	13.2	14.0
Sdm-6B8-a	18	0.772	0.966	1.245	12.8	13.5	14.2
Total	139		0.945		average	13.5	

Three coins of the Sdm-6B group of varieties were subjected to metallographic analyses. On examining the average arithmetic weights of these cross deniers and the silver fineness results obtained, one can again observe a large variation in the weights of pure silver in the coins, ranging from 0.153 to 0.518 g - an average of 0.364 g (Table 19). If we exclude the metric data of the cross denier no. 10841 of the Sdm-6B1-a variety, which differs slightly in style from the others, we obtain an average pure bullion weight of 0.399 g.

Table 19. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-6B

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
10841	VI	Sdm-6B01-a	19.21	0.901	0.421
00170	VI	Sdm-6B06-c	51.04	0.909	0.518
00078	VI	Sdm-6B07-a	50.37	0.866	0.153
average			41.65	0.908	0.364
average without coin No 10841			57.26	0.841	0.399

Group Sdm-6C: group of varieties of cross deniers with Type a edge and Type 27 characters on the obverse

This group of varieties includes 23 subgroups in 59 varieties. There are 3326 whole specimens. These deniers are often deficient or struck with a worn die. Their weights range from 0.529 to 1.354 g, with an average of 0.860, and diameters from 11.2 to 14.4 mm, with an average of 12.6 mm (Table 20).

Table 20. Weights and diameters of coins of the Sdm-6C group of varieties.

Variety	Number	Weight min.	Average weight	Weight max.	ø min.	Average ø	ø max.
Sdm-6C1-a	17	0.604	0.982	1.253	11.5	12.5	13.2
Sdm-6C1-b	1	0.872	0.872	0.872	12.5	12.5	12.5
Sdm-6C1-c	1	1.046	1.046	1.046	12.0	12.0	1.02
Sdm-6C2-a	5	0.651	0.748	0.853	11.2	11.5	11.7

Variety	Number	Weight min.	Average weight	Weight max.	ø min.	Average ø	ø max.
Sdm-6C3-a	1	0.734	0.734	0.734	11.5	11.5	11.5
Sdm-6C4-a	1	0.839	0.839	0.839	12.4	12.4	12.4
Sdm-6C5-a	1	1.052	1.052	1.052	12.9	12.9	12.9
Sdm-6C6-a	6	0.873	0.995	1.255	11.9	12.3	12.6
Sdm-6C6-b	1	0.700	0.700	0.700	11.7	11.7	11.7
Sdm-6C7-a	3	0.612	0.952	1.252	12.3	12.9	13.9
Sdm-6C8-a	118	0.595	0.807	1.15	12.0	12.7	13.8
Sdm-6C8-b	18	0.684	0.788	0.866	12.0	12.5	12.8
Sdm-6C8-c	8	0.673	0.827	1.112	12.8	13.2	13.9
Sdm-6C8-d	1	0.880	0.880	0.880	13.4	13.4	13.4
Sdm-6C8-e	3	0.851	0.934	1.085	12.2	12.4	12.9
Sdm-6C9-a	197	0.563	0.801	1.091	11.1	12.6	13.9
Sdm-6C9-b	11	0.709	0.767	0.905	12.0	12.5	13.1
Sdm-6C9-c	36	0.608	0.771	0.971	12.1	12.5	13.1
Sdm-6C9-d	10	0.696	0.822	0.915	12.0	12.4	14.1
Sdm-6C9-e	762	0.529	0.809	1.354	11.2	12.4	14.0
Sdm-6C9-f	3	0.817	0.830	0.841	12.6	12.6	12.6
Sdm-6C9-g	82	0.630	0.801	1.076	11.7	12.5	13
Sdm-6C10-a	1	0.815	0.815	0.815	12.4	12.4	12.4
Sdm-6C11-a	1	1.169	1.169	1.169	12.1	12.1	12.1
Sdm-6C12-a	15	0.793	0.948	1.082	12.1	12.5	13.0
Sdm-6C12-b	1	0.802	0.802	0.802	12.0	12.0	12.0
Sdm-6C12-c	1	0.923	0.923	0.923	13.2	13.2	13.2
Sdm-6C13-a	1	0.956	0.956	0.956	12.5	12.5	12.5
Sdm-6C14-a	9	0.672	0.893	1.062	12.5	12.9	13.2
Sdm-6C14-b	2	0.849	0.903	0.958	12.4	12.5	12.6
Sdm-6C14-c	7	0.746	0.883	0.977	12.1	12.4	12.8
Sdm-6C14-d	2	1.005	1.005	1.006	12.0	12.5	13.0
Sdm-6C14-e	1	0.944	0.944	0.944	12.4	12.4	12.4
Sdm-6C14-f	2	0.993	1.018	1.043	12.5	12.8	13.2
Sdm-6C15-a	4	0.892	0.975	1.06	12.4	12.5	12.7
Sdm-6C16-a	1	0.992	0.992	0.992	13.2	13.2	13.2
Sdm-6C16-b	1	0.898	0.898	0.898	13.5	13.5	13.5
Sdm-6C16-c	1	0.848	0.848	0.848	12.6	12.6	12.6
Sdm-6C17-a	3	0.821	0.887	0.977	12.8	13.2	13.8
Sdm-6C17-b	2	0.805	0.894	0.983	12.3	12.6	12.9
Sdm-6C18-a	7	0.783	0.929	1.054	12.6	13.2	13.7

Variety	Number	Weight min.	Average weight	Weight max.	ø min.	Average ø	ø max.
Sdm-6C18-b	2	0.879	0.883	0.888	12.7	12.8	13.0
Sdm-6C18-c	1	0.930	0.930	0.930	12.9	12.9	12.9
Sdm-6C18-d	1	1.180	1.180	1.180	13.6	13.6	13.6
Sdm-6C18-e	1	0.845	0.845	0.845	13.6	13.6	13.6
Sdm-6C18-f	3	0.882	0.938	0.991	12.6	13.1	13.4
Sdm-6C19-a	1	0.955	0.955	0.955	13.1	13.1	13.1
Sdm-6C19-b	2	1.014	1.019	1.025	13.6	13.6	13.6
Sdm-6C20-a	342	0.649	0.886	1.268	12.0	13.2	13.9
Sdm-6C20-b	1563	0.557	0.892	1.357	11.2	13.3	14.4
Sdm-6C20-c	9	0.733	0.839	0.964	13.0	13.5	14.0
Sdm-6C20-d	3	0.797	0.862	0.936	12.8	13.2	13.6
Sdm-6C21-a	1	0.797	0.797	0.797	12.8	12.8	12.8
Sdm-6C21-b	29	0.700	0.879	1.140	11.9	12.4	13.3
Sdm-6C22-a	2	0.766	0.899	1.033	12.4	12.5	12.6
Sdm-6C23-a	13	0.631	0.860	1.154	11.4	11.9	12.9
Sdm-6C23-b	3	0.844	0.941	1.072	11.8	12.3	12.5
Sdm-6C23-c	1	0.781	0.781	0.781	12.4	12.4	12.4
Sdm-6C23-d	1	1.019	1.019	1.019	12.6	12.6	12.6
TOTAL	3326		0.860	average		12.6	

The distribution of the weights of the three most numerous subgroups of varieties: Sdm-6C8, Sdm-6C9 and Sdm-6C20 are shown by histograms (Figs. 49-51).

There are 145 specimens deniers included in subgroup Sdm-6C8, classified into four varieties. The greatest number of artefacts from this assemblage, 43.4%, falls into the range of 0.8 to 0.9 g, followed by 33.10% of the artefacts in the range of 0.9-1.0 g. The 0.7-0.8 g and 1.0-1.1 ranges each concentrate 9.6% of the material. Arguably, these coins were intended to reach weights between 0.9 and 1 g, but eventually most of the material reached weights between 0.8 and 0.9 g, which is associated with an increase in the minting rate (Fig. 49).

The 1011 whole specimens of deniers of the subgroup of the Sdm-6C9 variety, are among the most abundant in the Słuszków I assemblage. A large proportion of these coins have weights in the 0.8-0.9 g range (41.1%). Slightly fewer of them reached a weight of 0.9-1.0 mm (40.4%). In terms of the number of specimens, two more ranges are noticeable: 0.7-0.8 g (12.1%) and 1.0-1.1 g (11.1% of the material) (Fig. 50).

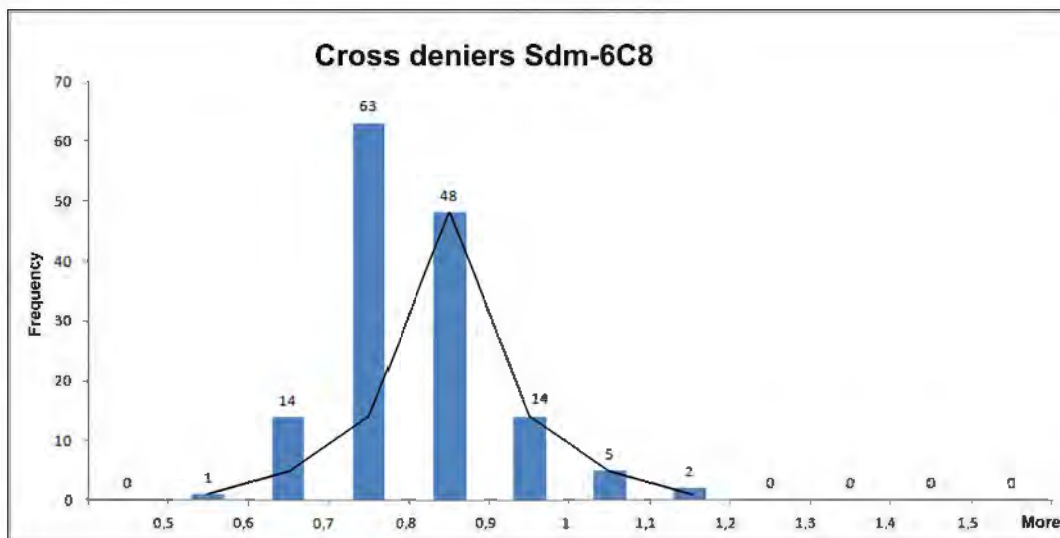


Fig. 49. Distribution of weights of cross deniers of subgroup Sdm-6C8 (compiled by A. Kędzierski)

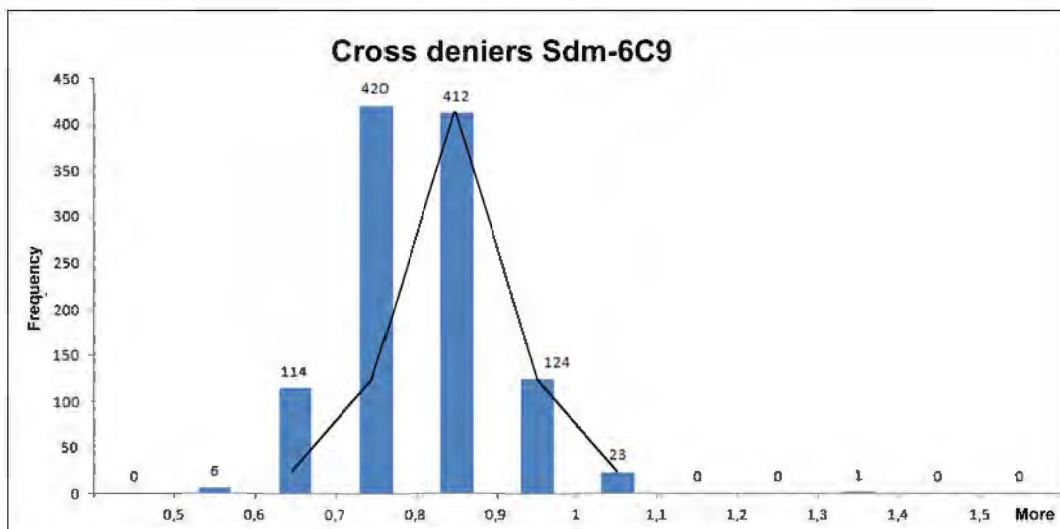


Fig. 50. Distribution of the weights of cross deniers of the subgroup of varieties Sdm-6C9 (compiled by A. Kędzierski)

The Sdm-6C20 subgroup of varieties is the most numerous among the Type VI deniers and includes 1917 whole coin specimens. Most of them reach a weight of 0.8 to 0.9 g (39.8%) and 0.9 to 1 g (32.1%). The second range was probably intended to determine the assumed - nominal weight of the deniers, (Fig. 51).

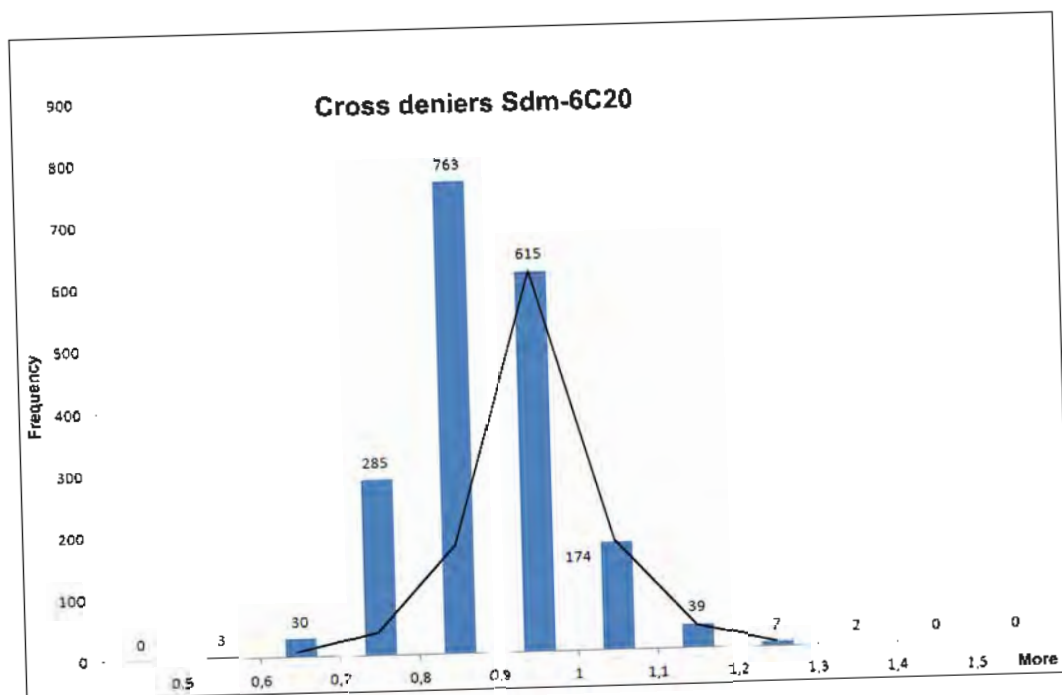


Fig. 51. Distribution of deniers weights of subgroup Sdm-6C20 (compiled by A. Kędzierski)

Several coins included in the Sdm-6C group were subjected to specialised studies. We have at our disposal the results of metallographic analyses of deniers of the subgroup of Sdm-6C9 varieties (similar to CNP 858), known from many isolated and cluster finds from the Polish territory, dated to the late 11th century. Both their weight and silver fineness are very evenly matched. The actual silver weight is 0.385 g on average, which is similar to the values obtained for the Kraków deniers of Władysław Herman, and higher than the quantities obtained for the royal deniers of Bolesław II (Table 21, cf. Table 4).

Table 21. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from subgroup Sdm-6C9

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
00056	VI	Sdm-6C9-a	50.22	0.766	0.384
00173	VI	Sdm-6C9-a	42.39	0.859	0.366
00175	VI	Sdm-6C9-d	49.20	0.821	0.404
average			47.27	0,814	0.385

Also, five cross deniers from the subgroups Sdm-6C12 and Sdm-6C14 with the characteristic wide arc, which links them to the minting activities of Sieciech, were subjected to metal analysis. The specimens Nos. 2582 and 3834, which have the same die as the large Sieciech Type I/2 deniers, show fairly high silver purity (46.76% and 57.03%). On the other hand, specimens with reverses similar to the large Sieciech deniers of Type I/1³⁰ according to Stanisław Suchodolski (1987) contain less silver, with purity ranging from 17.68 to 39.33% (28.3% on average), and pure silver in the alloy averaging 0.243 g. These figures are higher than those obtained for the royal deniers of Bolesław the Bold, but lower than the results obtained for the Kraków deniers of Władysław Herman (Table 22, cf. Table 4).

Table 22. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-6C12 and Sdm-6C14.

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
2582	VI	Sdm-6C12-a	46.76	0.901	0.421
3834	VI	Sdm-6C12-a	57.03	0.909	0.518
3730	VI	Sdm-6C12-a	17.68	0.866	0.153
10890	VI	Sdm-6C12-a	27.81	0.882	0.245
4398	VI	Sdm-6C12-a	39.33	0.847	0.333
		average	37.72	0.881	0.334

The analysed specimens also include Sdm-6C18-c and Sdm-6C18-b coins, which have obverses similar to deniers of the Sdm-6C20 variety (CNP 813), and reverses similar to deniers from issues associated with the Sieciech mint - Sdm-6C14 (similar to CNP 1480). The silver fineness of the analysed coins is in the range of 30.98-43.84%, with an average of 37.41%, and the estimated weight of pure silver ranges from 0.322 to 0.408 g, with an average of 0.365 g (Table 23).

Four deniers of the Sdm-6C20 variety subgroup were subjected to metallographic analysis. Their silver purity ranges from 38.55 to 68.78% (mean 46.34%), and the weight of pure bullion in the coins ranges from 0.310 to 0.578 g (mean 0.422 g). This is higher than the value found for Władysław Herman's Kraków deniers (Table 24).

The next analysed coins from the Sdm-6C group of the Sdm-6C21 variety subgroup, due to the depictions on both obverse and reverse, probably represent an intermediate link between the older coins included in the Sdm-6C9 and Sdm-6C20 varieties and probably the latest artefacts in the hoard - deniers of the Sdm-6D4 variety. The pure silver content of the alloy of these coins averages 0.38 g, similar to that of the Kraków deniers of Władysław Herman.

³⁰ In an article on Polish cross deniers from the Słuszków I hoard, these coins were identified as being close to CNP 858 (Kędzierski 1998b).

Table 23. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-6C18 and Sdm-6C19.

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
09182	VI	Sdm-6C18-c	43.84	0.930	0.408
00807	VI	Sdm-6C19-a	30.98	1.040	0.322
		average	37.41	0.985	0.365

Table 24. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-6C20

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
00745	VI	Sdm-6C20-a	68.78	0.840	0.578
09181	VI	Sdm-6C20-a	42.65	1.060	0.380
09261	VI	Sdm-6C20-a	34.80	0.891	0.310
00785	VI	Sdm-6C20-a	38.55	0.817	0.313
00937	VI	Sdm-6C20-a	47.98	0.980	0.470
00156	VI	Sdm-6C20-a	51.98	0.935	0.486
09264	VI	Sdm-6C20-a	42.19	1.032	0.435
		average	46.70	0.936	0.424

Table 25. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-6C21

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
729	VI	Sdm-6C21-b	46.1	0.729	0.336
820	VI	Sdm-6C21-b	42.94	0.990	0.425
		average	44.52	0.859	0.380

Group D - group of varieties of cross deniers with a Type a edge, without marks between the arms of the cross on the obverse

The Sdm-6D group included 1490 whole coins that do not have marks between the arms of a simple cross on the obverse. The coins were included in four subgroups of varieties. The first three contain single pieces, while the fourth contains as many as 1486 pieces. The weights of the coins of this group range from 0.61 to 1.334 g, with an average of 0.889 g. Their diameters range from 11.1 to 13.1 mm, with an average of 12.1 mm (Table 26).

Due to the high abundance of the Sdm-6D4-a variety, a histogram of the weight distribution was made for these coins. The largest number of deniers (39.8%) is in the 0.8 to 0.9 g range. The second most abundant is the range 0.9-1.0 g (30.3%), the third 0.7-0.8 g (15.4%) and the fourth the range from 1.0-1.1 g (9.1%). It is likely that deniers of the Sdm-6D4-a variety were intended to be produced in the 0.9-1.0 g weight range, but mostly reached weights below 0.9 g (Fig. 52).

Table 26. Weights and diameters of coins of the Sdm-6D group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-6D1-a	2	0.750	0.811	0.872	11.8	12.0	12.2
Sdm-6D2-a	1	0.794	0.794	0.794	12.6	12.6	12.6
Sdm-6D3-a	1	1.012	1.012	1.012	11.7	11.7	11.7
Sdm-6D4-a	1486	0.61	0.889	1.334	11.1	12.1	13.1
Total	1490		0.889		average	12,1	

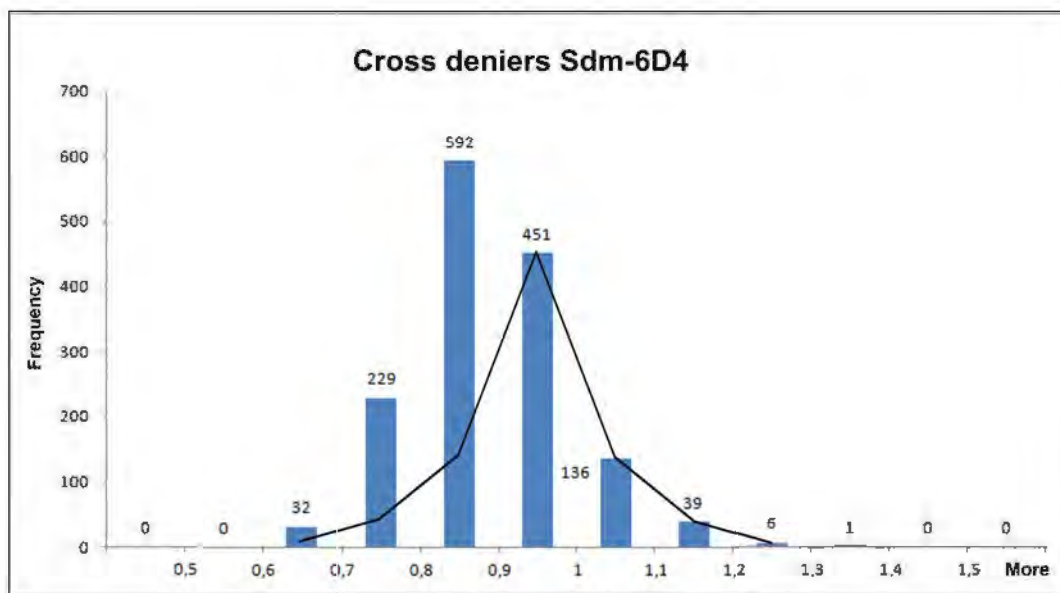


Fig. 52. Distribution of weights of deniers of subgroup Sdm-6D4 (compiled by A. Kędzierski)

Five coins of the Sdm-6D4-a variety were selected for metallographic analyses. The silver purity ranged from 32.64 to 75.78% (mean 48.65%). The pure bullion content of the coins examined ranged from 0.274 to 0.708 g (mean 0.451 g).

Table 27. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-6D4a

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
12006	VI	Sdm-6D4-a	75.78	0.935	0.708
12019	VI	Sdm-6D4-a	46.30	0.876	0.405
12021	VI	Sdm-6D4-a	32.64	0.840	0.274
12023	VI	Sdm-6D4-a	40.25	0.905	0.364
12281	VI	Sdm-6D4-a	48.28	1.046	0.505
average			48.65	0.920	0.451

C. Later varieties of Type VII

Subtype VIIp - crosiers to the right

The assemblage of later varieties of cross deniers with right-facing crosier depictions included 552 specimens in six groups and 20 subgroups, varying in number and metric characteristics. Their average weights within the 25 varieties into which they may be classified range from 0.59 to 1.259 g, and their diameters from 10.5 to 13.7 mm.

Group Sdm-7pA - deniers with a crosier to the right with a wreath of five beads around the crosier and a cross pattée with S9 markings on the reverse

The Sdm-7pA group deniers, which are distinguished by a wreath of composed of five beads, comprised just one coin weighing 0.734 g and measuring 12.6 mm in diameter.

Table 28. Weights and diameters of coins of the Sdm-7pA group of varieties.

Variety	Number	Weight-min	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7pA1-a	1	0.734	0.734	0.734	12.6	12.6	12.6

Group Sdm-7pB - deniers with a depiction of a crosier to the right with a small and medium crook without signs next to it on the obverse and with a cross pattée with S9 markings on the reverse

This is the largest group of right-facing crossier deniers varieties, containing 491 artefacts classified in five subgroups. Their weights range from 0.59 to 1.259 g, with a mean of 0.880 g, and diameters from 10.5 to 13.7 mm, with a mean of 12.0 mm (Table 29).

Table 29. Weights and diameters of cross deniers of the Sdm-7pB group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7pB1-a	8	0.743	0.941	1.203	11.4	12.0	12.5
Sdm-7pB1-b	4	0.816	0.866	0.905	12.0	12.2	12.3
Sdm-7pB1-c	5	0.670	0.795	0.915	11.4	11.9	12.5
Sdm-7pB2-a	1	0.753	0.753	0.753	12.5	12.5	12.5
Sdm-7pB3-a	239	0.59	0.875	1.176	10.5	11.8	13.1
Sdm-7pB4-a	231	0.668	0.913	1.224	11.9	12.6	13.7
Sdm-7pB5-a	3	0.927	1.076	1.259	12.4	12.4	12.8
TOTAL	491		0.894		average	12.2	

A histogram of the weight distribution was drawn up for the most numerous subgroup of 7pB3 coins. The largest number of artefacts - 42.5% - were in the 0.80-0.9 g range. Lighter coins (less than 0.8 g) account for 19.8% of the assemblage. Heavier specimens (over 0.9 g) represent 26.8% of the pieces. It seems that the described deniers were intended to reach weights between 0.9 and 1 g, but mainly lighter specimens, weighing less than 0.9 g, were produced (Fig. 53).

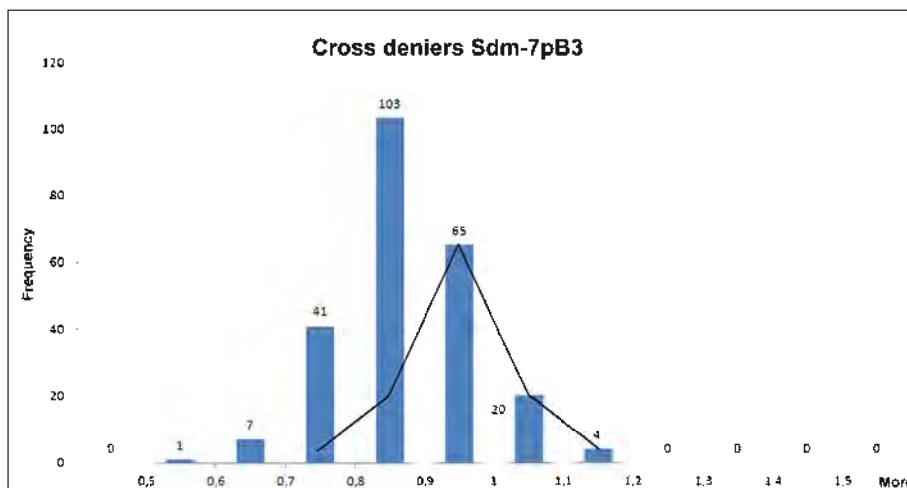


Fig. 53. Distribution of the weights of cross deniers of subgroup Sdm-7pB3 (compiled by A. Kędzierski)

Table 30. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-7pB

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
00090	Vllp	Sdm-7pB3-a	43.97	0.991	0.435
00157	Vllp	Sdm-7pB4-a	45.46	0.843	0.383
		average	44.71	0.917	0.409

Group C - deniers with a depiction of a crosier with a large crook on the obverse and a cross pattée with S9 markings on the reverse

This group comprises only 32 whole specimens. Their weight ranges from 0.701-1.139 g, with an average of 0.838 g, while their diameter does not exceed 13.1 mm, with an average of 11.9 mm (Table 31).

Table 31. Weights and diameters of coins of the Sdm-7pC group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7pC1-a	1	0.804	0.804	0.804	11.3	11.3	11.3
Sdm-7pC1-b	6	0.731	0.878	1.072	12.2	12.3	12.9
Sdm-7pC2-a	19	0.701	0.821	0.980	11.2	11.7	12.3
Sdm-7pC3-a	1	0.805	0.805	0.805	12.4	12.4	12.4
Sdm-7pC4-a	5	0.742	0.870	1.139	11.2	12.1	13.1
TOTAL	32		0.938			11.9	

Group Sdm-7pD - deniers with representations of crosiers with a rectangular crook on the obverse and a cross pattée with S9 markings on the reverse

The group is represented by only two specimens with an average weight of 0.994 g and a diameter of 11.6 mm.

Table 32. Weights and diameters of cross deniers of the subgroup of varieties Sdm-7pD1.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7pD1-a	1	1.184	1.184	1.184	12.3	12.3	12.3
Sdm-7pD1-b	1	0.805	0.805	0.805	11	11	11
TOTAL	2		0.994		average	11.6	

Sdm-7pE group - deniers with signs of Types ‘e-i’ by the crossier on the obverse and a cross pattée with S9 markings on the reverse

This is a small group of coins on the obverses of which the depiction of the crossier begins with a dot at the bottom. It contains only eight examples with weights ranging from 0.692 to 1.094 (average 0.883 g) and diameters ranging from 11.5 to 13.3 mm (average 12.4 mm) (Table 33).

Table 33. Weights and diameters of coins of the Sdm-7pE group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7pE1-a	1	0.692	0.692	0.692	12.2	12.2	12.2
Sdm-7pE2-a	2	0.862	0.866	0.871	12.0	12.5	13.0
Sdm-7pE3-a	4	0.812	0.833	0.848	1,5	11.7	12.2
Sdm-7pE4-a	2	0.959	1.026	1.094	12.6	12.9	13.3
Sdm-7pE4-b	1	0.870	0.870	0.870	12.8	12.8	12.8
TOTAL	10		0.883		average	12.4	

Sdm-7pF3 group

There were 16 coins in this group, very diverse in terms of style of workmanship, as well as the marks (or lack thereof), between the arms of the cross pattée on the reverse. The weights of the coins in the Sdm-7pF group range from 0.724 to 1.109 g, with diameters of 11.1 to 12.7 mm (Table 34).

Table 34. Coin weights and diameters of the Sdm-7pF3 group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7pF1-a	2	0.840	0.892	0.945	11.1	11.1	11.1
Sdm-7pF2-a	9	0.840	0.905	0.981	11.7	12.2	12.5
Sdm-7pF3-a	1	0.841	0.841	0.841	12.0	12.0	12.0
Sdm-7pF4-a	3	0.724	0.972	1.109	11.4	12.2	12.7
Sdm-7pF5-a	1	0.778	0.778	0.778	11.8	11.8	11.8
TOTAL	16				average	12.0	

Subtype VII - crosiers to the left

This subtype contains 4089 coins with the representation of a crossed crosier to the left. They may be classified into seven groups of varieties, 18 subgroups and 55 varieties. Coin weights range from 0.436 to 1.363 g, with an average of 0.869 g, and diameters range in value from 10.4 to 13.7 mm, with an average of 12.3 mm.

Group Sdm-7A – cross deniers with a crosier with a small crook without signs next to it on the obverse and a cross pattée with S9 markings on the reverse

The Sdm-7A group of varieties comprises 846 whole specimens classified into two subgroups (depending on the marks at the crook) and 12 varieties. The coins of this group reach weights ranging from 0.554 to 1.237 g, with an average of 0.857 g, and their diameters range from 10.4 to 13.6 mm, with an average of 12.3 mm (Table 35).

Histograms of the data concerning the weights of the coins in the two most numerous subgroups of varieties in this group: Sdm-7A1 and Sdm-7A2 (Figs. 54, 55).

Table 35. Weights and diameters of coins of the Sdm-7A group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7A1-a	3	0.731	0.817	0.877	12.4	12.9	13.3
Sdm-7A1-b	313	0.554	0.812	1.260	11.4	12.5	13.3
Sdm-7A1-c	5	0.687	0.750	0.779	11.9	12.3	13.4
Sdm-7A2-a	13	0.648	0.804	0.904	12.0	12.5	13.0
Sdm-7A2-b	128	0.603	0.856	1.070	11.8	12.5	13.4
Sdm-7A2-c	10	0.725	0.913	0.989	11.7	12.0	12.4
Sdm-7A2-d	2	0.686	0.757	0.829	11.9	12.1	11.9
Sdm-7A2-e	2	0.772	0.802	0.833	12.1	12.2	12.4
Sdm-7A2-f	30	0.729	0.912	1.169	11.9	12.4	13.2
Sdm-7A2-g	169	0.614	0.947	1.237	11.1	12.5	13.6
Sdm-7A2-h	5	0.926	1.049	1.189	12.5	12.8	13.2
Sdm-7A2-i	8	0.650	0.767	0.911	12.1	12.3	12.5
Total	688		0.859		average	12.5	

Coins of the Sdm-7A1 sub-group, numbering 321 whole pieces, are mainly grouped in two weight ranges; 0.7 to 0.8 g (34.5%) and 0.8-0.9 g (33%). Also noticeable is the proportion of coins in the 0.6 to 0.7 g range (12.7%) and 0.9-1 g (14.3%). It is likely that nominally the deniers of this subgroup were intended to reach a weight of 0.8 to 0.9 g, but almost half of the material did not exceed 0.8 g in weight and were struck at the higher mint rate (Fig. 54).

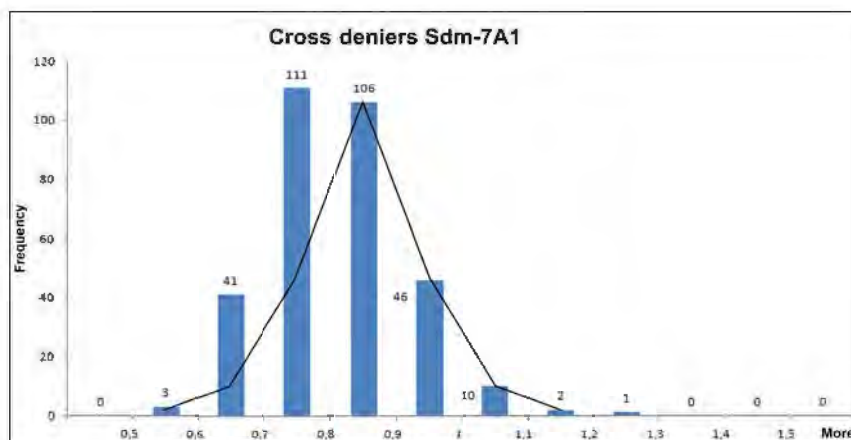


Fig. 54. Distribution weights of cross deniers of subgroup Sdm-7A1 (compiled by A. Kędzierski)

The Sdm-7A2 variety subgroup is represented by 367 artefacts in nine varieties. Unlike the artefacts included in Sdm-7A1, these show a slightly higher weight. The largest number of specimens is concentrated in the 0.9 to 1.0 g range, with 37.1%, and the second most numerous is the 0.8 to 0.9 g range, with 29.7%. The first appears to have been nominal for the deniers of the Sdm-7A2 subgroup (Fig. 55).

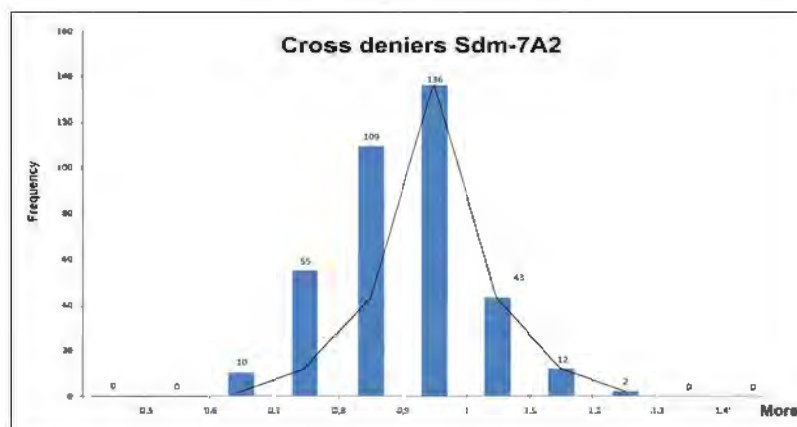


Fig. 55. Distribution of weights of cross deniers of subgroup Sdm-7A2 (compiled by A. Kędzierski)

Five coins of the Sdm-7A group with silver purity ranging from 49.11 to 67.65% were selected for metallographic analyses. The weight of silver in them ranges from 0.317 to 0.577 g (Table 36).

Table 36. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-7A

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
00161	VII	Sdm-7A1-b	67.65	0.853	0.577
00129	VII	Sdm-7A1-b	58.33	0.801	0.467
00153	VII	Sdm-7A1-b	49.11	0.646	0.317
00134	VII	Sdm-7A2-a	55.41	0.702	0.388
00093	VII	Sdm-7A2-b	52.85	0.943	0.498
Average			56.67	0.789	0.449

Group Sdm-7B - cross deniers with a crossier to the left with a medium sized crook on the obverse and a cross pattée with S9 markings on the reverse

This group contains 3038 artefacts which are quite diverse in appearance and classified into three subgroups and 20 varieties. Weights of whole specimen range widely from 0.436 to 1.363 g, and diameters from 10.6 to 13.7 mm (Table 37).

Table 37. Weights and diameters of coins of the Sdm-7B group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7B1-a	31	0.576	0.758	1.066	11.7	12.4	13.3
Sdm-7B1-b	5	0.791	0.846	0.915	12.4	13.1	13.6
Sdm-7B1-c	616	0.614	0.881	1.363	11.5	12.2	13.6
Sdm-7B1-d	97	0.607	0.835	1.057	11.2	12.5	13.4
Sdm-7B2-a	447	0.436	0.863	1.223	10.7	11.9	13.6
Sdm-7B2-b	901	0.592	0.882	1.328	10.6	12.4	13.5
Sdm-7B2-c	14	0.715	0.845	0.943	11.9	12.6	13.4
Sdm-7B2-d	8	0.810	0.958	1.269	11.9	12.5	13.2
Sdm-7B2-e	34	0.642	0.824	1.030	11.8	12.5	13.6
Sdm-7B2-f	279	0.535	0.847	1.159	11.2	12.4	13.5
Sdm-7B2-g	125	0.636	0.876	1.140	12.0	13.0	13.6
Sdm-7B2-h	17	0.633	0.805	0.943	11.3	12.9	13.5
Sdm-7B2-i	21	0.719	0.834	1.057	10.9	12.3	13.1

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7B2-j	3	0.838	0.991	1.243	12.4	12.6	12.9
Sdm-7B2-k	3	0.750	0.781	0.797	11	11.5	11.9
Sdm-7B2-l	198	0.628	0.885	1.097	12.1	12.5	13.3
Sdm-7B2-m	168	0.762	0.846	1.062	10.4	11.7	12.0
Sdm-7B2-n	58	0.664	0.869	1.125	12.1	13.2	13.7
Sdm-7B2-o	11	0.735	0.907	1.050	11.8	12.3	12.9
Sdm-7B3-a	2	0.905	0.944	0.983	12.6	12.8	13.1
Total	3038		0.869		average	12.3	

A histogram of the weight distribution was made for the most numerous subgroup of Sdm-7B2 varieties. There were 2287 whole coins in this group, classified in fifteen varieties. The largest number of artefacts (39.2%) is concentrated in the 0.8 to 0.9 g range. The second most numerous is the range grouping specimens weighing between 0.9 and 1.0 g (27.1%). Such weights were probably intended to be nominal. However, the majority of coins of this subgroup were struck on flans weighing less than 0.9 g (Fig. 56).

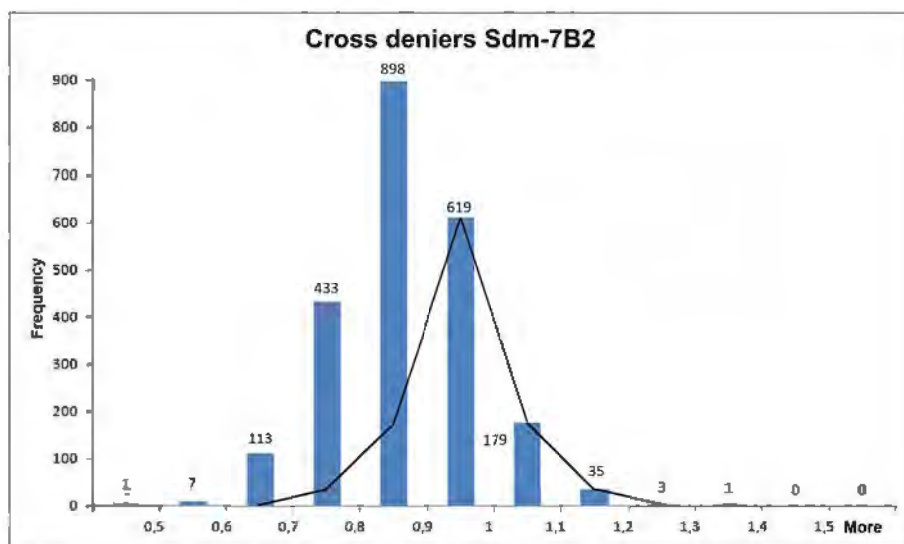


Fig. 56. Distribution of weights of cross deniers of subgroup Sdm-7B2 (compiled by A. Kędzierski)

Eleven specimens of coins of the Sdm-7B group were subjected to metallographic analyses. The silver purity obtained ranges from 46.64 to 59.17% (mean 55.39%), which means the estimated weight of pure silver in coins in the range of 0.399 to 0.563 g, that is an average of 0.465 g (Table 38).

Table 38. Purity of silver, weight of the artefact and weight of pure silver of cross deniers of group Sdm-7B

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
00147	VII	Sdm-7B1-c	59.17	0.849	0.502
00138	VII	Sdm-7B1-b	53.79	0.831	0.446
00150	VII	Sdm-7B2-a	57.22	0.876	0.501
00125	VII	Sdm-7B2-a	55.07	0.735	0.404
00152	VII	Sdm-7B2-a	53.82	0.899	0.483
00127	VII	Sdm-7B2-b	59.12	0.924	0.546
00144	VII	Sdm-7B2-b	51.97	0.885	0.46
00159	VII	Sdm-7B2-c	60.76	0.927	0.563
00145	VII	Sdm-7B2-f	48.57	0.831	0.403
00122	VII	Sdm-7B2-i	50.64	0.789	0.399
00143	VII	Sdm-7B2-m	46.64	0.889	0.414
		average	55.39	0.857	0.465

Group Sdm-7C - cross deniers with crosiers with a large crook on the obverse and a cross pattée with S9 markings on the reverse

The Sdm-7C group of varieties brings together 277 deniers with a large crook, divided into two subgroups due to the absence (subgroup Sdm-7C1) or presence (subgroup Sdm-7C2) of characters at the crook. There is a total of eight varieties. The weights of coins in this group range from 0.618 to 1.178 g, with a mean of 0.877 g, while their diameters range from 11.2 to 12.9 mm, with a mean of 12.2 mm (Table 39).

Table 39. Weights and diameters of coins of the Sdm-7C group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7C1-a	25	0.633	0.852	1.069	11.8	12.3	12.9
Sdm-7C1-b	23	0.746	0.875	1.098	11.5	12.2	12.6
Sdm-7C1-c	5	0.767	0.917	1.048	12	12.5	12.9
Sdm-7C1-d	8	0.618	0.797	0.956	11.9	12.3	12.9
Sdm-7C2-a	191	0.671	0.881	1.163	11.4	12.2	12.5
Sdm-7C2-b	13	0.83	0.978	1.178	11.2	12.0	12.4
Sdm-7C2-c	3	0.767	0.813	0.846	11.8	11.9	11.9
Sdm-7C2-d	9	0.708	0.800	0.916	11.2	11.8	12.6
Total	277		0.877	average		12.2	

The weights of the coins of the most numerous subgroup Sdm-7C2 (216 specimens) are shown by means of a histogram. Most specimens (36.5%) fell into the range of 0.8-0.9 g. Slightly fewer coins (26.6%) comprised the 0.9-1.0 g range, and the latter was probably the range representing coins with a nominal mint rate (Fig. 57).

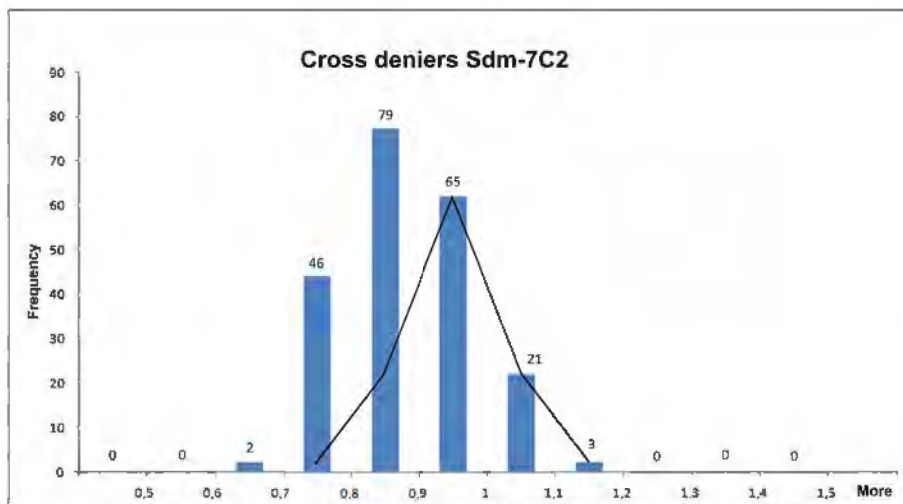


Fig. 57. Distribution of weights of cross deniers of subgroup Sdm-7C2 (compiled by A. Kędzierski)

One specimen of the Sdm-7C group was tested for the elemental content of the coin's alloy (Table 40).

Table 40. Purity of silver, weight of the artefact and weight of pure silver of cross deniers from group Sdm-7C2-d

Inv. no.	Type	Variety	Ag (%)	Weight (g)	Ag (g)
00160	VII	Sdm-7C2-d	35.23	0.904	0.318

Group Sdm-7D - crosier with a large crook and Type 6A cross on the obverse and cross pattée with Type S9 markings on the reverse

The deniers assigned to the Sdm-7D group of varieties were distinguished on the basis of the characteristic crossing of the Type 6A crosier. Twenty-six coins were classified here, ranging in weight from 0.692 to 1.07 g, mean 0.907 g, and diameters from 11.7 to 12.7 mm, average 12.2 mm (Table 41).

Table 41. Weights and diameters of coins of the Sdm-7D group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7D1-a	26	0.692	0.907	1.07	11.7	12.2	12.7

Group Sdm-7E - deniers struck with a damaged die with illegible upper part of the obverse and a cross pattée with Type 2F arms and S9 markings on the reverse (Table 42)

Table 42. Weights and diameters of coins of the Sdm-7E group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7E1-a	16	0.718	0.836	1.026	10.9	11.4	12.4

Sdm-7F group - deniers with a dot at the bottom of the crozier on the obverse and a cross pattée with S9 markings on the reverse (Table 43)

Table 43. Weights and diameters of coins of the Sdm-7F group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7F1-a	6	0.770	0.872	1.043	12.4	12.8	13.4
Sdm-7F1-b	1	0.764	0.764	0.764	12.9	12.9	12.9
Sdm-7F1-c	1	0.777	0.777	0.777	12.4	12.4	12.4
Sdm-7F1-d	3	0.913	0.946	0.980	12.2	12.7	13.1
Total	11		0.874		average	12.8	

Group Sdm-7G – cross deniers with croziers facing left on the obverse and without markings or with markings other than S9 on the reverse

Within this numerically small group, the coins are classified on the basis of the imagery of the reverses: different marks between the arms of the cross pattée than the S9 type, which appear on the reverses of most later issues of Type VII cross deniers. Coins in the Sdm-7G group range in weight from 0.668 to 1.157 g, with diameters between 11.3 and 13.1 mm (Table 44).

Table 44. Weights and diameters of coins of the Sdm-7G group of varieties.

Variety	Number	Weight-min.	Weight-average	Weight-max.	ø-min.	ø-average	ø-max.
Sdm-7G1-a	1	0.972	0.972	0.972	12.4	12.4	12.4
Sdm-7G2-a	1	0.789	0.789	0.789	11.3	11.3	11.3
Sdm-7G3-a	2	0.74	0.869	0.999	11.7	11.8	11.9
Sdm-7G4-a	3	0.882	0.974	1.082	12.2	12.4	12.5
Sdm-7G5-a	13	0.738	0.982	1.149	11.7	12.3	13.0
Sdm-7G6-a	5	0.668	0.818	1.157	11.9	12.2	12.6
Sdm-7G6-b	6	0.744	0.883	1.147	12.4	12.6	13.1
Sdm-7G7-a	1	0.742	0.742	0.742	12.4	12.4	12.4
Sdm-7G7-b	1	0.692	0.692	0.692	12.9	12.9	12.9
Total	33		0.910		average	12.3	

Considering the pure silver content of the analysed coins from the Sdm-7A - Sdm-7C groups, it is possible to speak of fairly good coin alloy quality. The best quality ones contain more than 0.5 g, while the worst ones slightly more than 0.3 g of pure silver. These quantities, apart from the results of metallographic analyses of two specimens (inv. nos. 153 and 160), show better quality than the average weight of pure silver in the Kraków deniers of Władysław Herman.

4.3. Trends in the metric features of the later varieties of cross deniers

Analysing the metric characteristics of the later varieties of the cross deniers, minted for more than a century, we observe a decrease in both weights and diameters of coins. Such a trend is clear until the middle of the 11th century, when it becomes strongly disturbed.

The cross deniers used in Poland at the end of the 11th and the beginning of the 12th century varied greatly in alloy quality. For the most part, even those of Polish provenance contained more silver near the surface than the deniers of Duke Władysław Herman, and their quality - taking into account the metallographic studies carried out for numismatic material from the Słuszków I hoard - increased with time. Of course, such a view is built only on the basis of the results obtained from the near-surface layer of the coins. It is known that some of the cross deniers had cores made of a metal other than silver, and the silver fineness obtained during laboratory tests does not necessarily correspond with the real amount of pure bullion in the coin. The extent of the occurrence of cross deniers with a core is unknown (Kiersnowski 1959; Suchodolski 1998; Bogucki 2008). Therefore, it should be noted that the results of metallographic analyses obtained for the material do not necessarily correctly determine the actual amount of silver in all the artefacts studied.

Comparing the average weights of coins and the pure silver content of the distinguished groups of cross deniers types V, VI and VII, we find that the most even results are achieved by coins with a pearl cross (type V) and with a crozier (type VII). Cross deniers type VI with a simple cross are characterized by greater diversity (fig. 58-60).

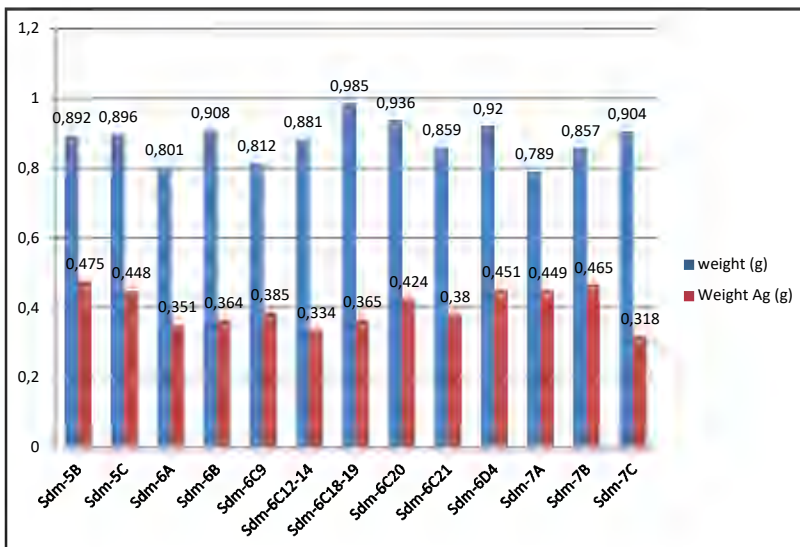


Fig. 58. Weights of alloy (blue) and pure silver (red) of later varieties of Types V-VII deniers (compiled by A. Kędzierski)



Fig. 59. Averaged weights of later issues of cross deniers according to separated groups of varieties (compiled by A. Kędzierski)

Analysing the later deniers issues in terms of pure silver content within the separated groups, we can see that Type V coins are the best in terms of quality. The proportion of pure silver in them ranges from 0.448 to 0.553 g (average 0.454 g, for 10 analyses). Type VII coins (20 specimens) subjected to metallographic analyses contained an average of 0.447 g of pure silver, giving an estimated amount of pure bullion ranging from 0.318 to 0.577 g. The pure silver in the Type VI deniers subjected to analysis fell within a much wider range of 0.153 to 0.708 g (the average for the 30 coins examined was 0.391 g of pure bullion) than the results obtained when deniers of Types V and VII were examined (Fig. 60). It was in the group of Type VI deniers that specimens exhibited a very poor level of silver purity: coin no. 10841 of the Sdm-6B01-a variety - 192/1000 and no. 3730 of the Sdm-6C13-b variety containing 176/1000 of pure bullion in the alloy. While the first specimen's poor fineness is partly compensated for by its large flan weight (1.176 and 0.225 g of pure silver), the second (0.866 and 0.12 g respectively) is inferior in value even to Boleslaw II's royal deniers. It is not known whether the sizes of the coins reflect the issuer's policies concerning the use of precious metal or whether they are an example of undervaluation - the forging of a coin by mint staff. The appearance of the designs on these specimens, do not differ much from their

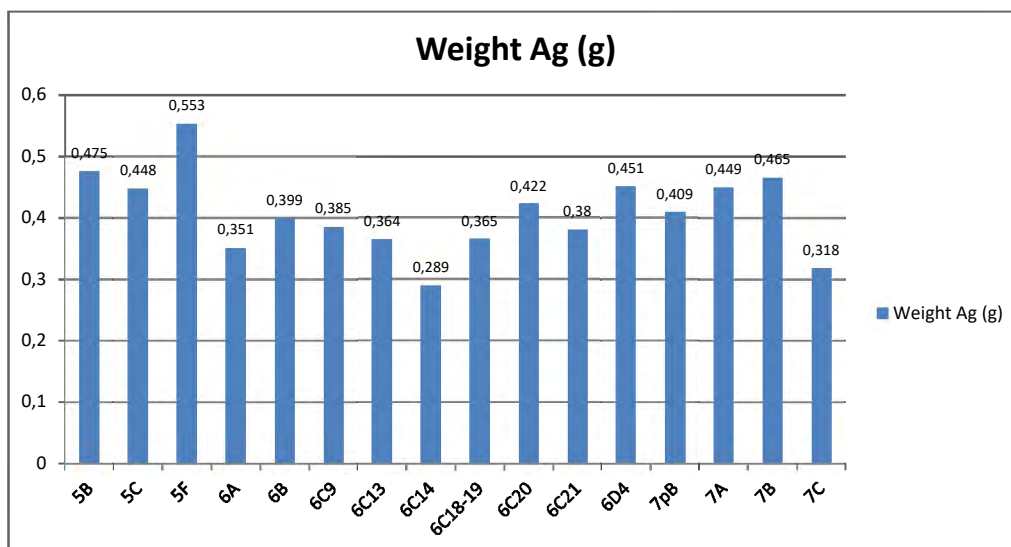


Fig. 60. Weight of pure silver in Type V-VII cross deniers within separated groups of varieties and sub-groups according to surface metal analysis (compiled by A. Kędzierski)

contemporaries struck in better silver.

Having analysed the weights and silver purity of the later varieties of cross deniers from the Słuszków I hoard, it is also worth reviewing the changes in their diameters. Among the later coins,

the examples with the largest diameters are those belonging to Type VI, which is probably related to their worse bullion quality, masked by the higher alloy weight and the larger diameter of the coin. Slightly lower in diameter are the latest deniers of Type V, and the smallest crossier cross deniers (Fig. 61). The latter, despite being heavier than artefacts with a representation of a beaded

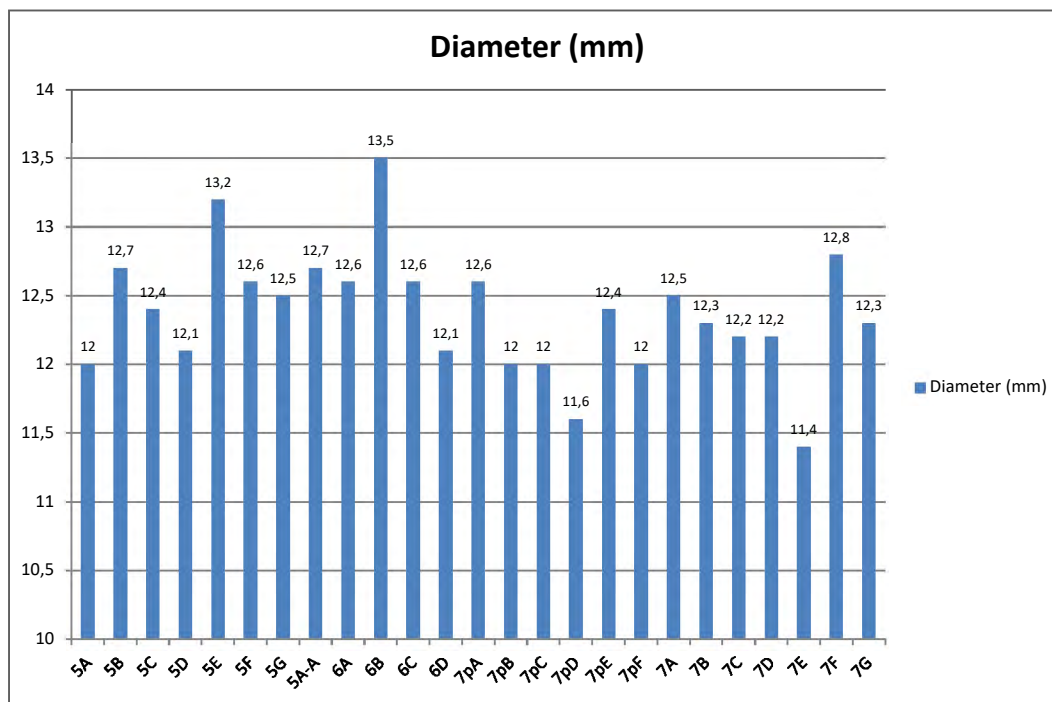


Fig. 61. Diameters of later issues of cross deniers (averaged values), according to separate groups of varieties (compiled by A. Kędzierski)

cross, were struck on smaller discs, but made of thicker plate and with a wider edge.

The examination of the numismatic material from the point of view of metrology did not make it possible to single out coins that in terms of correctness of manufacture, could represent first issues of the weight assumed by the issuer. When analysing the most numerous varieties of cross deniers, the uneven distribution of their weights is well visible. Lighter specimens predominate, seemingly with weight deliberately reduced in comparison to the nominal weight. The large differences in the weights of the cross deniers of the latest varieties, even within a single issue, can be explained by the *al marco* technique commonly used at the time of their production, which consisted of achieving the nominal weight of a group of coins rather than individual specimens. The apparent increase in the 1090s in the number of deposited hoards and finds of isolated cross deniers in the Polish territory, unknown from the early Middle Ages either earlier or later, may be indicative of the huge amount of monetary silver in circulation. The production of such a large

number of cross deniers with the technological possibilities of the time may have led to some anomalies in the weights of the alloy as well as the content of pure silver in the coins. All the more so as compulsory coinage exchange, which would have required a greater technological regime relating to a consistent policy on bullion, was not applied in Poland at the time.

5. Provenance and Chronology

5.1. Introductory remarks

Determining the origin and precise dating of the later issues of cross deniers is a very complex issue. Their production took place in many centres in Poland and Saxony, as evidenced by the large number of types, varieties and styles of production and the locations of finds of these coins, known mainly from the territory of Poland and Polabia. The lack of legends on the coins, indicating the issuer or the places of production, makes it difficult to assign the coins to specific centres or even regions.

This part of the study presents the results of a long-standing discussion on attempts to identify the centres of production and issuers of the cross deniers obtained in the course of research on numismatic material from deposit I from Słuszków. Consideration of the origin of the later types of cross deniers in the next stage of the study was based on the analysis of numismatic finds - mainly from Słuszków. On their basis, an attempt was made to assign some of the varieties of cross deniers to states, issuers and minting centres. This work took into account the representations occurring on the cross deniers, the combinations and similarities of dies, analysis of the metal used and the distribution of coins, as well as the composition of hoards, mainly from the last two decades of the 11th and early 12th centuries. In this chapter, I have also attempted to establish a more accurate dating of the latest issues of cross deniers. It was not possible for all varieties to set a more precise chronological framework for their production. The endeavour was mainly successful for issues of Type VI cross deniers, associated with the minting of Władysław Herman, his son Zbigniew and count palatine Sieciech.

During the reign of Herman, the first non-ducal money attested in finds appeared, produced by the count palatine Sieciech, referred to in the work as large Sieciech deniers. Coins with his name and mark on the obverse did not bear any reference to the person of the ruler, so their production was probably private. At the same time, we do not know whether they were produced with the consent of duke Władysław Herman. The weights, diameters and, as it seems, the pure bullion content of these particular palatine deniers were definitely higher than the majority of coins used by the people of Poland at the end of the 11th century, both in the form of cross deniers and the official ducal coins of Władysław Herman from the Kraków mint (see Chapter IV - *Metrology*). Thus, this part of the production of coins by Sieciech was of a representative nature (Trawkowski 2002; Suchodolski 2005). It seems that Sieciech's role in the last decade of the 11th century was strong enough for him to be able to pursue his own policies without problems, including in the production of coins. From the deniers attributed to the palatine Sieciech depicting his mark and name on the obverse and a cross pattée with a broad arch on the other side (Type I - Suchodolski 1987), it was possible, by comparing the depictions on the reverses, to find examples of cross

deniers struck with the same die as Sieciech's large deniers. Further analyses of the depiction of obverses and reverses made it possible to distinguish a larger group of hitherto anonymous cross deniers with the depiction of a simple cross on the obverse, Type VI, according to Marian Gumowski's (1939) classification. Thanks to the analysis of the combination of dies, groups of deniers related to the minting of the Count Palatine, and probably also to that of the dukes Władysław Herman (1079-1102) and Zbigniew (1096-1106), have been distinguished. This is an exceptionally comfortable situation for establishing both the origin and the time of production of cross deniers (Kędzierski 1998b). It is much more difficult to determine the chronology of deniers of Types V and VII and those of Type VI, unrelated to the issues of the Count Palatine and dukes Władysław and Zbigniew.

Late varieties of cross deniers do not bear any legible legends related to the presentation of the issuer, such as the oldest with the legend **ODDO** and **OTTO** (CNP 292-308), referring to the name of the emperor, or the slightly later ones with the inscription **EBERHARD** (CNP 828-833) referring to Eberhard, Bishop of Naumburg (1045-1079). It is therefore impossible to determine the time of production of the earliest issues of cross deniers by this route.

Consequently, the best method of determining the chronology of the anonymous cross deniers is to use indirect methods: analysing their weight and diameter, the alloy composition of the coins and the occurrence of particular varieties of cross deniers in other hoards. On the basis of past research, the seemingly obvious conclusion was that most older varieties of cross deniers are characterised by a greater weight and diameter than later ones, although there are occasional exceptions to this rule. An example of chronological anomalies regarding the size and weight of cross deniers is the large Sieciech deniers, which, compared to the Type VI cross deniers attributed to palatine Sieciech, are larger in diameter and heavier in weight. Considering only the metric data, we could consider them to be several decades older. The metrological analysis carried out for the coins from Słuszków has allowed us to observe in many cases large variations in the weights of the coins, even within a single variety, which can be explained by the application of the *al marco* technique mentioned in the previous chapter. However, over the course of a quarter of a century (from c. 1080 to c. 1105), no decisive changes are observed in the weights of the latest issues of cross deniers. Probably in the period before the introduction of the compulsory exchange of money, initiated during the reign of Bolesław the Wrymouth, no more or less restrictive technological regime was applied to their metric features. More noticeable are the changes in the diameters of coins, especially within the Type VII cross deniers with crosier. Their latest issues are considerably smaller than those of c. 1080, and generally lack the outer part of the obverse design.

The analyses of the alloy composition of the Słuszków coins, carried out in the Laboratory of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, did not help much in the study of the origin and chronology of the latest varieties of cross deniers. It is difficult to decide whether the higher silver fineness and the presence of certain trace elements are related to

the place and time of issue, or perhaps more to the origin of the silver deposits and the way the coins were produced. At the same time, it should be noted, as mentioned earlier, that through metallographic analyses we are not able to obtain objective results of the actual composition of the silver alloy, but only estimates. Analyses are mainly useful for comparative studies between individual specimens.

A certain indication for the dating of cross deniers is the change in the style of imagery on the coins. Older ones are characterised by a greater richness of the design and, due to their diameter, a wider outer field and a small central field. With time, the outer field is reduced, while keeping a similar central field size, which is connected with a decrease in the diameter of the flans. The circumferential inscription is also modified. Clear and wide letters and marks, visible on older specimens, with time become narrower and fade away on the latest varieties of coins. Of course, there are deviations from the norm in this case as well. Very late issues of cross deniers with a wide obverse and completely legible pseudo-legend marks are known. The best examples of this are coins of the Sdm-6C20 (~CNP 813) variety with a small field and a wide outer field, produced at the turn of the 11th and 12th centuries.

Probably a more effective method of dating late varieties of cross deniers is to compare the composition of hoards of coins from the late 11th and early 12th centuries. The most useful are assemblages of cross deniers containing foreign issues that can be dated more precisely than the former. In such a case, it is necessary to find coins in the assemblage that could represent the latest part of the deposit. However, in hoards from the late eleventh and early twelfth centuries, apart from cross deniers, usually only sporadic examples of other coins are discovered. Also in such cases, they were often issues that had been struck before the middle of the eleventh century. Thus, often the latest cross deniers in the deposit can in fact be much later than the latest well-datable coin in the assemblage. This is exemplified by the newly discovered Słuszków II assemblage, where cross deniers of the Sdm-6D4 variety (~CNP 867-868), probably issued in the early 12th century, are numerous and considered to be among the latest. If the deposition of the hoard were to be dated by foreign coins alone, its moment of concealment would have to be set back two decades and linked chronologically to the latest of them, namely with the deniers of King Ladislaus I of Hungary (1077-1095), minted in the eighties of the 11th century (Huszár 1979, no. 24). The same deniers are also in the composition of the Słuszków I hoard, where the latest well-dated coin is the denier of King Coloman of Hungary (1095-1116) from the middle of the ruler's reign (Huszár 1979, no. 37). With the presence of this latter Hungarian coin, we obtain the first important clue regarding the dating of the latest issues of cross deniers in the deposit and the time of its concealment. Taking into account the dating of the Coloman coin, we can consider the middle of the first decade of the 12th century as the time of the hoard's concealment, which also corresponds to the end of Duke Zbigniew's reign in Greater Poland. For further considerations, it is necessary to identify issues of cross deniers that could have been minted in the middle of the first decade of

the 12th century. Very helpful in determining the time and place of production of cross deniers is also the tracing of the contents of other hoards from the turn of the 11th and 12th centuries, in which it is possible to trace the presence or absence of certain varieties and on this basis create chronological chains of cross deniers.

5.2 The origin of cross deniers - a discussion

The question of the origin of cross deniers has been the subject of dispute between Polish and German researchers for more than 150 years. While the origins of their production now appear to be well explained and documented, a major difficulty is the attempt to attribute the earliest issues of cross deniers from the late 11th and early 12th centuries not only to specific centres, but even to regions - Poland or Saxony.

Initially, all researchers considered the cross deniers, then called *Wendenpfennige* [Wendish deniers], after the regions where they were discovered in areas inhabited by the Slavs (German: *Wenden*), to be money used by the Polabian Slavs, modelled on Western European coins. In the first half of the 19th century, Joachim Lelewel attributed their minting to Emperor Henry II (Lelewel 1826, 157). Later, however, this researcher came to believe that these were coins of the Polabian Slavs (Lelewel 1851, 350). Kazimierz Stronczyński located the production of cross deniers in the area between the Elbe and the Vistula. He linked the types with depictions of a simple and beaded cross on the obverses with Mieszko II and his wife Richeza (he read the obverse legend on the deniers as **RIXA**), the type with a crossed crozier on the obverse with that ruler's son, Kazimierz the Restorer (Stronczyński 1847, 255-257). German scholars contemporary with him considered these deniers to be products of Saxon bishop's mints, produced mainly for the market of Slavic Polabia and Poland. One of the first German scholars to deal with the cross deniers was Bernhard von Köhne, who considered them to be Polabian imitations of the deniers of Ludwig the Pious **XPISTIAN RELIGO** (Köhne 1849). Herman Dannenberg, on the other hand, regarded cross deniers as products of German mints intended for exchange with the Slavs. He considered their prototype to be a Magdeburg coin with a depiction of a chapel on the obverse and a cross pattée on the reverse and the legend **IN NOMINE DNI AMEN** (Dbg 643). In addition, he was the first to draw attention to the coin with the name **EPERHARDVS** mentioned in the obverse legend (CNP 828-833), identifying it correctly with the German bishop Eberhard of Naumburg (1045-1079). Dannenberg was against recognising the coins in question as Polish products (Dannenberg 1876, 488-491). Cross deniers were also regarded as Saxon issues by Julius Menadier, who created a new name for them, derived from the proposed place of production: *Sachsenpfennige* - Saxon deniers (Menadier 1891, 196).

At the turn of the nineteenth and twentieth centuries, Polish numismatists associated the production of cross deniers with native mints, although some of them favoured the hypothesis of an

earlier issuing of cross deniers in Saxony and only later in Polish lands. Walery Kostrzębski called cross deniers “the deniers of the Slavs”, which, according to him, was supposed to denote first and foremost the purpose of these coins, but also partly their origin. He saw the beginning of production in the mint located on the territory of the state of the Polish ruler Bolesław I the Brave (992-1025). After the king’s death and the disintegration of his monarchy, the minting of Slavic deniers was to split into two trends: Polish (deniers with a simple cross, with a crossed crosier and the oldest varieties with a beaded cross on the obverse) and Polabian. The latter type was supposed to have been produced at the mints of German and Slavic bishops, comprising the later varieties with a beaded cross and all types except those previously mentioned (Kostrzębski 1900, 258-260). The exclusively Polish origin of cross deniers was advocated by Marian Gumowski, although over time he fundamentally changed his views on their domestic issuers. Initially, he believed that cross deniers were a circulating part of the monetary production of the Polish rulers Mieszko I (966-992) and Bolesław I the Brave, while he classified other types of coins identified with these rulers as low-volume commemorative issues (Gumowski 1904, 28). He excluded the possibility of the minting of coins by Polish bishops. The researcher later changed his mind, but considered that all cross deniers constituting the products of the mints of the Polish bishops were minted in Poznań, Gniezno, Kruszwica and Wrocław (Gumowski 1924, 42-79). He assigned specific coin types to each of these centres. Deniers of Type I (with a representation of a temple) and Type II (with a chapel) were supposed to have come from Poznań, Type IV (with Alpha and Omega, and later with the letter **S**), and Type VII (with a crosier) - from Gniezno. Coins of Type V (with a representation of a beaded cross) were linked by the researcher to the minting of the successors of Bishop Unger in Poznań, and coins of Type VI (with a representation of a simple cross) - to the alleged Kuyavian bishopric in Kruszwica. He attributed the latest type of cross deniers (with hand and head) to the episcopal mint in Wrocław (Gumowski 1939, 108-192).

Polish numismatists contemporary to Gumowski did not all regard cross deniers as the production of only national mints. Wiktor Wittyg classified the oldest issues as part of the German minting, while the later ones as part of the Polish issues (Wittyg 1920). Zygmunt Zakrzewski associated the oldest types with Saxony, rightly noting, among other things, that the earliest examples were found not in Poland but in the Polabian region. He attributed the later issues to the Polish rulers: Kazimierz I the Restorer (in the last years of his reign) and his son Bolesław II the Bold. He also associated some of them with Polish bishops (Zakrzewski 1921). On the basis of the reconstruction of the outer field legends, this researcher tried to attribute several varieties of cross deniers to the Bishop of Gniezno, Type V - with a patriarchal cross, Type VI - with an **ETO** inscription, and Type VII - with a crosier (Zakrzewski 1925). Roman Grodecki spoke against these views, ruling out the existence of minting privileges for the Church in 11th-century Poland. He was against transferring the legal situation prevailing in the early mediaeval period from Germany to Poland. He also pointed out that the Christian symbolism present on early mediaeval coins was

common to Latin Europe at the time, so cross deniers bearing such imagery did not necessarily have to be products of bishops' mints. This researcher was sympathetic to the view of German scholars about the western, rather than Polish, origin of Bishop Eberhard's cross deniers - the only ones from the mid-11th century with an issuer mentioned in the legend (Grodecki 1928/9).

Post-war research into the origin of cross deniers has taken into account the economic aspects of coin production and trade on a broader scale, using the achievements of economic and social history. The dominant trend, both among German and most Polish scholars, was to consider cross deniers as issues of German mints.

The Saxon origin of cross deniers, in line with early mediaeval raw material and economic conditions, was advocated by Ryszard Kiersnowski, basing his conclusions on abundant Polish and German source material (Kiersnowski 1960, 191-211; 1961, 178-179). Stanisław Suchodolski discussed the minting of older types of cross deniers, located, according to him, in Saxony, in an attempt to establish their more precise dating and place of production (Suchodolski 1971, 15-26). However, some Polish scholars advocated, in line with M. Gumowski's views, an exclusively national origin for them. A researcher who was completely on the side of the "Polishness" of all cross deniers was Anatol Gupieniec. Among other things, he drew attention to the huge concentration of finds in the territory of Poland, pointed to the high level of economy and culture at the time of Bolesław I the Brave, as well as to the possibilities of mining local ore (Gupieniec 1960). Jan Pysiak published a similar conception of the location of the cross deniers mints. This author primarily advocated a reverse flow of silver bullion - from Poland to the west (Pysiak 1995). As recently as a quarter of a century ago, such a judgement seemed improbable, but after the discovery of remains of silver and lead smelting at sites on the border of Silesia and Lesser Poland, which were probably already active in the 11th century, Professor Jan Pysiak's opinion does not seem devoid of any real basis (Rozmus 2014, 245-248).

Of the post-war works by German researchers, Vera Jammer's publication on Saxon minting in the early mediaeval period is noteworthy. The author concurred with the views of H. Dannenberg and located the cross deniers mints in eastern Saxony, emphasising the importance of two centres: Magdeburg and Bardowick. She focused her attention on the older varieties of the coins in question, from the second half of the 10th and first half of the 11th centuries (Jammer 1952, 58-61). A shortcoming of this work was the rather cursory use of Polish numismatic sources (Kiersnowski 1955). Fritz Taute located mints of cross deniers in Magdeburg, Halle, Wallhausen and in Naumburg. According to him, the issues of the first two would have been deniers of types VII and VIII - with a depiction of a cross pattée with a crosier on the reverses, the issues of Wallhausen would primarily have been deniers of Type VII (one of their older issues bore the inscription **+UVALHUZE**, which the researcher read as a distorted name of the town of Wallhausen) and the issues of Naumburg would have been deniers of Type VI (Taute 1949, plate 61-65; Chabrzyk 2016). The earlier findings of German scholars were summarised by Lothar Tewes. In an article

dealing mainly with the origins of the production of cross deniers, he pointed out the possibility that they were issued in Poland at the end of the 11th century (Tewes 1981).

In a text from more than two decades ago, Christoph Kilger presented early mediaeval Saxon minting in the period from the middle of the 10th to the beginning of the 12th centuries (Kilger 2000). The author attempted to establish the places of production and the chronology of cross deniers. Some of his findings concerning the origin of their later varieties seem not to be substantiated by the finds. Of the coins of interest here because of their chronology, he attributes the later Type V issues to the Meissen mint. Type VI deniers with a simple cross on the obverse, on the other hand, he associates with the southern area of the Saale, Naumburg and Poland. Cross deniers with the depiction of a crosier on the obverse of Type VII, according to Ch. Kilger, were from the reign of Henry IV and produced in Halle-Giebichenstein, Merseburg and probably in Poland. From among the deniers assigned by M. Gumowski to Type VIII, the CNP 1007-1013 varieties were classified as belonging to M. Gumowski's Type VI (deniers with the representation of a simple cross on the obverse) and associated with the places of production of such coins, while the production of the others (CNP 999, CNP 1000-1006, CNP 1014-1020, CNP 1028-1035) was assigned to the Halle-Giebichenstein site. It is worth noting that the latest varieties of cross deniers, presented by Kilger in his 2000 paper, represent a small part of the material known from Słuszków from Deposit I (and which has now been presented in the newly developed typology). Kilger distinguished nine phases in the development of Saxon minting in the early mediaeval period. The deniers in question fall chronologically into the two latest periods of the described minting. The first, spanning the penultimate decade of the 11th century, is characterised by a reduction in royal minting in favour the issues of bishops and magnates. The second of these periods is dated from 1090-1105, and represents a return to a more centralised model of money production, chronologically linked to the reign of Henry IV.

As can be seen from the above presentation of the discussion on the origin of cross deniers, the beginnings of their minting can undoubtedly be traced to Saxony, above all to Magdeburg - the oldest Saxon centre of coin production and an important centre of trade with the Slavs, but is also associated with the mints at Bardowick, Merseburg, Gittelde and Giebichenstein (Suchodolski 1971, 17-19). However, the location of the minting of cross deniers from the late 11th and early 12th century is still a matter of dispute.

Ryszard Kiersnowski presented some basic criteria related to establishing the place of production of cross deniers, referring rather sceptically to the possibility of their Polish origin. He analysed the problem by considering the distribution of the finds, the question of the scale and technique of production, the bullion base and the possibility of the existence of episcopal minting in Poland (Kiersnowski 1964b).




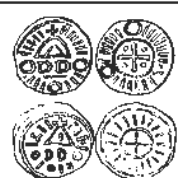




Discoveries of cross deniers (Kiersnowski 1960, 196-197) are concentrated mainly in Poland (64% of recorded finds and about 75% of coin specimens) and in Polabia (15% of finds and 22%

of specimens). The percentage of Polish finds in relation to the remaining recorded German issues is much higher here than in other central European countries (Kiersnowski 1960, 179 and 196). Saxon cross deniers generally contained no less silver than other German coin issues contemporary to them (cf. Chapter IV - *Metrology*), so it is surprising to see their small presence in the finds, mainly of later issues, in exports from German territory to central and northern European countries (Kilger 1992), excluding Poland and the neighbouring Polabia. It seems that it was from Saxony that cross deniers penetrated eastwards and northwards, above all in the late tenth and first half of the eleventh century, during the most dynamic period of minting there (Hatz 1985). The chronology of cross deniers finds from Sweden, comprising almost exclusively specimens from before the mid-11th century, agrees with this. (Fig. 62; cf. Kilger 1992, 10-20).

If Polish mints began producing cross deniers after the middle of the 11th century, their penetration outside the country, like that of other native coins, was small. The absence of the latest varieties of cross deniers and of the deniers of Bolesław II the Bold and Władysław Herman in finds from northern and eastern Europe does not exclude Polish minting of later issues of cross deniers. It should also be borne in mind that the level of production of cross deniers in the country was many times higher than the official Piast issues and that an underestimated part of the numismatic material from the Polabian finds may in fact have come from Polish mints.

The number of cross deniers found in Poland is several tens of thousands,³¹ so their entire production probably reached the number of many millions of pieces. Marian Gumowski describes 743 varieties of cross deniers (Gumowski 1939, 109-192), however, when processing further newly discovered hoards, specimens that do not fit into the old classification are still being found, which attests to the large scale of their production. The huge number of cross deniers issues must have involved the organisation of efficient mint workshops. Certainly, Polish mints could not have undertaken such a large minting production in the first two thirds of the 11th century. The total number of deniers of Bolesław I the Brave and Mieszko II known so far does not exceed 300 pieces. The situation changed fundamentally during the reign of Bolesław II the Bold. His close contacts with secular and clerical Saxon feudal lords resulted in the establishment of a well-organised mint, which probably took place around 1070 (Kiersnowski 1960, 314). The short period of production of royal deniers of this ruler, which lasted only three years, is estimated by Stanisław Suchodolski at around 2,000,000 pieces. This researcher distinguished 208 lower and 268 upper dies among the coins of Bolesław the Bold from the Wiślica II hoard discovered in Lesser Poland (Reyman-Walczak *et al.* 2013, no. 107). One should also remember the earlier ducal issues of this ruler, certainly more numerous than those of the royal period, as they were produced over a longer period than three years (Suchodolski 1973, 98-99).

31 The hoards of Służków I and Służków II alone total almost 20,000 cross deniers.

Variety by Dannenberg / * by CNP	Image of coin	Number of coins	Number of finds
1325/1325b		115	48
1329		60	24
1326		6	6
1328/1800		9	9
1327		3	3
1330/1331/1332		507	100
1815/* 473		1	1
1333		41	15







1335/1808		22	12
1336		1	1
1347		48	20
1975/*691/*709		2	2
1350		2	2
1351		1	1

Fig. 62. Variants of the cross deniers from discoveries in Sweden (Kilger 1992)

Another condition for large-scale coin production is the availability of bullion. The melting of foreign coins or ornaments into raw material was unprofitable and was probably only carried out at a time with very limited mint production. The available silver deposits in Saxony in the early mediaeval period were incomparably larger than in the Polish lands. Exploited during the reign of Otto I after 968, the huge deposits of silver ore in the Lower Harz, in the Rammelsberg massif near Goslar, and on the western slope of the Harz Mountains in Gittelde and those in Upper Saxony near Mittweida (Dziekoński 1963, 67-68) provided the Saxons with a steady supply of cheap

raw material. A large amount of silver extracted from local mines allowed the minting of coins on a large scale, with the surplus destined for foreign markets.

The extraction of silver in Poland, due to its natural resources, was undoubtedly a much more difficult undertaking than in Saxony. Deposits of silver-bearing ores are found in Lower Silesia, the border area between Silesia and Lesser Poland and in the Świętokrzyskie Mountains (Kóčka-Krenz 1988). The earliest known information about silver mining in the Polish lands is provided by an eleventh-century reference, probably to Olkusz, in the account of Rabbi Shlomo Ben Yitzchaki, known as Rashi of Troyes, who lived in the years 1040-1105 (Pytel 1970; Rozmus 2002). A somewhat later reference to silver mining is found in the 1136 Bull of Gniezno by Innocent III, which mentions that the Archbishopric of Gniezno owned the village of *Zversov*, near Bytom, where peasant silver miners lived (KDW, no. 7). Similarly old is the exploitation of lead ore in the Otmuchów-Nysa estate of the Bishops of Wrocław (Dziekoński 1963, 18). While today silver is mainly obtained in Poland from copper ores mined in Silesia, in the early mediaeval period this metal was extracted from lead ores. Recent archaeological excavations located on the border of Lesser Poland and Silesia have uncovered remains of sites with traces of lead and silver extraction from local lead ore deposits. Archaeological sites of this type have been discovered (Rozmus 2014, 301-305) in the area from Olkusz to Bytom and Tarnowskie Góry (along an east-west line) and from Siewierz and Przeczyce to Trzebinia and Chrzanów (along a north-south line). One of the largest sites of this type is located in Dąbrowa Górnicza-Łosień. Excavations there have confirmed references to silver mining in Poland during the early mediaeval period. Remains of furnaces, slags containing lead and traces of silver testify to the local extraction of silver from lead ore (Rozmus 2014, 140-145). The local mining of lead ores in the late 11th century therefore seems certain; the aforementioned finds also allow us to conclude that silver was recovered from lead as a result of successive technological processes. It is not, however, yet possible to determine the degree to which locally-produced metal was used in the production of Władysław Herman's Kraków deniers, or Polish cross deniers issues. Cheaper raw material sourced from domestic mines, rather than obtained from melting down foreign coins, would certainly have encouraged the issue of coinage (Kędzierski, Wyczółkowski 2013, 225-230; Chabrzyk, Młodecka 2013, 243-244; Suchodolski 2013). Recent specialised analyses, related to the determination of the origin of silver bullion using isotope analysis of lead used in the production of coins from the 11th and 12th centuries have so far not yielded conclusive results.³² The 207/206 and 208/206 lead isotope ratios of eleventh-century Hungarian coins, cross deniers of types V-VIII, large Sieciech deniers, but also Kraków coins of Bolesław the Bold and Władysław Herman were studied. The large deniers of the Count Palatine turned out to be the most homogeneous group, while the coins of Bolesław the

32 Research under the grant "*Studies on the origin and circulation of silver in early mediaeval Poland through lead isotopic analyses*" (NCN UMO - 2013/09/B/HS3/03289) was conducted under the direction of Prof. Władysław Duczko; cf. Miśta-Jakubowska 2020, 176-181, among others.

Bold were characterised by the greatest diversity in terms of the values of lead isotopes tested. It is possible that further studies of silver coins of this type will yield more conclusive results.

It must be acknowledged that in the last quarter of the 11th century there was the potential to organise mint workshops in Poland, as well as the capacity to obtain the silver raw material needed to undertake the production of cross deniers.

The next criterion given by Ryszard Kiersnowski regarding the possibility of producing cross deniers in Poland is the technology of their production. The entire Polish mint production of the second half of the 11th century: the deniers of Bolesław II and his brother Władysław, as well as the deniers of the count palatine Sieciech, primarily his Type I (Suchodolski 1987) had, like the cross deniers, a raised edge. The first coins with a high edge came from Germany, but the technological level of Polish minting workshops in the second half of the 11th century made it possible to produce artefacts of this type, as evidenced by deniers minted in Poland.

Another issue raised in connection with the origin of cross deniers is the problem of the existence of episcopal minting in Poland in the 11th century, which is a feature linked to their production in Saxony. Most of the opinions expressed on this subject are characterised by scepticism. It is pointed out that the Saxon state and economic conditions regarding minting rights cannot be uncritically transferred to legal relations prevailing in Poland (Grodecki 1928/9, 70-71). The first minting privileges for the Church in Poland date from the 12th century (Grodecki 1928/9, 71-89; Zakrzewski 1921, 98). Marcin Pauk considers the minting activities of Polish bishops before the middle of the 12th century as unlikely. However, based on recent findings by numismatists concerning the Polish minting of later issues of cross deniers, the researcher does not exclude its existence in Poland at the turn of the 11th and 12th centuries (Pauk 2010, 570). Apart from the oldest Type I issues, the only known cross deniers with a legend naming the issuer is a coin inscribed **EPERHARDVS EPC** (CNP 828-833). Marian Gumowski links it to the alleged diocese of Krużwica and its bishop Eberhard (Gumowski 1924, 171-195; Gumowski 1939, 164-165). Within Greater Poland, such cross deniers are known from only two hoards from Górzycza (Szczurek *et al.* 2017, nos. 70/1043-1048) and Sędzinek (Szczurek *et al.* 2017, nos. 226/208). However, due to the few finds of coins with the name **EBERHARD** on Polish territory, they should certainly be linked to the mint production of Bishop Eberhard of Naumburg between 1046 and 1079.

The period of Władysław Herman's reign of interest to us here, there was a serious weakening of the authority of the monarchical power in comparison with the situation in the reign of his predecessor Bolesław the Bold. In this period, there was probably an increase in the importance of the magnates, on whose support the new ruler had to rely. The role of clerical dignitaries also seems to have increased, as can be seen from the role of the Archbishop of Gniezno, Marcin, in alleviating the conflicts between the Piast dukes at the turn of the 11th and 12th centuries. It is therefore possible that, in addition to the extra-ducal issues of the deniers of the palatine Sieciech, episcopal coins could also have appeared at this time (Suchodolski 1987, 12-44). A favourable occasion

for the bishops to obtain minting privileges would have been when king Boleslaw the Bold had been deposed from the throne after the execution of Bishop Stanisław and Władysław Herman began his reign. This fateful event in 1079, which had far-reaching consequences for the country, may have been the moment when both secular and clerical feudal lords began their own minting activities. Also later, in the 1090s, in a period characterised by serious internal conflicts, such activities were also very likely (Benyskiewicz 2010, 147-279). The hypothesis that in this period, the coinage was minted by someone other than the ruler and his Count Palatine seems acceptable, on account of the position of duke Władysław not being as strong as that of his predecessor, his elder brother. However, it is difficult to judge to what extent the coin finds from this time can support this hypothesis. Certainly, the last two decades of the 11th century are characterised by a clear dominance in the finds of cross deniers, with a smaller percentage of other coins than had been the case earlier.

5.3 The Polish minting of cross deniers. Archaeological artefacts

The Polish origin of the cross deniers is supported above all by the surviving artefacts. The most important are undoubtedly the finds of coins of Sieciech, count palatine of Władysław Herman. Some of them, with a cross pattée on the reverse, imitate the later varieties of Type VI cross deniers (Fig. 63). This goes hand in hand with the analogous shaping of the raised edges.

Another artefact most probably connected with the Polish minting of cross deniers is a rectangular brass plate with a hole, found in a child's grave in an early mediaeval cemetery in Brześć Kujawski (Kaszewscy 1971; Mikołajczyk 1985). It depicts a cross pattée surrounded by an outer field with the characters ●V●V, characteristic of the latest cross deniers of Type V and, above all, Type VII. It is possible that this pendant was struck with the die used to produce local issues of cross deniers (Paszkiwicz 2006, 15-19; Bogucki 2008, 214-216), although it cannot be ruled out that the object was imported (Fig. 64).

Recently, during surface work carried out on the Trojanówka River - a tributary of the Proсна River,³³ in the vicinity of the village of Cieszyków, commune of Szczytniki, in the eastern part of the Kalisz district (18 km south-east of Kalisz), a similar copper plate was discovered. It was almost square with sides of 17-18 mm, and stamped on both sides with the die of the obverse and reverse of a cross denier (Fig. 65). The artefact was found in the humus layer of an early mediaeval site where, in addition to numerous fragments of ceramic vessels, other coins from the 11th and early 12th centuries were present (Kędzierski 2010a, 83; Szczurek *et al.* 2017, no. 26).

33 Surface survey work in the Proсна river basin was carried out in 2009 under the direction of Leszek Ziábka, from the District Museum of the Kalisz area.



Fig. 63. Deniers of count palatine Sieciech with the cross pattée Type I, variant 1-5 according to the classification by S. Suchodolski (1987) (photo: A. Kędzierski)



Fig. 64. Brass plate from Brześć Kujawski (photo: P. Chabrzyk)



Fig. 65. Copper plate from Cieszyków, Kalisz district (photo: A. Kędzierski)

The die imprint visible on the plate belongs to a Type VI deniers with a simple cross on the obverse. The majority of coins of this type, discovered in hoards from the turn of the 11th and 12th centuries, are associated with local production (see below). The diameter of the outer rim on the plate is 13 mm. Thus, a cross denier struck with this die could not have had a larger diameter, which corresponds in size to coins from the late 11th or early 12th century. The visible depictions on the plate are similar to the cross deniers of Sdm-6C08 (CNP 858/864). The described object was not a pendant due to the lack of a hole, but most likely a technological sample, perhaps from a nearby mint workshop. The discovery of a copper plate near Kalisz would be a strong argument for the Polish minting of cross deniers in this centre. It is also possible that the plate was prepared to be cut and then covered on the surface with silver or tin using the fire method and to be put into circulation as a forgery. However, for unknown reasons, perhaps due to loss, the object was preserved as a blank.

Another artefact related in shape and representation to the cross deniers is a thick lead disc, 15 mm in diameter, with a representation of a cross discovered at the early mediaeval settlement of Stare Miasto in Kalisz in the upper, mixed layer (Fig. 66: 1).³⁴ This artefact is somewhat reminiscent of Type VI cross deniers, but due to the large thickness of the disc, it does not imitate a coin very well. In the area occupied by the Stare Miasto settlement in Kalisz, in an excavation at 13 Stare Miasto Street, a further lead disc with slightly raised edges was also discovered, imitating, due to its large diameter (18-20 mm), the oldest Type VI cross deniers from the early 11th century. The artefact was concealed in a pit of a manufacturing facility later used as a rubbish dump, which, based on the pottery, can be dated to the second half of the 11th century (Fig. 66: 2). Another very intriguing find was also discovered in the plot at 13 Stare Miasto Street, in the humus layer (Fig. 66: 3). This third lead disc from the Kalisz Stare Miasto is very reminiscent of a cross denier from the late 11th century. Its diameter - 12.5 mm - corresponds in size to late 11th century coins. The very high hammered edge and the crosses stamped on the surface make the object very similar to the cross deniers of the latest issues. Due to its weight (1.942 g), this disc could not have functioned as money used in small transactions, but would be unrecognisable hidden in a larger mass of coins. The artefactual material from the Stare Miasto settlement also included a small lead disc, 10.8 mm in diameter, which depicts a cross pattée on one side. Also this latter artefact could, surreptitiously added to a collection of several dozen deniers, have pretended to be an original coin (Fig. 66: 4).

34 The archaeological work of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences on the Kalisz- Stare Miasto site between 2007 and 2020 was conducted by Adam Kędzierski and Dariusz Wyczółkowski.

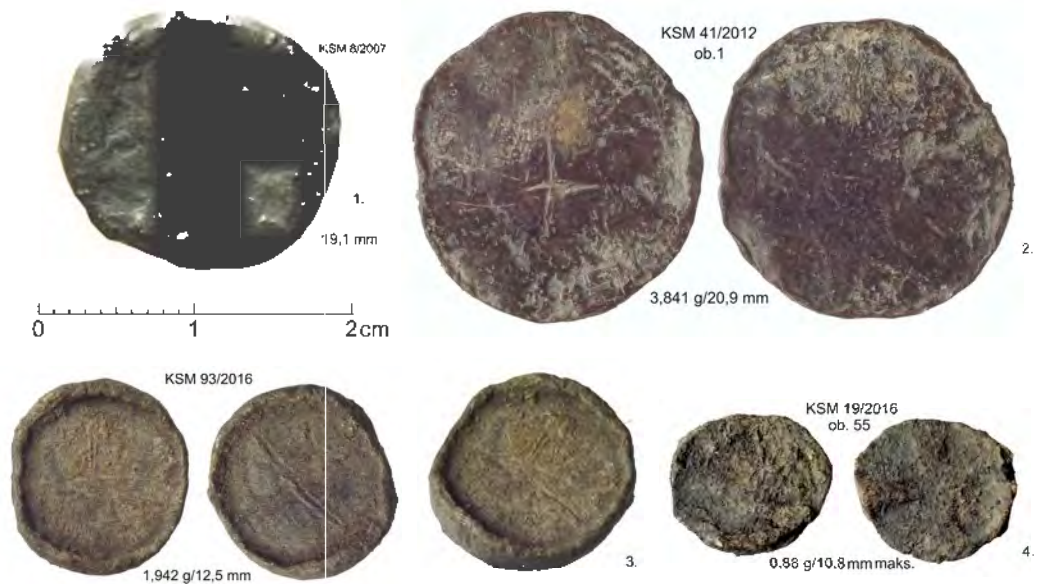


Fig. 66. Lead discs imitating coins from the Stare Miasto settlement in Kalisz (photo. A. Kędzierski)

While these artefacts with the image of a cross, a motif often used in the early mediaeval period, may have been modelled on cross deniers, they do not confirm the existence of mint workshops. The perfectly faithful reflections of the representation of the cross on the plates from Cieszyków near Kalisz and from Brześć Kujawski are a serious indication, if not outright proof, of the existence of mints of cross deniers in eastern Greater Poland and Kuyavia.

Another artefact sometimes cited in support of the notion of the Polishness of cross deniers is an ornamented fragment of deer antler discovered on Mount Lech in Gniezno in a secondary deposit, in a 20th-century levelling layer (Żurowski 1953, 103). It shows a drawing of a crosier with a rather unusual cross in a wreath of pearls/beads, similar to the depictions on the obverses of Type VII cross deniers, minted in the late 11th and early 12th centuries (Fig. 67). It has been conjectured (Tabaczyński 1957-1959) that this may have been a model for an engraver to make die for cross deniers. A different interpretation has, however, recently been put forward by Witold Garbaczewski, who believes that the artefact may have been used as a kind of apotropaic amulet, protecting against evil powers (Garbaczewski 2006, 54-55). However, it seems more likely that the artefact was indeed used as a pattern for mint dies. The representation of the obverse of a Type VII cross deniers made on the antler may have been used by the engravers of dies at the cross deniers mint in Gniezno. The artistic motif on the discovered artefact is very much in keeping with the ecclesiastical character of the Gniezno centre. It was probably the most suitable place in Poland at that time to issue episcopal coins. Of course, it is impossible to build an entire concept

of the production of Type VII deniers in Gniezno on the basis of a single artefact. However, it is very likely that in the second half of the 11th century a mint workshop of cross deniers may have operated in this, the most important of the early mediaeval centres of the Polish Church, as evidenced by numerous deniers with a representation of a crosier in assemblages discovered in Poland, dated to the late 11th and early 12th centuries.

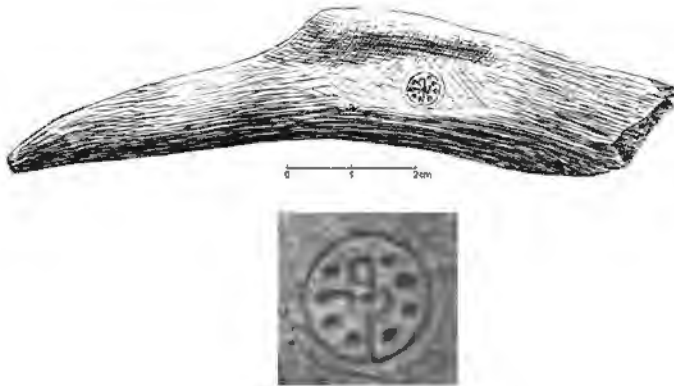


Fig. 67. Fragment of a deer antler from Gniezno with an engraved drawing of the obverse of Type VII cross deniers (drawing and photo: MPPP Archives in Gniezno)

5.4 The Polish minting of cross deniers in the light of technological and physicochemical analyses of coins

Important material for the discussion of the origin of at least some of the later issues of cross deniers has been provided by the Słuszków hoard (Słuszków I). Its analysis has made it possible to define a group of hitherto anonymous varieties of cross deniers that have reverses identical to Polish Sieciech coins of Type I/2 according to the classification of S. Suchodolski (1987). The assemblage also allows distinguishing three large sets of varieties of items related by the combinations and similarity of their dies to large Sieciech Type I deniers.

In the Słuszków I deposit, 14 specimens (average weight 0.953 g and diameter 12.5 mm) were defined as belonging to a previously unrecorded variety of Type VI deniers with a simple cross - Sdm-6C12-a (-CNP 858/848). On their obverse, four full beads are visible between the arms of the cross, and on the reverse (identical to the reverse of a large Sieciech Type I/2 deniers) is a cross pattée with an arch filled with four beads (Fig. 68).



Fig. 68. Reverse of the large deniers of Sieciech (Type I, variant 2) and of the cross deniers Sdm-6C12-a (CNP 858/848) (photo: A. Kędzierski)

The reverses of both types of coins struck with the same die differ significantly in the diameter of the flans. This problem also applies to other cross deniers produced with the same dies in the Słuszków I hoard. Perhaps it is related to the technology of producing high edges, which will be discussed in the section on forgeries of cross deniers.

Coins of the Sdm-6C12 variety (-CNP 858/848) whose obverses connect directly to the reverse of the large Type I/2 Palatine's deniers - with a wide arc with four points in the centre - give further combinations of dies with the reverses of deniers of the Sdm-6C14 variety (-CNP 858/1480; 14 examples, average weight 0.886 g, diameter 12.8 mm) (Fig. 69).

In addition, the coins of the last subgroup have characteristic reverses provided with a wide arc without dots in the centre (Fig. 70), very similar to those in the design on the large Sieciech Type I/1 deniers (Suchodolski 1987; Kędzierski 1998b; 2005).

In addition to the observed identity of the reverse die of the Type I/2 Sieciech coins and the cross deniers of the Sdm-9C12 variety (-CNP 858/848) and the similarity of the large Type I/1 Sieciech deniers to the Sdm-9C14 cross deniers (-CNP 858/1480), the other side of the Type I/4 Sieciech deniers also has a counterpart among later issues of cross deniers (Fig. 71).

The obverses of the cross deniers of the Sdm-6C18-bc (-CNP 813/1480) varieties are very similar, although not identical, to the large Sieciech Type I/4 deniers. The varieties of these cross deniers are represented by 11 specimens (average weight 0.943 g, diameter 13.1 mm). Their obverses, on the other hand, show great similarity to the examples of the Sdm-6C19-a variety (-CNP 813/1480) and to the large set of coins included in the Sdm-6C20 subgroup (-CNP 813). They have a distinctive legend in a broad outer field, in the form of circles, triangles and the letter R ending in a circle, and with a small simple cross on the obverse and a small cross pattée on the reverse. These deniers were first described by S. Suchodolski (1960, 27-28).

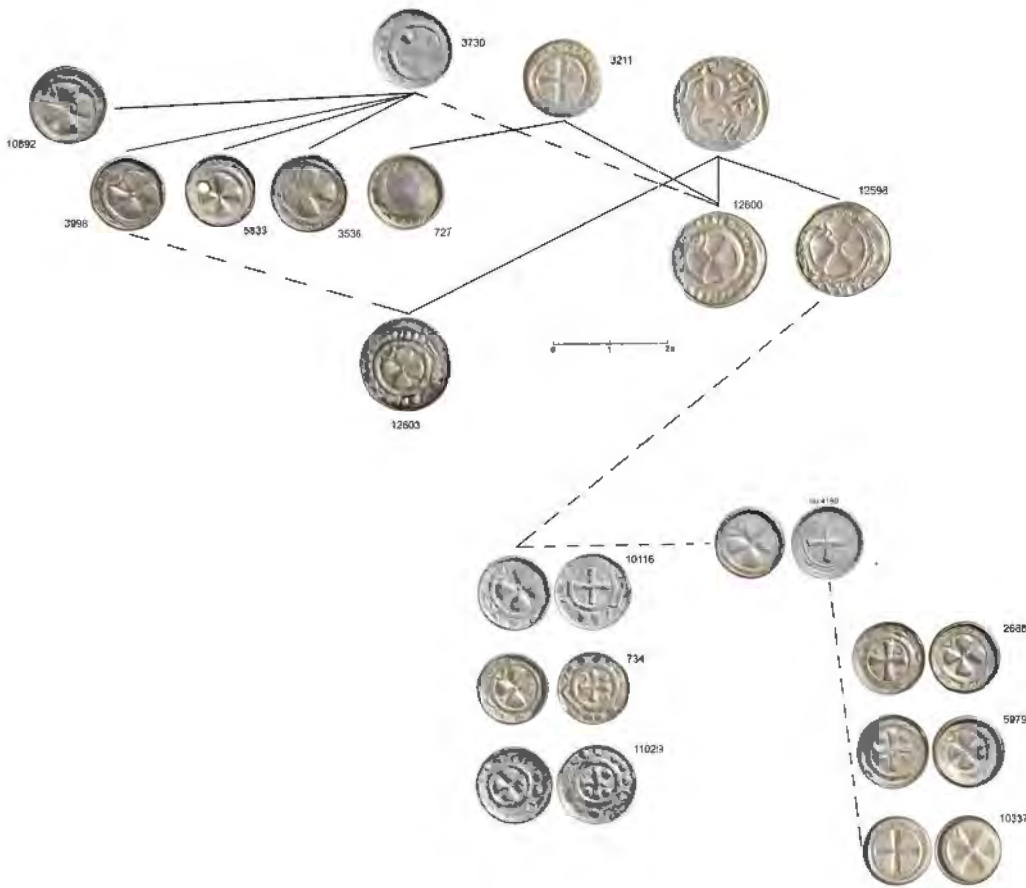


Fig. 69. Combinations of dies of Sieciech's deniers with cross deniers (prepared by A. Kędzierski)

The first Słuszkow assemblage also included Type VI coins of the Sdm-6A5 subgroup of varieties (-CNP 848; 17 specimens, average weight 0.837 g, diameter 12.2 mm), similar to the Sdm-6C12 specimens described earlier (-CNP 858/848). On the obverse they depict a simple cross with hollow circle and full dots between the arms, while the reverse depicts a cross pattée with an arch (less wide than on Sdm-6C12 coins) with three dots in the centre. In contrast, coins of the Sdm-6C14 variety (-CNP 858/1480) are alluded to on specimens classified as Sdm-6A6 (-CNP 836/1480; two specimens, average weight 0.918 g, diameter 12.7 mm). While the reverses of these coins are very similar to the coins categorised as Sdm-6C14 varieties (-CNP 858/1480), the obverses, instead of the four full dots in the arms of the simple cross, depict an empty circle-bead-full circle-bead combination. Coins with a broad arch on the reverse still include deniers of the Sdm-6A7 variety (-CNP 847; 6 examples, average weight 0.866 g, diameter 12.4 mm). On the obverse they

depict a simple cross in a 'continuous' border, with a faint empty circle-bead-full circle-bead in its arms, making them somewhat similar to coins of the Sdm-6D4-a variety (-CNP867-8). On the other side is depicted a cross pattée with an arch and a single dot in the centre.



Fig. 70. Reverse of the large deniers of Sieciech Type I, variant 1 and the cross deniers of variant Sdm-6C14-a, similar to CNP 858/1480 (photo: A. Kędzierski)



Fig. 71. Reverse of the large deniers of Sieciech Type I, variant 4, and the cross deniers of variant Sdm-6C18-b, similar to CNP 813/1480 (photo: A. Kędzierski)

Cross deniers of the Sdm-6C12-a variety, which have an identical reverse die to the large count palatine Sieciech deniers of Type I/2 and the other mentioned cross deniers with very similar reverses to the Sieciech coins of types I/1 and I/4, have a smaller weight and diameter than specimens with the Count Palatine's mark and name. The metric differentiation of the two types of coins of this magnate is probably related to the different purpose of the two groups: economic and representative. While the former group was unobtrusive, copying the patterns of cross deniers commonly used at the time, the latter was a completely new phenomenon in Polish minting. Apart from the representation of Sieciech's mark and his name, the deniers of this issuer were distinguished by their greater weight and diameter. The arithmetic average of weights and diameters calculated for 118 whole large Sieciech Type I deniers is 0.972 g and 15.4 mm, which far exceeds the parameters of cross deniers of the time.

5.5 The origin and dating of cross deniers

5.5a. Type VI cross deniers from Naumburg³⁵

Apart from the late varieties of Type VI cross deniers associated with Polish minting, there are varieties with the representation of a simple cross on the obverse of coins of this type known from both Polish and Polabian discoveries. While at least some of the issues of Polish cross deniers with the depiction of a simple cross on the obverse can be traced back to coins of Sieciech, with his mark on the obverse, in the case of German cross deniers such comparative analyses can be carried out using the cross deniers of Bishop Eberhard of Naumburg - an exceptional Type VI specimen, with a legend naming the issuer (Fig. 72).



Fig. 72. Cross deniers of Bishop Eberhard of Naumburg(CNP 828-833) after B. Kluge (1991, plate 73/438)

No example of this undoubted product of German workshops was included in the Słuszków I assemblage. There are, however, deniers from the end of the 11th century in it, the features of which relate to this German episcopal coinage by means of a different shaping of the raised edge of type b (the edges on the obverse and reverse sides leaning at right angles to the disc) than on most of the later issues of cross deniers. A similar way of making the coin flans in relation to later issues of cross deniers is known only in relation to slightly later cross deniers of Type VI varieties Sdm-6B1 - Sdm-6B8 (CNP 834-851),³⁶ also found in the Słuszków I hoard and other assemblages from Poland and Polabia. Also similar on them are the marks between the arms of the cross on the obverse - full and empty circles - different from those found on deniers linked to Sieciech and Zbigniew (four full spheres or none) and a border composed of oval beads, separating the coin's

³⁵ Cross deniers connected with the minting activity of duke Władysław Herman, his count palatine Sieciech and duke Zbigniew are discussed in Chapter VI - *Mint of cross deniers in Kalisz*

³⁶ These coins also have a Type c edge: on the obverse, the edge tilts inwards and on the reverse to the outside, in opposition to the discs of the other issues of the later cross deniers.

central field from the outer field. Cross deniers alluding in style to the Eberhard issue are included in deposit I from Słuszków. They have been classified in the Sdm-6B group, and have been found both in the Polish lands and in Polabia.

In the material from the Słuszków I hoard, only 142 whole specimens of deniers with Types b and c edges were distinguished (cf. Chapter 3 - "Typology"), which can be dated to the end of the 11th century. They have an average weight of 0.937 g and an average diameter of 13.5 mm. As mentioned above, these coins are found in hoards from the late eleventh and turn of the eleventh and twelfth centuries in Poland and Polabia. They have been recorded in the assemblage from Leest near Potsdam (Kiersnowski 1964c, 42-43; Seyer 1997) and Sonnenwalde near Cottbus (Knorr 1937, 22), among others.

They are not present in the deposit from Zbiersk, hidden around 1085, but are already in the assemblage of the probably not much later hoard from Górki (Paszkiewicz 1991), dated by the presence of the first type of deniers of King Ladislaus I of Hungary (after 1077). These coins are also found, among others, in the assemblage from Parzęczew near Zgierz, and are accompanied by coins of this Hungarian ruler. Hoards from the last decade of the 11th century from Mazovian Naruszewo (Gorlińska *et al.* 2015, nos. 89/566-645) and Jastrzębniki near Kalisz (Szczurek 2017, nos. 86/351-400) also contained coins of the Sdm-6B variety group (Fig. 73).



Fig. 73. Cross deniers group Sdm-6B from the hoard at Jastrzębniki near Kalisz (photo: A. Kędzierski)

In the assemblage from Gleina near Halle, dated to the beginning of the last decade of the 11th century (Gumowski 1953, 38; Kiersnowski 1964c, 35-36), the earliest specimens of the Sdm-6B group deniers (CNP 834-851) are absent, although there are stylistically similar slightly older varieties similar to CNP 802-812, with a broader outer field and clearly visible pseudo-legend marks (Fig. 74).³⁷



Fig. 74. Cross deniers CNP 802-812 from the Gleina hoard (near Halle) (photo: Staatliche Museen zu Berlin archives)

It is worth considering the percentage of Type VI deniers linked to the minting of Władysław Herman and Duke Zbigniew and to Saxony (Sdm-6B1 - Sdm-6B8) on the example of an analysis of the composition of several hoards from Poland (Table 45).

Table 45: Type VI coins in hoards from the late 11th and early 12th centuries.

Variety according to A. Kedzierski ↓CNP/Hoard→.	Śluzków I	Leżnica	Ogorzelczyn	Ojców I	Naruszewo
Dating	approx. 1105	approx. 1100	approx. 1095	approx. 1095	at 1090
Number of artefacts	13 061	620	161	221	876
Sdm-6C8 - Sdm-6C17 (CNP 851-866)	8.94%	1.9%	5. %	3.6%	1.9%
Sdm-6C18 - Sdm-6C20 (CNP 813 and CNP 813/1480)	15.06%	0.3%	0	0	0

³⁷ Photographs of the team's coins were made available by Prof Bernard Kluge, for which I offer my thanks .

Variety according to A. Kedzierski ↓CNP/Hoard→.	Śluzzków I	Leźnica	Ogorzelczyn	Ojców I	Naruszewo
Dating	approx. 1105	approx. 1100	approx. 1095	approx. 1095	at 1090
Sdm-6D4 (CNP 867-868)	11.25%	0.15%*	0	0	0
Sdm-6B1 - Sdm-6B6 (CNP 834-852)	3.51%	8.65%	10.5%	7.2%	9.2%

* coins similar to CNP 867-868, but with poorly visible spheres between the arms of the simple cross

In the composition of the hoards shown in Table 45, the Śluzzków I deposit holds a special place. In this hoard, deniers attributed to Polish minting occupy the primary place among Type VI deniers. In the other assemblages, a greater proportion of deniers linked in this work to Saxon minting is observed. This is probably related to the chronology of the assemblages. Hoards hidden as late as the 11th century contain more cross deniers of the Sdm-6B1 - Sdm-6B08 varieties (-CNP 834-851), flowing heavily from Saxony at the time. They may have ceased to be produced at the end of the 11th century, so there are very few such coins in the Śluzków I assemblage, hidden around 1105. Their production in the last quarter of the 11th century must be linked to the episcopal mint in Saxon Naumburg.

5.5b. Type VII cross deniers with a crosier

The origin of late issues of cross deniers with the representation of a crosier is a complicated issue. Perhaps small emissions were produced by Prince Zbigniew in Greater Poland, as well as by an unknown issuer in Silesia. However, most of the type VII cross deniers probably come from the mints of the archbishops of Magdeburg and Gniezno. When considering the origin of deniers related to the minting of Duke Zbigniew, attention is drawn to the inscriptionless deniers of Type VII classified in the Sdm-7A6 variety. They bear on the obverse a representation of a crosier facing to the right - -CNP 993 and a depiction of a cross pattée with a **V** between the arms, very similar to that found on the reverse of coins of the Sdm-6D4 variety (-CNP 867-868), attributed to Zbigniew, also with the same 'continuous' ring around the central field (Fig. 75).

The two known specimens weigh on average 0.892 g, with an mean diameter of 11.1 mm. Such a weight corresponds to the Sdm-6D4 coins, while the diameter is clearly smaller and refers only to the smallest specimens of cross deniers of the variety with a simple cross on the obverse. The unquestionable similarity of the reverses of the described varieties of deniers and the similar metric data encourage a very late dating of these Type VII coins - even to the middle of the first

decade of the 12th century. It is tempting to see the depiction of the crosier on the obverse as associated with ecclesiastical rather than secular minting. While the cross often depicted on early mediaeval coins was used on both secular and clerical feudal coins, the use of the crosier - an attribute of episcopal authority - on cross deniers is more likely to be associated with an ecclesiastical issuer. It is difficult to judge whether the similarity of the reverse of the Sdm-7pA6 coins (CNP 993/858 and 867-868) to the Sdm-6D4 deniers (CNP 867-868) is accidental. Perhaps it is a matter of imitating the bishop's coinage in Greater Poland at the beginning of the 12th century, or perhaps it is also an argument for the existence of a bishop's coinage production linked in some way to Zbigniew's minting (Nakielski 2013, 58). It should be remembered, as already mentioned, that the archbishops of Gniezno owned the village of *Zversov* near Silesian Bytom, where lived peasants engaged in silver mining.

A very puzzling question is the origin of the later Type VII deniers with the representation of a crossed crosier on the obverse and the depiction of a cross pattée with S9 type marks on the reverse. These are, in addition to the previously described Type VI coins with the depiction of a simple cross, the most common cross deniers in hoards from the late 11th and early 12th centuries discovered in Poland and Polabia. The oldest varieties without a crossbar on the image of the crosier are associated with the German mints of Halle-Giebichenstein, Merseburg and Wallhausen (Chabrzyk 2016, 79-80). While the minting of Type VII deniers with a crosier depiction in the period before c. 1080 can be linked to Saxony, the issue becomes very complicated later on.

At the current level of research, it is difficult to attribute most of the later Type VII deniers to medieval regions and mints. Undoubtedly, as late as the 1080s, when the Polish minting of cross deniers began, Type VII specimens made up only a small proportion of them in deposits. In the hoard from Zbiersk in the Kalisz district, where a single Sdm-6C9 cross denier attributed to Władysław Herman occurred, only 2% of the cross deniers belonged to the type with a crosier (cf. Fig. 105). In a similarly dated or slightly later assemblage from Sיעień-Rumunki in Mazovia (Gorlińska *et al.* 2015, no. 147), Type VII specimens reached 3.1%. Probably a few years later, the



Fig. 75. Cross deniers Type VII Sdm-7pA6 (similar to CNP 993/867-868) and Type VI Sdm6D4-a (-CNP 867-8) from the Słuszków I hoard (photo: A. Kędzierski)

assemblage from Sokołowo, Gostynin district in Mazovia (Bogucki *et al.* 2016, no. 228), probably hidden at the end of the 1080s, contained 19.3% of crosier deniers, apart from one Sdm-6C9 (out of 205 silver artefacts). In addition to the older varieties, similar to CNP 967, there were specimens just over 13 mm in diameter, already with a rather narrow outer field, foreshadowing the appearance of specimens similar to CNP 986-7, which later dominated the Type VII material in the hoards of the late 11th and early 12th centuries. Another interesting assemblage in which changes in minting of crosier deniers can be observed is a small deposit from Zgłowiączka (Gorlińska *et al.* 2015, no. 208), hidden at the turn of the 1080s and 1090s. Numbering 98 coins, the hoard contains three Kraków deniers of Władysław Herman and two Sdm-6C9 (CNP 858) deniers attributed to him. Already 30.5% of the cross deniers in this hoard are specimens with a crosier, including specimens that can be counted among their latest issues (Fig. 76).



Fig. 76. Later issues of Type VII deniers from Zgłowiączka, Włocławek district (photo: A. Kędzierski)

The 1090s saw a rapid development of the minting of cross deniers with a crosier. This is indicated by a hoard from Jastrzębniki in the Kalisz district dated to this period (Szczurek *et al.* 2017, no. 86). It did not include coins attributed to Sieciech and Duke Zbigniew, but in turn included a Type VIII Wrocław cross denier with a representation of the head of the variety of CNP 1008-1009 (Szczurek *et al.* 2017, no. 86/714; Kędzierski 2023). Among cross deniers, specimens with a crosier already accounted for 40.7% of the material, compared to only 22% of Type VI coins. The coins of Type VII were dominated by coins described by Marian Gumowski as the CNP 986-7 variety. In the latest of the discussed hoards, the Słuszków I hoard, deniers of Type VI slightly predominate (43%), represented in large numbers by specimens attributed to Władysław Herman (Sdm 6C9=CNP 858) and Duke Zbigniew (Sdm-6C20=CNP 813 and Sdm-6D-4=CNP 867-868), and probably issued at the Kalisz mint. They outnumber coins with

a crosier, which constitute 42% of this type of coinage, Among 5323 such coins of Type VII, as many as 4341 can be classified as the latest issues from the end of the 11th and early 12th centuries. Analysing isolated finds of late issues of cross deniers on archaeological sites, one can also observe a domination of coins with a representation of a crosier. Such a situation is evident at the Stare Miasto site in Kalisz, where 21 deniers of the latest Type VII issues have been identified, and only 12 Type VI specimens (Kędzierski 2018, 205-208). An even greater prevalence of Type VII deniers over Type VI specimens can be seen at Site 4 in Giecz. There 192 specimens were found with a representation of a crosier and only 48 with a representation of a simple cross (Syty 2015, 119-179). It seems likely that the sudden increase in the number of Type VII deniers in the finds from the last decade of the 11th century is related to the large-scale commencement of their Polish minting, most probably in Gniezno, only 30 kilometres away from Giecz. The scale of production of the alleged Gniezno workshop can be attested by the Środa Wielkopolska III hoard (Szczurek et al. 2017, no. 249). Consisting of 1187 coins and individual fragments of silver jewellery and silver ingots, the assemblage contains as many as 758 Type VII cross deniers, mainly of the latest varieties, representing as much as 69% of all cross deniers in this deposit. The crosier specimens discovered in Greater Poland correspond to the coins from Słuszków I. A series of specimens of the Sdm-7pB variety group (~CNP 990-991), as well as Sdm-7A-D (~CNP 986-7), are encountered in both hoards, which may indicate their Polish origin.

In terms of establishing the origin of Type VII deniers with a crosier and Type V specimens with a beaded cross, an extremely valuable source of information are the rare finds of coins classified as Type VIII according to the typology of M. Gumowski. Some of them depict a glove on the obverse and a cross pattée with a crosier on the reverse. Such depictions are known from coins discovered in the Polabian region that are undoubtedly Saxon in origin, including those in the hoard from Havelberg near the confluence of the Havel and the Elbe (Fig. 77: 308, 310; cf. Schauss 1836), and associated there with issues of cross deniers and obols.

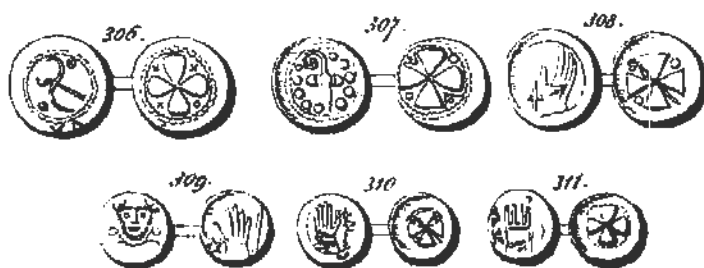


Fig. 77. Cross deniers from the Havelberg hoard according to Schauss (1836)

The Saxon provenance of the cross deniers with the depiction of a glove and a banner seems certain, this is also evidenced by the contents of the hoard from Gleina in the district of Querfurt, hidden around 1090. In this hoard of 1245 coins, 580 were recorded, of which 194 bore the inscription **OTTO HALLA** in the outer field instead of the pseudo legend in the form of wedges or circles. This indicates the place of production at the mint in Halle by an unidentified Otto. Their reverses depicted a cross pattée with a crosier. The other 386 coins in this group with a glove and a banner on the obverse bore the legend **MAGDEBURGH**, but the reverse depicted a cross pattée without a crosier (Kiersnowski 1961, 185). The obverses of four CNP 1001-1002 deniers from Słuszków bear the letters **OT** (Fig. 78: 2-3), which corresponds to the specimens recorded in the Saxon Gleina deposit. The assemblage also included a denier with a representation of a head on the obverse and a cross pattée with a crosier on the reverse (Fig. 78:1), not known from Polish finds and differing in the artistic level of the depiction of the head from the cross deniers attributed to the bishop's mint in Wrocław (CNP 1007-1013). Thanks to the combination of dies, it is possible to separate groups of coins, discovered at Słuszków, among other places, related by dies to inscribed deniers from the Gleina assemblage (Fig. 78).

Among the artefacts from Słuszków are examples of the rarely discovered coins of Type VIII with a reverse bearing a cross pattée with a crosier: CNP 999 (inv. no. 12 532, weight 1.059 g, diameter, 12.6 mm; Fig. 78: 5), CNP 1002 (inv. no. 12 531, 0.995 g, 13.9 mm and inv. no. 12 533, 0.916 g and 12.6 mm; Fig. 78: 4-5), and CNP 1029 obols (inv. no. 8178, 0.378 g, 9.6 mm diameter and inv. no. 12 536, 0.332 g, 10.1 mm). This representation on the reverse allows them to be linked to the Magdeburg and Halle mint workshops.

Analysis of the dies has also indicated to us deniers of other types, apart from VIII, with identical or very similar reverse designs. Such coins include a Type V denier with a representation of a beaded cross on the obverse (CNP 666/668), discovered at the Opole-Ostrówek site (Butent-Stefaniak *et al.* 2013, no. 52/1; Fig. 78: 6). Its reverse is identical to that of a Type VIII specimen, CNP 999 (Fig. 78: 5), which indicates the Saxon origin of the described coin with a beaded cross on the obverse. The obverse of the latter, on the other hand, is similar to the imagery of the coin no. inv. 2441 from Słuszków I (Fig. 78: 10), included in the subgroup of varieties Sdm-5F4 (290 specimens, average weight 0.834, diameter 12.6 mm). The similarities of the dies of coins going from Type VIII to V would indicate Saxony as the place of production, but the large number of deniers of this variety, among others in the Słuszków I hoard, would indicate their local origin (Nakielski 2013, 70-71). Deniers with the depiction of a crosier to the right on the obverse and a cross pattée and a crosier on the reverse are known from the Słuszków deposit - variety Sdm-7pF2-a (nine examples with an average weight of 0.905 g and an average diameter of 12.2 mm; Fig. 78: 8). A specimen from a hoard from nearby Ogorzelczyn has such depictions on the reverse (inv. no. 157, weight 0.96 g, diameter 12.3 mm; Fig. 78: 9). Its obverse shows a crosier with the crook facing to the left. A similar, but not fully legible denier comes from the study of a market

and craft settlement in Kalisz-Stare Miasto (Szczurek *et al.* 2017, 100c/16, weight 0.694 g; Fig. 78: 7). Through the analysis of die combinations, several varieties of Type VII can be added to the coins associated with Magdeburg and Halle. These mainly include the coins classified as variety Sdm-7pB3-a =CNP 990-991 (238 examples, average weight 0.874 g, diameter 11.8; Fig. 78: 11), Sdm-7A2-a =CNP 986-987 (12 specimens, average weight 0.804 g, diameter 12.5 mm; Fig. 78: 13), and Sdm-7G5-a=CNP 986-987/846 (13 coins, average weight 0.982 g, diameter 12.3 mm; Fig. 78: 12). The first two varieties of deniers are typical examples of coins common in finds with a representation of a crosier with a residually preserved inscription in the outer field and the most common **V●V●** signs on the reverse between the arms of a cross pattée. These coins seem most likely to be associated with the Halle or Magdeburg workshop (Taute 1949, 61-63, plate IV/2a, 2b, 3, 4, 5), but this is not certain and requires further study.

The hoard from Kopacz near Złotoryja in Silesia, analysed by W. Nakielski (Nakielski 2012, 155-156; Butent-Stefaniak *et al.* 2013, no. 29), dated to the turn of the 11th and 12th centuries, contained a group of cross deniers that are valuable for analyses related to their chronology and origin. In its composition is a very interesting series of several dozen deniers similar to the Sdm-7G3-a variety from Słuszków (~CNP 986-987/860; Fig. 79: d), struck with a single pair of dies, which could argue for their local origin.

Interestingly, its reverse (variety Sdm-7G3-a) is very similar to the reverse of deniers of variety Sdm-6C1 (~CNP 860) (Fig. 79: a), which were found in both the Słuszków and Kopacz deposits. It is possible that we are dealing with a Polish workshop in Silesia, producing both Type VI and VII deniers. Besides, this would not be the only case of different types of cross deniers being issued in one workshop. The aforementioned coins from Słuszków I, with a crosier on the obverse Sdm-7G5-a= CNP 986-987/846, also show great similarity to the obverse of the previously described coin from Ogorzelczyn (inv. no. 148), probably produced in Halle or Magdeburg (Fig. 78:12 and Fig. 80; coin inv. no. 1024) with an archaic reverse depicting a cross pattée with a U-shaped mark, exactly like that on Type VI deniers of the Sdm-6A8-a variety (similar to CNP 846; cf. Fig. 80: coin inv. no. 4943).

Other deniers of types V, VA and VI were also observed in the material from the Słuszków I hoard that had reverses struck with the same dies and were probably issued at the same mint. These include two coins of types V and VI. The reverse of the Type VI deniers of the Sdm-6C3-a variety (~CNP 853/864) (inv. no. 3880, weight 0.734 g, diameter 11.5 mm) is identical to the reverse of the Type V deniers Sdm-5C1-b (inv. no. 969, weight 0.830, diameter 12.0 mm; Fig. 81). Their late time of issue is evidenced by the absence of legend marks in the outer fields. Similar to it in style of workmanship are the Sdm-5D2-a and Sdm-5B10-a coins (both ~CNP 655/672) and the probably slightly older Sdm-5C2-a deniers (~CNP 655/652).



Fig. 78. Cross deniers with a cross pattée and a crozier on the reverse and coins linked with them through die similarity (photo: A. Kędzierski and Saatiche Museen zu Berlin archives, prepared by: A. Kędzierski)

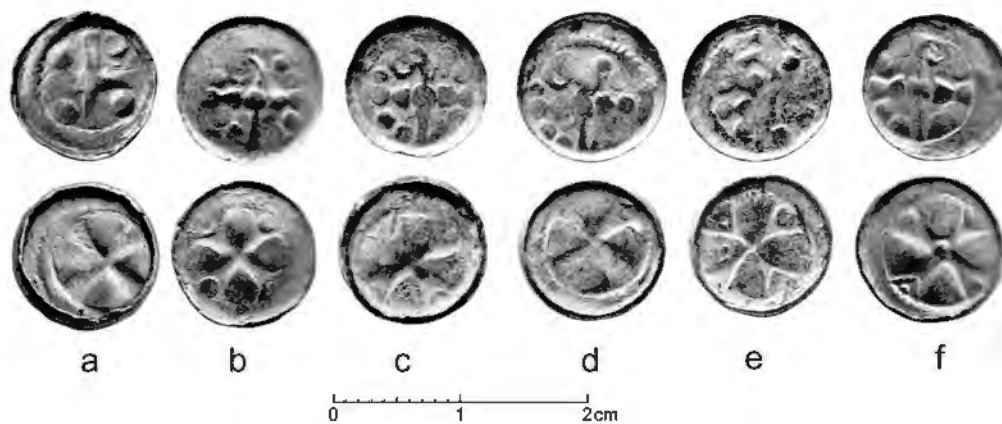


Fig. 79. Type VI and VII deniers from the hoard from Kopacz according to W. Nakielski (2012)

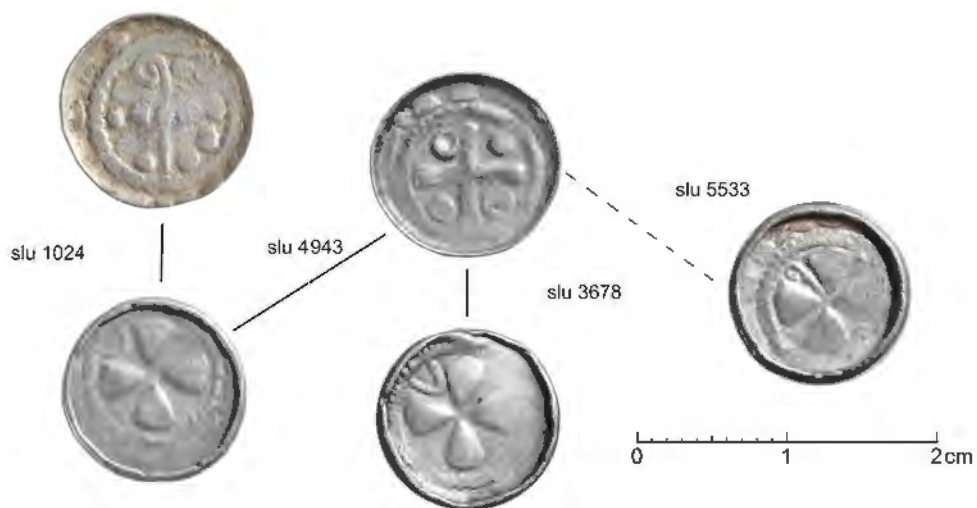


Fig. 80. Cross deniers variants: Sdm 7G5-a (inv. no. 1024), Sdm-6A8-a (inv. no. 4943), Sdm-6A8-b (inv. no. 3678), Sdm-6A11-a (inv. no. 5533) (photo: A. Kędzierski)

Another two single examples of deniers of types VI and V with identical reverse dies, belong to the Sdm-6C07-a variety (CNP 851-852), which is represented by three specimens with an average weight of 0.952 g and a diameter of 12.9 mm. The only coin in the hoard, Sdm-5B6-a (CNP 655/851-852), with an identical reverse to the deniers described earlier, weighs 0.819 g and measures only 11.8 mm in diameter (Fig. 82: 1-2. The metric differences, particularly in diameter, between the specimens of the two varieties are perhaps related to the different time of their production. It is worth adding that the obverses of the deniers Sdm-6C03-a and Sdm-6C07-a described earlier are very similar, with characteristic **V** marks between the arms of the simple cross. Both may come from the same workshop. Further examples of the minting of different types of cross deniers at a single mint are specimens categorised as types VI and VA.

A coin categorised as Sdm-6D1-a=CNP 867-868/839 (no. 3500, weight 0.872 g, diameter 12.2 mm) has an identical reverse to specimens categorised as Sdm-VA-A2-a (no. 2886, 0.932, 12.3 mm; Fig. 82: 3-4). Both coins have quite similar measurements, so in their case it can be assumed that they were minted at the same time, at the turn of the 11th and 12th centuries.



Fig. 81. Cross deniers from the Słuszków I hoard: Sdm-6C3-a (~CNP 853/864), Sdm-5C1-b (~CNP 655/864) (photo: A. Kędzierski)



Fig. 82. Cross deniers of types V, VA, VI with the same reverse die (photo: A. Kędzierski)

5.5c. Cross deniers of Type V with a beaded cross

The last type of cross deniers occurring in large numbers in the Słuszków I hoard are specimens with a representation of a cross in a beaded wreath, classified by M. Gumowski as Type V. In the assemblage, there are a total of only 1686 specimens and this group is clearly inferior in number to the specimens with a simple cross and a crosier on the obverse. In the second and third quarters of the 11th century it was this type of deniers that was dominant in hoards from Poland and Polabia.

In the Słuszków deposit, some of the more numerous varieties of cross deniers with a beaded cross on the obverse are specimens classified in subgroup Sdm-5F4 (~CNP 648). The average weight of 290 whole specimens of both varieties is 0.834 g, with a diameter of 12.6 mm. Their weights are, on average, slightly lower than coins from what is considered one of the latest - the Sdm-6D4-a=CNP 867-868 variety (1486 whole specimens, average weight 0.889, diameter 12.1 mm). Outside of Słuszków, they occur in hoards dated from the 1090s onwards. They are missing from assemblages hidden in the 1080s and at the turn of the 1080s and 1090s, e.g., Zbiersk or Sokołów, where individual Type VI Sdm-6C9 deniers (CNP 858), associated with Władysław Herman's minting already occurred. Instead, they appear in finds from the following decade, in Poland, but also in the Polabian assemblage from Gleina (Fig. 83).

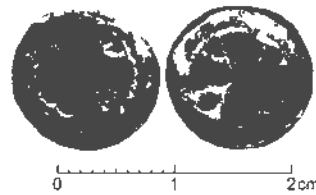


Fig. 83. Deniers Sdm-5F4 (~CNP 648) from Gleina near Halle (photo: Staatliche Museen zu Berlin archives)

Due to the large number of such deniers discovered in hoards from Poland, Witold Nakielski considers them to be products of the Poznań mint (Nakielski 2013, 58). As has been discussed earlier, specimens of cross deniers are known that on the obverse side have a design very similar to the Sdm-5F4 specimens (~CNP 648), while the reverse depicts a cross pattée crossed by a crosier (Fig. 78: 6). This is a characteristic motif of Saxon deniers, and therefore the origin of the Sdm-5F4 coins still remains an open question at present. On the other hand, specimens Sdm-5C10 (CNP 655/648) and similar specimens identified as Sdm-5C11 (similar to CNP 655/648, but the dot in the centre of the cross pattée is present on the reverse), by the image on the reverse, allude to the above varieties. At Słuszków, 124 whole specimens were included in the first subgroup (average weight 0.839 g, diameter 12.5 mm) and 54 whole coins in the second (average weight 0.826 g and diameter 12.3 mm). Such deniers appear in hoards from the 1090s (Fig. 84), including Jastrzębniki (Szczurek *et al.* 2017, no. 86/275, Kędzierski 2023), and Ogorzelczyn (Szczurek *et al.* 2017, no. 168/61).



Fig. 84. Cross deniers of the Sdm-5C10-a variety from Jastrzębniki (Szczurek *et al.* 2017, no. 86/275) and the Sdm-5C11-a variety from Ogorzelczyn (Szczurek *et al.* 2017, no. 168/61) (photo by A. Kędzierski)

In terms number of specimens, the third Type V variety in the hoard be classified as coins of the Sdm-5C12 (-CNP 657 and 664-5), of which there were 106 whole specimens (average weight 0.848 g, diameter 12.2 mm). They have metric characteristics very similar to the previously described subgroup Sdm-5F4 (-CNP 648). On their obverse is depicted a cross inside a ring composed of 12 beads and with four crosses between its arms. On the reverse is depicted a cross pattée with two crosiers and two crosses. Deniers of this variety are found in hoards from the turn of the 1080s and 1090s. In the later ones, specimens with a slightly narrower outer field are found (Fig. 85).



Fig. 85. cross deniers of the Sdm-5C12-a variety from the Zgłowiączka hoard (Gorlińska *et al.* 2015, no. 208/36), Sokołów (Bogucki *et al.* 2016, no. 228/94) and Ogorzelczyn (Szczurek *et al.* 2017, no. 168/76) (photo by A. Kędzierski).

Slightly less numerous in the composition of Słuszków I are deniers of the Sdm-5C15-a variety (-CNP 650/649), which bear the representation of a cross in a wreath of beads with two circles between its arms. It is represented by 64 whole specimens with an average weight of 0.824 g and a diameter of 12.3 mm. These are lower than the averaged weights and diameters of the Sdm-6D4-a cross deniers, considered here to be the latest cross deniers. Coins of the Sdm-5C15-a variety (-CNP 650/649) are encountered in hoards from the 1090s. It is probably one of the latest varieties of cross deniers, bearing a beaded cross on the obverse. Outside of Słuszków, it is known from a number of finds, including in an assemblage from Leźnica Mała (Gorlińska *et al.* 2015, no. 65/252). It is not known whether the above varieties of Type V cross deniers can be linked to Polish minting, but certainly the scale of their production was significantly inferior to the issues of Type VI and VII cross deniers in the late 11th and early 12th centuries.

The remaining latest varieties of Type V occurred in small groups, which may be due to the origin of these coins from small mint workshops, whose products are absent from other, smaller bullion assemblages of the time. Undoubtedly, the end of the 11th century is connected with a sharp decrease in the number of Type V deniers in the Polish finds, as shown in the following diagrams (Fig. 86). This may be related to the transfer of the mainstream production of cross deniers to Poland, where large-scale issues of Type VI deniers with a simple cross and Type VII with a crosier began.

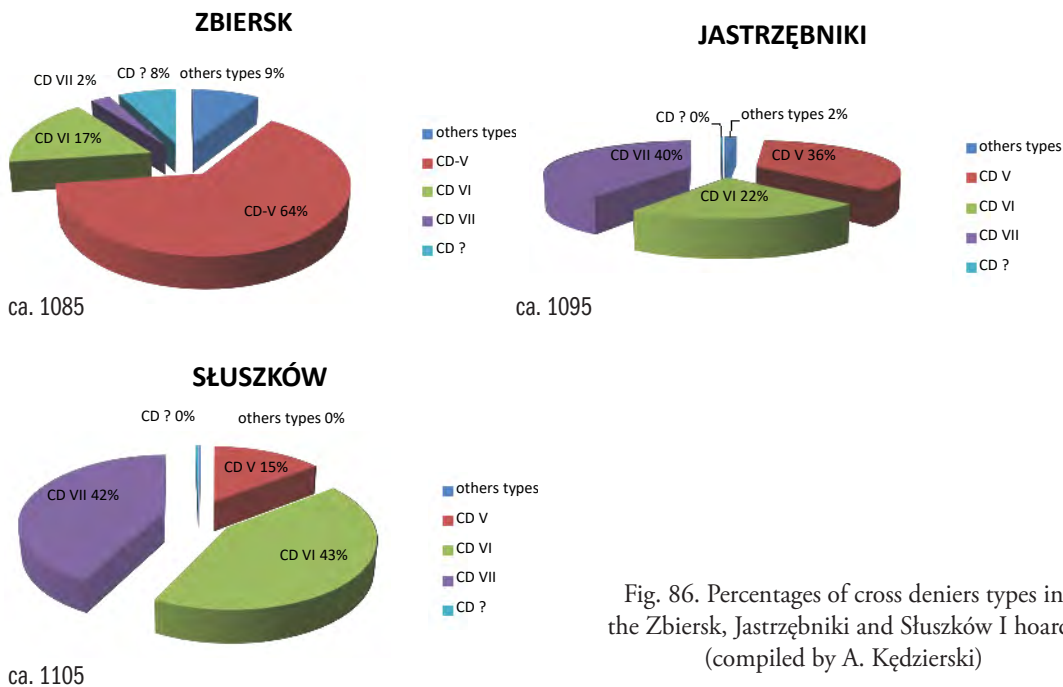


Fig. 86. Percentages of cross deniers types in the Zbiersk, Jastrzębniki and Słuszków I hoards (compiled by A. Kędziński)

The origin of the V-type deniers should be linked to the Saxon mints, but perhaps some of the varieties discussed above that are found in greater numbers in the Słuszków I assemblage, belong to a Polish mint? Proposals put forward by Christoph Kilger linking the production of Type V cross deniers to Meissen (Kilger 2000, 86-89) are, for the time being, uncertain, as workshops in Magdeburg and Halle are also included as possibilities.

5.5d. Other types of later varieties of cross deniers

The Słuszków I hoard also contains a small number of varieties of two further types of cross deniers produced at the turn of the 11th and 12th centuries: Type IV with the letter **S** on the reverse - five whole examples of which occur in the deposit, varieties CNP 518, CNP 523 and CNP 524 (average weight 0.934 g, diameter 13.9 mm) and Type VIII with a representation of a head *en face* - two whole pieces and two half coins (CNP 1010 and CNP 1012).

The origin of deniers with the letter **S** on the obverse is not linked to Polish minting and attempts to link them to the workshop in Gniezno have no support in the finds (Gumowski 1939, 134-141). Certainly such coins were minted in Saxony, as confirmed by the distribution of finds between the Elbe and Havel. Christoph Kilger's proposed workshop in Merseburg may be the site of their production (Kilger 2000, 81). While this place of manufacture of the later varieties of Type IV deniers can be agreed upon, their indicated chronology (first years of the 12th century) does not seem appropriate. The diameter and weight of the coins known from Słuszków (average weight of whole pieces 0.934 g, average diameter 13.9 mm), five whole pieces and one fragment (Fig. 87), are too great for material of the early 12th century. It seems likely that these coins were produced before 1090.



Fig. 87. Cross deniers of Type IV with the letter S from the Słuszków I hoard (photo: A. Kędzierski)

More complex is the question of the origin of cross deniers with the representation of a head on the obverse. The ones known from Słuszków bear a schematic depiction of one with the characteristic straggling hair, unlike the varieties discovered in Polabia and Saxony, such as at Gleina.

There, the finely rendered elements of the head are shown: the hair, moustache and beard. In addition, the reverse of the deniers shows a cross pattée crossed with a crosier (cf. Fig. 78: 1), which is probably to be linked to the workshop in Halle. Similarly, the find from Leest contains at least one coin with a head, quite different from the Wrocław deniers (Seyer 1997, table 42). On the other hand, the varieties of deniers CNP 1007-1013, four specimens of which were found in the Słuszków I assemblage, must be associated with a Polish mint and Wrocław (Fig. 88; cf. Suchodolski 1996; Kędzierski 2002; Nakielski 2012, 171-179). With regard to the distribution of finds of these coins, almost wholly restricted to Silesia and its neighbouring areas, it can be concluded that the westernmost find of a Wrocław cross denier with the head of CNP 1008 variant is a specimen discovered in Spandau, Berlin (Kiersnowski 1987). It seems, however, that this single discovery from outside Silesia and its environs does not call into question the Wrocław origin of cross deniers with a depiction of the head of St John the Baptist (CNP 1007-1013) - the patron saint of the local cathedral; Suchodolski 1996; Kędzierski 2002). On the other hand, it is a signal that, if rare Wrocław deniers are recorded in the Polabian region, the more numerous Type VII deniers with a crosier discovered there may also come from Polish mints.



Fig. 88. Cross pennies of Type VIII, variants CNP 1010 and CNP 1012 from the Słuszków I hoard (Szczurek *et al.* 2017, 238/12930, 12931) (photo: A. Kędzierski)

5.5e. Imitations and forged cross deniers. Production technique

In addition to the lead objects resembling cross deniers but not struck with a die mentioned earlier, coins are known that either imitated cross deniers of the late 11th and early 12th centuries or were forgeries of them. The former were made of good silver and probably supplemented the monetary mass of silver in circulation. In the Słuszków I hoard, single specimens of coins are encountered that appear to have been made of good quality silver, but differ in design from the commonly found deniers. Examples of this are coins of the Sdm-5G1-a variety (CNP obverse

none/864), on which the arms of the cross are made of dots, or specimens included in the Sdm-7pE1-a variety (~CNP 994), where, in turn, the lower part of the crosier and the crossbar are also made of dots, unlike on most Type VII cross deniers. Among the late varieties of cross deniers, one also encounters specimens made, it seems, of good silver, with a very carelessly-executed design. An example of this type of production is, among others, the coin with inv. no. 8021, probably struck in the third quarter of the 11th century. This denier, with its depiction of a crosier, is made carelessly and has no equivalent among other specimens of this type (Fig. 89: 1). Similarly, the Type VI coin of the Sdm-6C05-a variety (denier No. 29, somewhat similar to CNP 860) has a crude design. Both the arms of the simple cross on the obverse and the cross pattée on the reverse are crooked, uneven and very different from those placed on most specimens of Type VI coins (Fig. 89: 2).

Both coins, although looking very unusual, have a silver content not inferior to their contemporary counterparts of more orthodox type (Table 46).



Fig. 89. Imitations of cross deniers from the Słuszków I hoard (photo: A. Kędziński)

Table 46. Results of metallurgical analysis of cross deniers imitations

Inv. no.	Type/ variety	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
4352	VII/ none	66.64	0	0	0	0.1	0.08	1.39	0	0	0	0.13	0.11	0.17	0.11	30.42	0.84
10622	Sdm-6C6-a	59.44	0.53	0	0	0.04	0	0	0	0	0	0.12	0.08	0.11	0.23	37.9	1.55

In the late eleventh and early twelfth centuries, counterfeit deniers were in circulation (Sucholdski 1998; Bogucki 2008; Miśta-Jakubowska 2020, 106-124). The production of silver-coated copper or brass coins was carried out by two methods. The first - plating - involved covering a copper or brass nucleus with a silver sheet. Coins were struck from the material thus prepared (Hammer 2012, 323). Flans made in this way seem to be represented by two cross deniers preserved fragmentarily: one of Type VII from Stare Miasto in Kalisz (inv. no. 6/2006) (Fig. 90: 1) and one from the Słuszków I deposit (no. 12887) of Type V (Fig. 90: 2). It is possible that the process of joining the three layers: silver-copper-silver alloy was carried out incorrectly, which is why the discs began to delaminate.



Fig. 90. Delaminated cross deniers: from Stare Miasto in Kalisz (1) and from Słuszków I (2)
(photo: A. Kędzierski)

Perhaps the way the deniers were produced - coins with a high edge - was to hide the inner layer, not made of silver? The way in which they were produced has not been satisfactorily explained so far, despite research on the subject (Drożdż 2013; Nakielski 2014). Certainly, however, the high edges were formed after the coin was struck. This is evidenced by observed instances where the inside of the high edge shows partially destroyed legend inscriptions indicating that it was made after the coin was minted (Fig. 91: 1). Further evidence that the coin was struck prior to the formation of the edge can be seen in cases where an off-centre die strike is observed with the raised edge of the coin intact at the same time (Fig. 91: 2).



Fig. 91. Cross deniers: Type VI from the Jastrzębniki hoard with a visible inner side of the high edge, with partially damaged signs of the legend (1) and Type VII from Słuszków I with the reverse die shifted (2)
(photo: A. Kędzierski)

The different, very characteristic shape of the edge of the obverse of cross deniers (leaning outwards) and the reverse (leaning inwards) suggests that we are not dealing with a simple process of raising the edge of struck coin discs by hammering. Certainly, such a handmade edge-raising

process, carried out on struck flans, would have resulted in a random direction of orientation of the edge of the obverse and reverse. For example, it was possible to strike the coins on a strip of sheet metal and then to cut the discs with a special cutter, extruding the high edge. Such a two-step process would explain the consistency of the formation of the edges on the obverse and reverse. Furthermore, depending on the diameter of the punch, coins minted with identical dies would have obtained different diameters, which goes hand in hand with the different height of the raised edges. The height of the edge of Sieciech's deniers with cross pattée reaches an average of 1.4 mm, and that of the directly related deniers as high as 2.2 mm. There is certainly a correlation between decreasing coin diameter and increasing edge height, as can be seen, among other things, on the latest deniers with a representation of a crossier from the Słuszków I hoard, of which coins not exceeding 12 mm in diameter have edges as high as 3 mm. There is a need for experimental research into the process of producing high edges. This procedure must have been quite simple if such a large number of cross deniers were produced. The earliest issues of deniers, because of their high edge, differ significantly from their contemporaries, the Kraków deniers of Władysław Herman, provided only with a slightly raised edge (Fig. 92).



Fig. 92. High edges of Type VII cross deniers from the Jastrzębniki hoard and low edge of Władysław Herman's Kraków deniers from the Stare Miasto settlement in Kalisz (photo: A. Kędzierski)

The second way of counterfeiting silver coins is the so-called fire method. This involved coating a copper disc with an amalgam of silver or tin. When heated, the mercury evaporates at 357 degrees and leaves the silver as a thin outer layer on the copper (La Niece 1990). A coin forged in this way is probably the specimen from Słuszków I, no. 2200 (Fig. 93: 1), and the half of a Type VI denier from Stare Miasto in Kalisz, no. 19/2006 (Fig. 93: 2).



Fig. 93. Falsified cross deniers from Słuszków I (1) and Kalisz-Stare Miasto (2) (photo: A. Kędzierski)

The forged coins may have come from both official mints and small counterfeiting workshops. The extent of cross deniers counterfeiting is unknown. Arguably, some of them, including those from the Słuszków hoards, may have had their silver amount reduced. Due to the good post-depositional conditions, the coins from both assemblages, hidden in pots, did not degrade as much as the specimens discovered individually. Undoubtedly, in the material from the Słuszków hoards, we can expect to find specimens with a copper or brass core (copper-zinc alloy). This is indicated by the metallographic analyses of the surface of coins linked to Duke Zbigniew's minting, with cavities where a layer of non-precious metal is visible under the silver surface. A surface-tested coin (no. 9195) of Type VI of the Sdm-6C20 subgroup of varieties (CNP 813) showed 87.84% silver on the surface and 81.59% on its worn surface in the coin's field. Even more surprising results came from the analysis of the silver surface of another coin and the part with a pitting in the outer field by the raised edge (coin no. 9196). Here the differences were even greater at 96% and 48.16% silver respectively. In the case of this specimen, huge ranges in copper content were also evident: 1.6 and 45.5% and zinc: 0.26 and 4.42%³⁸ (Fig. 94).



Fig. 94. Coins no. 9195 and 9196 from the Słuszków I hoard with visible pitting corrosion on the surface (photo: A. Kędzierski)

³⁸ Surface studies by SEM/EDX were carried out by Dr Ewelina Miśta as part of the grant "The origin and circulation of silver in early mediaeval Poland using lead isotopic analyses" (NCN UMO - 2013/09/B/HS3/03289), carried out under the direction of Prof Władysław Duczko (cf. Miśta-Jakubowska 2020, 104-106).



Fig. 95. Copper and brass cross deniers from Kalisz-Stare Miasto (photo: A. Kędzierski)

Forged coins, coated with silver or tin, offered the possibility of making large profits. In addition to the large mints, smaller workshops may have been active in counterfeiting coins at the end of the 11th century in Kuyavia, among other places (Bogucki 2008). In Kalisz, counterfeit cross deniers, made of copper or a copper-zinc alloy, were used. Five counterfeit coins (Fig. 95) were discovered during archaeological investigations at the former trade and craft settlement.³⁹ Four of them depict a beaded cross on the obverse (KSM 8/2006, KSM 191/2010, KSM 2019/2014, KSM 216/2014), and one a simple cross (KSM 180/2014).⁴⁰ The latter is made of brass. Unlike the other cross deniers, these coins have no or a very low raised edge. Their dating is associated, most probably, with the second and third quarters of the 11th century, except for the specimen KSM 215/2014, which dates from the late 11th and early 12th centuries, when domestic cross deniers were already being produced. It is difficult to judge whether these coins had come from Polish or Saxon mints.

³⁹ Research at Stare Miasto has been conducted since 2001 under the direction of T. Baranowski, A. Kędzierski, D. Wyczółkowski and L. Ziąbka.

⁴⁰ The coin marked No. 1 (inv. no. 8/2006) - Type V, CNP 538-541 or 572-576, weight 0.932 g, diameter 14.7 mm; No. 2 (inv. no. 191/2010) - Type V, similar to CNP 597-606, weight 0.793 g, diameter 14.6 mm, struck on a disc without a high edge; No. 3 (inv. no. 219/2014) - Type V, similar to CNP 612-619, weight 0.502 g, diameter 14.2 mm; No. 4 (inv. no. 191/2010) - Type V, similar to Sdm-5B4 (?) (CNP 624), weight 0.229 g, diameter 10.4 mm; No. 5 (inv. no. 180/2014) - Type VI, similar to CNP 808 (?), weight 0.645 g, diameter 13.7 mm.

5.6 The origin and chronology of cross deniers in the light of metallographic studies

When investigating the origin and chronology of early mediaeval coins, one can also make use of analyses of the composition of the metal alloy from which they were made, comparing the different varieties and types. Of course, the randomness of the material examined and the non-destructive method of analysis give a very general, strongly biased, picture of the nature and quality of the bullion used, due to the heterogeneity of the metal alloy structure. However, despite all the disadvantages, such analyses give some idea of the material used for coinage. The research was carried out in “craters” in the surface of the objects, which made it possible to obtain more authoritative data than those obtained from the surface of coins subjected to leaching processes and, later, to chemical cleaning procedures associated with the conservation of antiquities.

Coins that are undoubtedly Polish, and from which it would be worth starting the consideration related to the type of bullion, are Sieciech's deniers with his name and mark. Seven such coins from Słuszków were analysed (Fig. 96 and 97, tab. 47).



Fig. 96. Large deniers of the count palatine Sieciech from the Słuszków I hoard subjected to metal analysis (photo: A. Kędzierski)

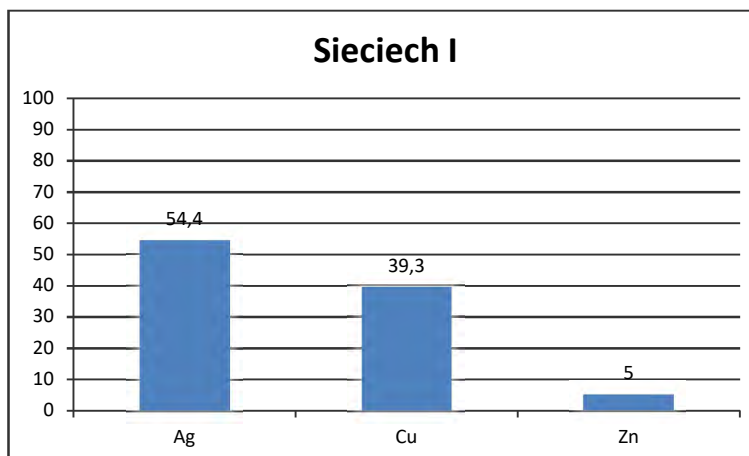


Fig. 97. Averaged percentage content of silver, copper and zinc of large Sieciech Type I deniers from the Słuszków I hoard (compiled by A. Kędziński)

Table 47. Results of metallurgical analysis of large deniers of Sieciech Type I and II.

Inv. no.	Type	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
12660	I/1	60.71	0	0	0.1	0.46	0	0	0	0	0	0	0	0.1	0	30.7	7.93
12661	I/1	70.65	0.15	0	0	0	0	0	0	0	0	0	0	0.2	0.28	25.32	3.39
12600	I/2	53.9	0	0	0	0.17	0	0	0	0	0	0.22	0.07	0	0	45.2	0.44
12601	I/3	58.71	0.3	0	0.05	0.18	0	0.41	0	0	0	0.07	0	0.16	0.37	32.87	6.88
12596	I/4	51.37	0.1	0	0.16	0.27	0	0.5	0	0	0	0	0.08	0	0	45.09	2.44
12595	I/5	51.84	0.32	0	0	0.07	0.15	0	0	0	0	0.1	0.18	0.36	0.56	40.04	6.38
12662	II/12	33.72	0.09	0	0	0.1	0	0.35	0	0	0	0	0.06	1.44	1.23	55.69	7.33

The data presented above all show that the large deniers of the count palatine Sieciech with the depiction of the cross pattée on the reverse have at least 50% silver content (from 51.37% to 70.65%), in contrast to the coin of count palatine Sieciech with the monogram - 33.72 Ag. All, with the exception of the Type I/2 coin, are characterised by an increased zinc content.

It is very interesting to compare the previously anonymous cross deniers of Sieciech, distinguished by the great similarity or the identity of the dies, to his large deniers (Figs 98 and 99, tab. 48).



Fig. 98. Sieciech cross deniers Sdm 6A6-b, Sdm-6C12 and Sdm-6C14 from the Słuszków I hoard subjected to metallographic analyses (photo: A. Kędzierski)

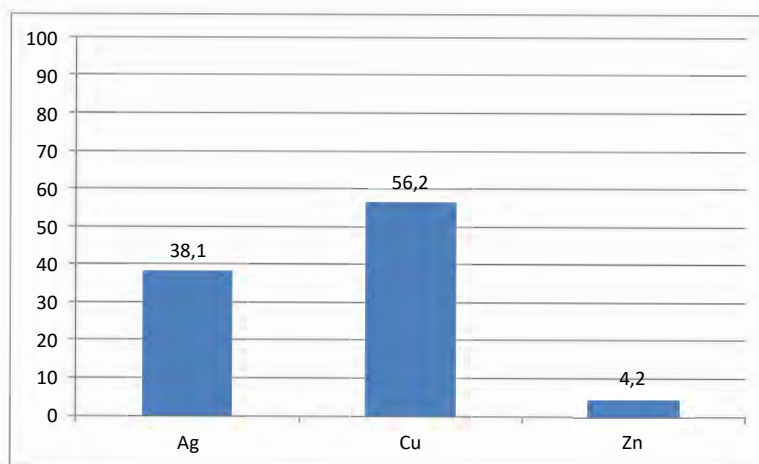


Fig. 99. Averaged silver, copper and zinc contents of deniers of subgroups of varieties: Sdm-6A6-b, Sdm-6C12 and Sdm-6C14 from the Słuszków I hoard (compiled by A. Kędzierski)

The above data show that the two studied deniers of the Sdm-6C12-a variety (CNP 848/858), with an identical reverse to the Sieciech Type I/2 coin, contain quite a lot of silver (51.9% on average) but decidedly little zinc (1.29%), as does cross denier No. 303 of the Sdm-6A6-b variety (CNP 836/1480). This corresponds to the quantities known from the analysis of specimen No. 12600 (count palatine Sieciech Type I/2 denier), but deviates from the results of the metallurgical study of specimens of the Sdm-6C12-b (CNP 848/858) and Sdm-6C14-a (CNP 858/1480) varieties, which have reverses identical or very similar to the large Type I palatine deniers. The research has shown that the coins of the two latter varieties have an inferior silver fineness and a higher zinc content, characteristic of the second element for the large Sieciech Type I/1 and I/3-5 deniers analysed (tab. 47 and 48).

Table 48. Results of metallographic tests on Sieciech cross deniers of the varieties: Sdm-6A6-b, Sdm-6C12 and Sdm-6C14-a

Inv. no.	Type/ variety	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
330	Sdm-6A-6-b	40.07	0.26	0	0	0.16	0	0.49	0	0	0	0	0.07	0,1	0	57.75	1.11
2582	Sdm-6C-12-a	46.76	0.54	0	0	0.14	0	0	0	0	0	0.07	0	0	0	51.31	1.15
3834	Sdm-6C-12-a	57.03	0.88	0	0	0.27	0	0.59	0	0	0	0.07	0.23	0.29	0	39.32	1.44
3730	Sdm-6C-12-b	17.68	0	0	0.13	0.18	0	0	0	0	0	0.1	0	0,12	0.46	76.8	4.53
10890	Sdm-6C-14-a	27.81	0	0	0	0.11	0	0.45	0	0	0	0.05	0.18	0.42	0.59	59.48	10.91
4398	Sdm-6C-14-a	39.33	0.48	0	0.09	0.26	0	0.11	0	0	0	0.07	0.13	0.27	0.54	52.56	6.15

Two Type VI cross deniers of the Sdm-6A5 subgroup of varieties (-CNP 848) were also designated for study. On the obverse between the arms of the simple cross are type '30-31' marks, and on the reverse is a broad arc with dots inside (tab. 49).

Table 49. Results of metallographic tests on cross deniers of varieties: Sdm-6A5-ab

Inv. no.	Type/ variety	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
4352	Sdm-6A-5-a	45.28	0	0	0	0	0	0.64	0	0	0	0	0.05	0.21	0.55	46.23	7.06
10622	Sdm-6A-5-b	42.37	0.38	0	0	0.35	0	0.83	0	0	0	0	0.16	0	0	45.53	10.37

The results obtained are quite similar for both coins. The proportion of silver ranges from 42.37 to 45.28%. The zinc content here is very high, in the range of 7.06 to 10.37%, similar to the small Sieciech deniers with a wide arc without dots (variety Sdm-6C14).

We also have metal analyses of deniers of the Sdm-6C9 variety (-CNP 858: Figs. 100 and 101, tab. 50), which were produced earlier than the coins of count palatine Sieciech and are discovered in deposits from the reign of Władysław Herman in Poland.



Fig. 100. Cross deniers subgroup of variants Sdm-6C9 subjected to metallurgical analysis (photo: A. Kędzierski)

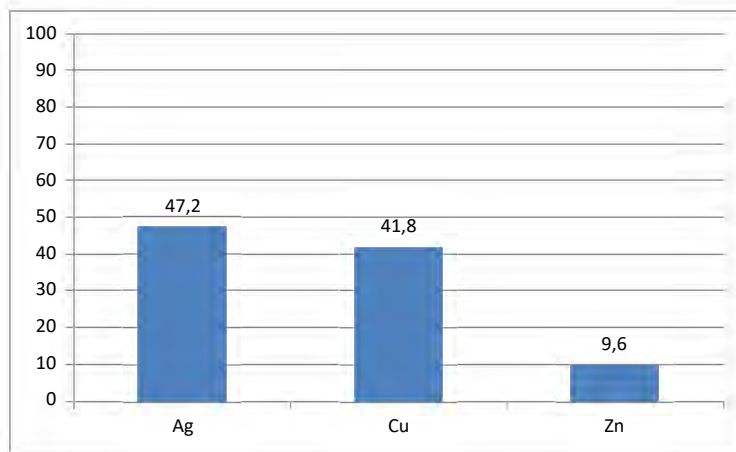


Fig. 101. Averaged content of silver, copper and zinc of cross deniers of the Sdm-6C9 variety from the Słuszków I hoard (compiled by A. Kędzierski)

Table 50. Results of metallographic analysis of cross deniers variants Sdm-6C9

Inv. no.	Type/variety odm	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
175	Sdm-6C9-d	49.2	0.47	0	0.07	0.24	0	0	0	0	0	0.08	0.12	0.47	0.22	41.38	7.75
56	Sdm-6C9-a	50.22	0	0	0	0.31	0	0	0	0	0	0.09	0	0.15	0	39.77	9.47
173	Sdm-6C9-a	42.39	0	0	0	0	0	0	0	0	0	0.06	0.08	0.61	0.85	44.38	11.64

The coins examined have a higher silver content (47.2% on average) than the cross deniers associated with the Sieciech mint (37.72% on average). The proportion of zinc in the metal alloy of these coins is high (9.62%) and corresponds to the content of this element in deniers with a very similar reverse to Type I/1 Sieciech deniers (subgroup of varieties Sdm-6C14- average zinc content 8.53%).

Among the artefacts analysed are also coins that have obverses similar to the Sdm-6C20 varieties (~CNP 813) and reverses similar to deniers from issues associated with Sieciech's mint, with a characteristic broad arc on the reverse (Fig. 102, Table 51).



Fig. 102. Cross deniers variant Sdm-6C18-a and Sdm-6C19 from the Słuszków I hoard
(photo: A. Kędzierski)

Table 51. Results of metallographic analysis of cross deniers variants Sdm-6C18-a and Sdm-6C19-a

Inv. no.	Type/refusal.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
09182	Sdm6C-18-a	43.84	0	0	0	0.15	0.09	0.19	0	0	0	0.11	0.17	0.24	0.43	45.98	8.8
00807	Sdm6C-19-a	30.98	0,15	0	0	0.09	0	0.83	0	0	0	0	0	0.27	0.23	61.19	6.26

The proportion of elements observed (average: Ag 37.41% and Zn 7.53%) resembles most closely the values characteristic of deniers similar in their reverses to Sieciech Type I/1 and I/3-5 deniers of Sdm-6C14 varieties (Ag 33.57%, Zn 8.53%).

While the varieties of Sdm-6C18-a and Sdm-6C18-b coins are few in the Słuszków I hoard, Sdm-6C20 deniers (~CNP 813; Figs 103 and 104, Table 52), related to them due to the high similarities of the obverse dies, constitute the largest set of homogeneous varieties in the entire hoard - 1,916 whole pieces. The metallographic study of these coins shows their considerable variation in silver content: from 34.8% to 68.78% - 46.7% on average, and a high proportion of zinc - 6.3% on average. Most of the data obtained show that the copper and zinc content exceeded the proportion of pure bullion in the alloy of deniers of the Sdm-6C20 varieties.



Fig. 103. Cross deniers subgroup Sdm-6C20 (CNP 813) from the Słuszków I hoard subjected to metallographic analysis (photo: A. Kędzierski)

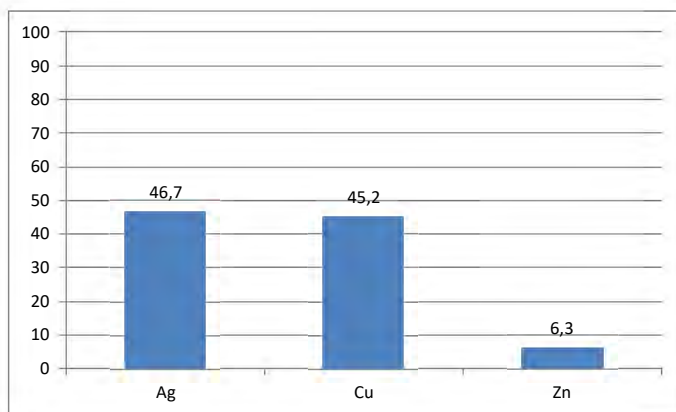


Fig. 104. Averaged percentage content of silver, copper and zinc in cross deniers variant Sdm-6C20 from the Słuszków I hoard (prepared by: A. Kędzierski)

Table 52. Results of metallographic analysis on cross deniers of the Sdm-6C20 variety group

Inv. no.	Type/odm	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
00745	Sdm-6C20-a	68.78	0.07	0	0	0.26	0	0	0	0	0	0.24	0.25	0.38	0.19	25.84	3.97
09181	Sdm-6C20-a	42.65	0.48	0	0	0	0	0.14	0	0	0	0.17	0.12	0.36	0.25	48.82	6.02
09261	Sdm-6C20-a	34.8	0	0	0	0.07	0.04	0.47	0	0	0	0.18	0.16	0.41	0.56	57.83	5.47
00785	Sdm-6C20-b	38.55	0.2	0	0	0.36	0	0.95	0	0	0	0	0	0.29	0.36	50.76	8.54
00937	Sdm-6C20-b	47.98	0	0	0.07	0.24	0	0.56	0	0	0	0	0	0.23	0.09	41.74	9.09
00156	Sdm-6C20-b	51.98	0.11	0	0	0.57	0	0.78	0	0	0	0.1	0	0.3	0.28	39.82	6.05
09264	Sdm-6C20-b	42.19	0.35	0	0	0.06	0	0.24	0	0	0	0.04	0.06	0.28	0.53	51.43	4.81

The next coins analysed, of the Sdm-6C21-b variety, due to their depictions, probably represent an intermediate link between the older coins included in the Sdm-6C9 and Sdm-6C20 varieties and the latest specimens in the hoard of the Sdm-6D4 variety (Fig. 105, Table 53).



Fig. 105. Sdm-6C21-b variety cross deniers from the Słuszków I hoard subjected to metallographic analyses (photo: A. Kędzierski)

Table 53. Results of metallographic analysis on cross deniers of the Sdm-6C21-b variety

Inv. no.	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
729	Sdm-6C21-b	46.1	0.12	0	0	0.29	0	1.46	0	0	0	0.1	0.19	0.56	0.58	44.34	6.26
820	Sdm-6C21-b	42.94	0	0	0	0.21	0	1.39	0	0	0	0	0	0	0	49.11	6.35

The percentages of silver, copper and zinc in the metal alloy are almost the same for both specimens of the studied variety and very similar to the percentages known from the analyses of the Sdm-6C20 coins (CNP 813).

The second largest assemblage of cross deniers attributed to a single variety in the hoard I from Słuszków are coins categorised as Sdm-6D4-a (-CNP 867-868; see Figures 106 and 107, Table 54).



Fig. 106. Cross deniers variant Sdm-6D4 from the Słuszków I hoard subjected to metallographic analysis (photo: A. Kędzierski)

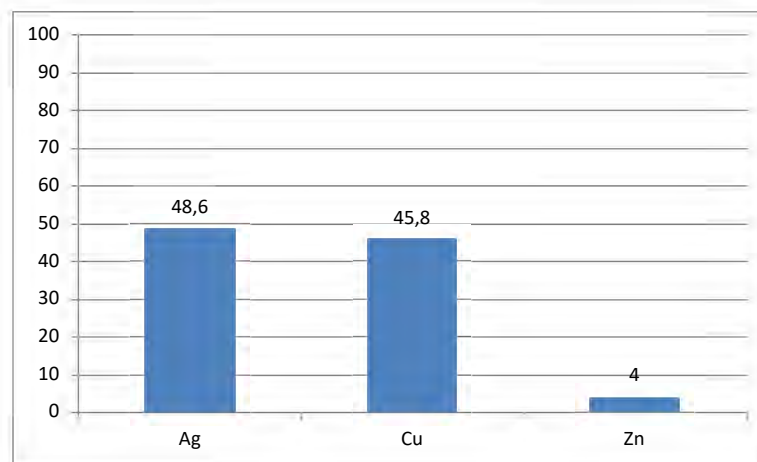


Fig. 107. Average content of silver, copper and zinc in cross deniers of the Sdm-6D4-a variety from the Słuszków I hoard (compiled by: A. Kędzierski)

Table 54. Cross deniers of the Sdm-6D4-a variety subjected to metallographic analysis

Inv. no.	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
12006	Sdm-6D4-a	75.78	0	0	0	0.08	0	2.27	0	0	0	0.05	0	0.06	0	20.39	1.36
12019	Sdm-6D4-a	46.3	0,25	0	0	0.12	0	0	0	0	0	0	0	0.15	0.44	47.53	5.21
12021	Sdm-6D4-a	32.64	0	0	0	0	0	0	0	0	1.03	0.16	0.29	0.95	0.37	63.07	1.49
12023	Sdm-6D4-a	40.25	0,12	0	0	0.03	0	0	0	0	0	0.05	0	0.16	0.6	54.54	4.24
12281	Sdm-6D4-a	48.28	0	0	0	0.17	0	0	0	0	0	0	0	0.17	43.52	7.87	

Among the examined artefacts, there are specimens with very different contents of silver, copper and zinc. Two specimens contain exceptionally low amounts of the latter element in their compositions, as in the case of Sieciech coins with a Type I/2 reverse.

Cross deniers of Type VI that should rather be linked to the Saxon minting, were also subjected to metallurgical studies (Figs. 108 and 109, Table 55). They date from the end of the third⁴¹ and the last quarter of the 11th century. They were probably struck in various workshops, including Naumburg (coins nos. 5574, 170 and 78).⁴²



Fig. 108. Cross deniers of Type VI from the Sluszków I hoard subjected to metallographic analysis (photo: A. Kędzierski)

⁴¹ Cross deniers recognised as older than 1080 are numbered according to CNP.

⁴² The only Polish cross denier from this group may be the specimen No. 166, categorised as variety Sdm-6A03-a (~CNP 843). A coin of this variety was found in a small hoard from Kalisz-Stare Miasto, accompanying the earliest issues of cross deniers with a representation of a crosier (Kędzierski 2016b). This assemblage probably constituted the contents of a purse, and can be dated to the turn of the 11th and 12th centuries.

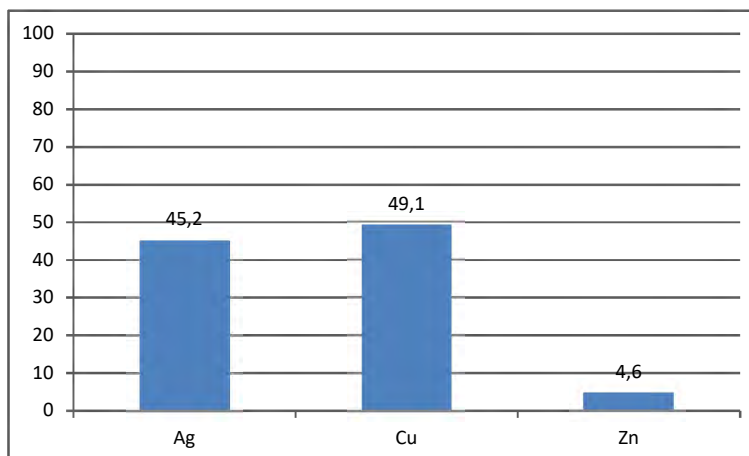


Fig. 109. Averaged silver, copper and zinc content of cross deniers variants: CNP 793-794, CNP 850/845, Sdm-6A3-a, Sdm-6B1-a, Sdm-6B2-b, CNP 836-840 and Sdm-6B06-b from the Słuszków I hoard (compiled by A. Kędzierski)

Table 55. Results of metallurgical analysis of cross deniers variants: CNP 793-794, CNP 850/845, Sdm-6A3-a, Sdm-6B1-a, Sdm-6B2-b, CNP 836-840 and Sdm-6B06-b

Inv. no.	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
2865	VI/CNP 793-794	55.39	0.34	0	0	0	0	0	0	0	0	0	0	0	0	43.43	0.84
164	VI/CNP 793-794	59.43	0.23	0	0.07	0.38	0	0	0	0	0	0	0	0	0	38.85	1.03
168	VI/850/845	48.45	0.27	0	0	0.05	0	0	0	0	0	0.09	0.05	0.19	0	46.59	4.32
166	VI/Sdm-6A-3-a	43.53	0.14	0	0	0.33	0	0.59	0	0	0	0.14	0.29	0.42	0.3	47.43	6.85
10841	VI/Sdm-6B-1-a	19.21	0.19	0	0	0.1	0	0	0	0	0	0.08	0.16	0.34	0.51	64.64	14.76
100	VI/Sdm-6B-2-b	32.06	0.25	0	0	0.18	0	0.45	0	0	0	0	0.08	0.12	0.17	66.08	0.61
5574	VI/836-840	47.36	0	0	0	0.04	0	0.11	0	0	0	0.1	0.15	0.2	0.2	50.38	1.44
170	Sdm-6B-06-b	51.04	0.15	0	0	0.38	0	0.15	0	0	0	0.06	0.17	0.2	0.17	39.8	7.86
78	Sdm-6B-06-b	50.37	0.36	0	0	0	0	0	0	0	0	0.16	0.14	0.16	0.08	44.84	3.9

The set of examined coins is characterised by a wide variation in silver content (from 19.21% to 45.3%, with an average of 45.2%).⁴³ The percentage of zinc, which is the most characteristic

⁴³ The coins, in addition to the latest deniers in this assemblage, were among the items found in the Gleina deposit near Halle.

and variable in the alloy composition of the cross deniers, averages 4.6% here, but large variations are observed, from 0.61 to as much as 14.76%. Cross deniers contemporary to them, and attributed to Polish mints, contained an average of 5.93% zinc and 44.35% silver in their alloy composition. These values are similar, although we see a slightly lower bullion quality of coins attributed to the Polish workshops.

The coin inventorised as no. 12071 (of the Sdm-6C11-a variety, CNP 853 and 867-868/861) is extremely interesting. Its obverse is somewhat reminiscent of that known from the Polish cross denier variety Sdm-6D4-a (CNP 867-868), while the reverse depicts a cross pattée with a cross and the letter V between its arms (Fig. 110, Tab. 56).



Fig. 110. Cross denier variant Sdm-6C11-a from the Słuszków I hoard subjected to metallographic analysis (photo: A. Kędzierski)

Table 56. Results of metallographic analysis of the cross deniers variety Sdm-6C11-a

Inv. no.	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
12071	Sdm-6C-11-a	44.97	0.12	0	0	0.07	0	0.16	0	0	0	0	0	0.31	0.94	52.85	0.57

The coinage of the Sdm-6C11-a variety has a similar proportion of silver to the Sdm-6D4-a deniers tested, but a significantly lower zinc content.

When presenting the results of metallurgical analyses, it is worth reviewing the composition of the raw material of the early 11th-century cross deniers that are linked to Saxony. Two such specimens from Słuszków were treated accordingly (Fig. 111, Table 57).



Fig. 111. Cross deniers of Type II and V from the beginning of the 11th century subjected to metallurgical analysis (photo: A. Kędzierski)

Table 57. Results of metallographic analysis on older cross deniers of types II and V

Inv. no.	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
2024	II/~CNP431-452	84.42	0.33	0	0	0	0	0	0	0	0	0	0	0.24	0	14.09	0.92
993	V/~CNP 538-541	72.79	0.45	0	0	0.07	0	0	0	0	0	0	0	0.12	0.22	25.64	0.7

The data presented here shows that the composition of the alloy used for the cross deniers is characterised by a high proportion of silver, ranging from 72.79 to 84.42% (average 78.6%). Apart from a noticeable proportion of copper, the other elements, including zinc, do not exceed 1%. It is certainly a much purer bullion than that used in the late 11th century for the later cross deniers issues.

It is interesting to observe the raw material used to produce one of the latest issues of deniers associated with Saxony. Among the coins from Słuszków I, a Type VIII coin was examined, CNP 1001 (Inv. no. 12535), a variety also known from the hoard from Gleina (Fig. 112, tab. 58).



Fig. 112. Cross deniers variant CNP 1001 subjected to metallurgical analysis (photo: A. Kędziński)

Table 58. Results of metallurgical analysis of cross deniers variants CNP 1001 sorted by amount to silver, copper, and zinc

Inv. no.	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
12535	VIII/CNP 1001	66,34	0,63	0	0,09	0,14	0	0,3	0	0	0	0	0,11	0,07	0,14	31,56	0,62

This Saxon cross denier, despite its late dating, retains good bullion quality (66.34% Ag) and only a trace amount of zinc in the alloy - 0.62%, unlike the alloy composition of cross deniers attributed to Polish workshops.

The composition of the alloys of Type V deniers from the third quarter of the 11th century is very interesting. These were very common varieties of cross deniers at the time, probably issued in Saxony (Fig. 113, Table 59).

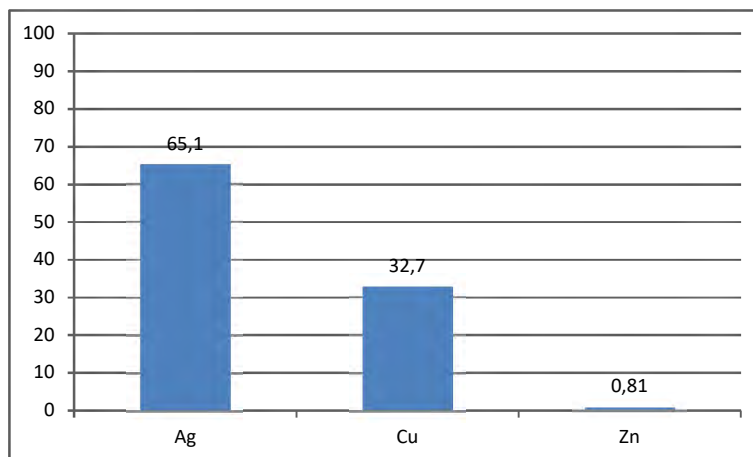


Fig. 113. Averaged percentage content of silver, copper and zinc in cross deniers variants CNP612-19, -CNP 627- 30, CNP 627, CNP657-8 from the Słuszków I hoard (compiled by. Kędzierski)

Table 59. Results of metallographic analysis of cross deniers of CNP612-19, -CNP 627-30, CNP 627, CNP657-8 varieties.

Inv. no.	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
12508	V/CNP 612-9	71.87	0.47	0	0	0.15	0	0.35	0	0	0	0	0.13	0.2	0.14	24.86	1.83
12347	V/CNP 627-30	39.18	0.1	0	0	0	0	0	0	0	0	0.15	0.2	0.15	0.17	59.32	0.74
12498	V/CNP 627	74.87	0.6	0	0.12	0.17	0	0.73	0	0	0	0	0	0.15	0.07	22.89	0.4
12505	V/CNP 657-8	74.39	0.55	0	0	0.18	0	0.19	0	0	0	0	0.17	0.1	0.24	23.91	0.27

Most deniers have a high silver content of 71.87 to 74.39%. The exception is the coin No. 12347, having only 39.18% of silver in the alloy. The proportion of zinc is low and does not exceed 1.83%.

The next analysed Type V deniers date from the late 11th century. (Figs. 133 and 134, Tab. 60). On the obverses, they feature an incomplete (type B) or full wreath of 12 beads (type C).

The deniers studied vary greatly in terms of metal alloy content, often even within a single variety. This applies to the proportion of silver, as can be seen from the results of the metal analysis of coins of the Sdm-5B8-a =CNP 624/672 varieties (inv. no. 188 weighing 0.88 g contains 64.6% silver, while coin number 240, weighing 0.905 g contains only 39.11% bullion), or Sdm-5C10-b=CNP 655/648 (coin no. inv. 12430 weighing 0.76 g contains 52.68% silver, while coin no. inv. 731 contains only 39.11% silver at 0.733 g). What is particularly surprising, however, is the very

different zinc content in the metal alloys of the cross deniers of the Sdm-5B8-a and Sdm-5C10-b varieties. Artefacts categorised as the former have 0.93 and 8.01% zinc, respectively, and those categorised as the latter have 1.99 and 10.08% Zn.



Fig. 114. Type V deniers of later emissions from the Słuszków I hoard subjected to metallurgical analysis (photo: A. Kędzierski)

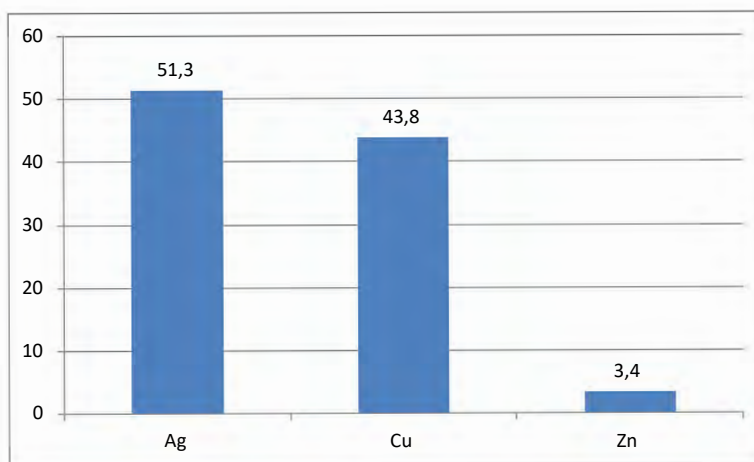


Fig. 115. Averaged percentage content of silver, copper and zinc in cross deniers variants: Sdm- 5B8-a, Sdm-5C6-a, Sdm-5C10-b, Sdm-5C11-a, Sdm-5C12-a and Sdm-5C15-a from the SłuszkówI hoard (prepared by: A. Kędzierski)

Table 60. Results of metallurgical analysis of cross deniers of CNP varieties Sdm-5B8-a, Sdm-5C6-a, Sdm-5C10-b, Sdm-5C11-a, Sdm-5C12a, and Sdm-5C15-a

Inv. no.	Type/variety	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
188	Sdm-5B8-a	64,6	0,16	0	0	0,17	0	0	0	0	0	0	0	0,12	0,3	33,72	0,93
240	Sdm-5B8-a	39,11	0	0	0	0,33	0	0	0	0	0	0	0	0,11	0,17	52,27	8,01
12454	Sdm-5C6-a	49,55	0,24	0	0	0,07	0	0	0	0	0	0,13	0,16	0,35	0,34	41,63	7,53
12430b	Sdm-5C10-b	52,68	0,49	0	0,04	0,11	0	0,93	0	0	0	0	0	0,14	0,25	43,36	1,99
731	Sdm-5C10-b	39,14	0,08	0	0	0,17	0	0,51	0	0	0	0,05	0,16	0,4	0,4	49,02	10,08
12306b	Sdm-5C11-a	38,21	0,31	0	0	0,2	0	0,98	0	0	0	0	0	0,14	0,1	59,43	0,64
12345b	Sdm-5C11-a	31,35	0,26	0	0	0,06	0	0,95	0	0	0	0	0,11	0,33	0,43	65,28	1,24
981	Sdm-5C12-a	79,66	0,3	0	0,24	0,24	0	0,2	0	0	0	0	0	0,21	0	18,79	0,36
12362b	Sdm-5C12-a	64,75	0	0	0	0,25	0	1,1	0	0	0	0	0	0	0	33,51	0,39
12390b	Sdm-5C15-a	54,16	0,29	0	0	0,22	0	0,38	0	0	0	0,11	0	0,17	0,14	41,45	3,07

Another group of Type V coin varieties for which we have data on the proportion of elements in the metal alloy are specimens with a Type D wreath (eight beads and two circles on the obverse, related through a high degree of die similarities to the Saxon deniers CNP 1001 Figs 112, 116 and 117, Table 61.



Fig. 116. Cross deniers variants Sdm-5F1 (CNP 646) and Sdm-5F4 (CNP 648) from the Słuszków I hoard subjected to metallurgical analysis (photo: A. Kędzierski)

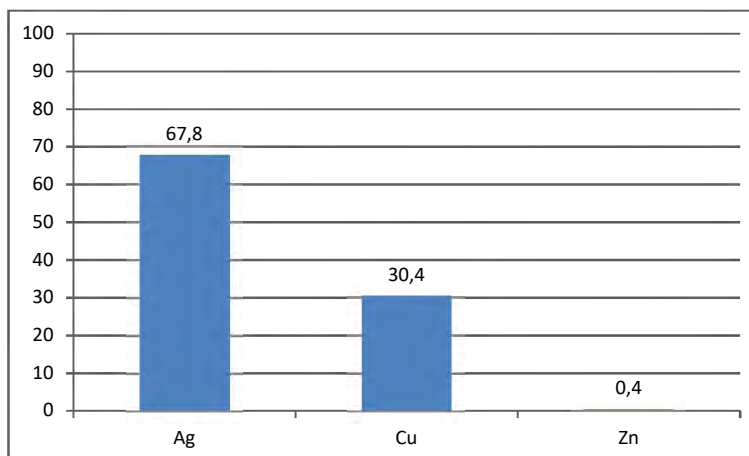


Fig. 117. Averaged percentage content of silver, copper and zinc in cross deniers Type V - Sdm- 6F1 and Sdm-6F4 from the Służków I hoard (prepared by: A. Kędzierski)

Table 61. Results of metallographic tests on cross deniers of the varieties Sdm-5F1 (CNP 646) and Sdm-5F4 (CNP 648).

Inv. no.	type variety	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
12507b	Sdm-5F4-a	77,26	0,59	0	0	0,2	0	1,04	0	0	0	0,09	0	0,12	0,09	21,05	0,15
12509b	Sdm-5F1-a	70,59	0,65	0	0	0	0	0	0	0	0	0	0	0,12	0,27	27,88	0,5
12378b	Sdm-5F4-a	68,69	0,13	0	0	0	0	0	0	0	0	0,17	0,07	0,15	0,24	29,76	0,79
12388b	Sdm-5F4-a	73,4	0,78	0	0,3	0,1	0	0	0	0	0	0	0	0,27	0,12	24,86	0,17
12446b	Sdm-5F4-a	66,15	0	0	0	0,1	0	0	0	0	0	0,11	0	0,09	0	33,19	0,37
12464b	Sdm-5F4-a	56,08	0,39	0	0	0	0	0	0	0	0	0,14	0,15	0,34	0,65	42,04	0,21
12468b	Sdm-5F4-a	60,37	0	0	0	0,06	0	1,63	0	0	0	0	0	0,11	0,36	36,81	0,67
12485	Sdm-5F4-a	69,88	0,09	0	0	0,19	0	1,25	0	0	0	0,09	0,1	0,11	0	28,01	0,28

While the Type V deniers with the representation of a cross in a wreath of beads of types B and C exhibited quite large differences in the bullion used, the examples bearing the image of a cross with eight dots and two circles (type D wreath) on the main side, have a rather homogeneous composition of the raw material: the silver content does not fall below the level of 56.08% and the zinc content reaches only 0.79%. These volumes are very similar to those that we know from the CNP 1001 specimen linked to the Saxon mint. It seems that these coins may have come from a common mint workshop, as confirmed by the combinations of dies (cf. Fig. 78: 6 and 10).

Among the Type V coins examined for quality and character of raw material, there was also one obol (Fig. 118, Table 62).

Fig. 118. Obol (halfpenny) CNP 684 from the Słuszków I hoard subjected to metallurgical analysis (photo: A. Kędzierski).



Table 62. Results of metallurgical analysis of obol variant CNP 684

Inv. no.	Type/variant	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
02192	V/CNP 684	24.82	0.14	0	0	0.07	0	0.17	0	0	0	0.06	0	0.05	0	73.13	1.55

In the composition of the obol alloy, the low proportion of silver (24.82%) and the high proportion of copper (73.13%) is very characteristic. Probably this quality of bullion was due to the unprofitability of the production of semi-denominational coins. The proportion of zinc is evident here (1.55%), but not in such quantities as in the metal alloys of some cross deniers, mainly Type VI.

In the Słuszków I hoard, apart from deniers of types V and VI, a sizeable portion consists of Type VII coins with a representation of a crosier on the obverse. Very interesting results were obtained from the study of specimens with the crosier facing to the right (Fig. 119, Tab. 63).



Fig. 119. Cross deniers variant Sdm-7pB3-a (CNP 990-991) from the Słuszków I hoard subjected to metallurgical analysis (photo: A. Kędzierski)

Table 63. Results of metallurgical analysis of cross deniers variant Sdm-7pB3-a (CNP 990-991)

Inv. no.	Type/variant.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
90	7pB3-a	43,97	0,12	0	0	0,13	0	0,31	0	0	0	0	0	0,26	0,58	46,98	7,65
157	7pB3-a	45,46	0,33	0	0,06	0,36	0	1,22	0	0	0	0	0,11	0,41	0,38	42,16	9,51

Both the silver content (44.7%) and especially the zinc content (8.5%) are reminiscent of Polish issues associated with Sieciech and Zbigniew, as well as some deniers of the Sdm-5B and Sdm-5C variety group.

The dominant group among the Type VII deniers in the Słuszków I assemblage are specimens showing the crozier facing to the left (Figs 120 and 121, Table 64).

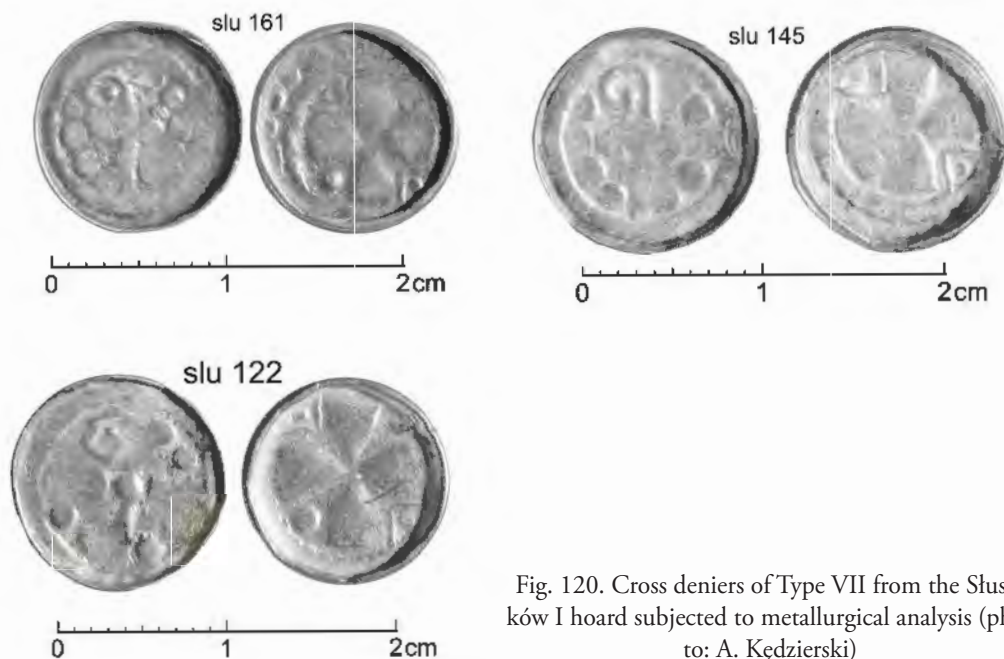


Fig. 120. Cross deniers of Type VII from the Słuszków I hoard subjected to metallurgical analysis (photo: A. Kędzierski)

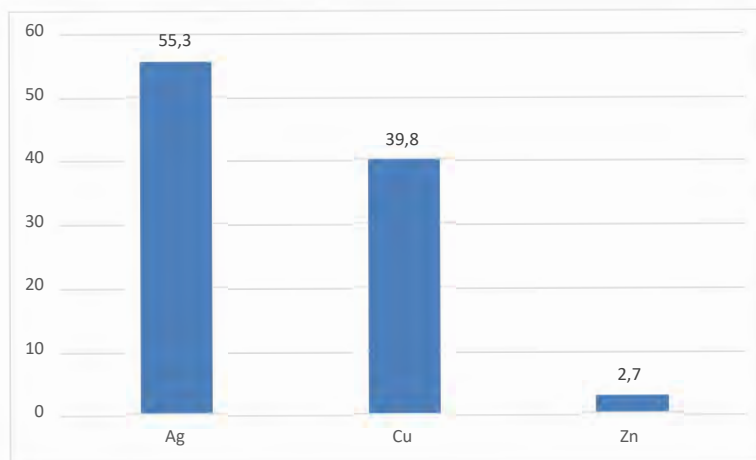


Fig. 121. Averaged percentage content of silver, copper and zinc in cross deniers Type VII with a left-facing crozier from the Słuszków I hoard (prepared by: A. Kędzierski)

Table 64. Results of metallurgical analysis of cross deniers from later issues of Type VII

Inv. no.	Type/variety	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
00118	VII/CNP 967	65,68	0,63	0	0,21	0,3	0	0	0	0	0	0	0	0,28	0	31,47	1,43
00138	VII/CNP 967	53,79	0,28	0	0,14	0,3	0	0,32	0	0	0	0	0	0	0	43,17	1,99
00129	Sdm-7A2-a	58,33	0,49	0	0,07	0,27	0	0,12	0	0	0	0,22	0,15	0,22	0,28	37,87	2
00134	Sdm-7A2-a	55,41	0,36	0	0	0,15	0	0,24	0	0	0	0	0	0	0	40,11	3,73
00093	Sdm-7A2-b	52,85	0,31	0	0,09	0,46	0	0	0	0	0	0,07	0,14	0,42	0,85	38,63	6,17
00153	Sdm-7B1-d	49,11	0	0	0,13	0,33	0	0	0	0	0	0,07	0,17	0,26	0	45,59	4,34
00144	Sdm-7B2-a	51,97	0,36	0	0,31	0,65	0	0	0	0	0	0,09	0,25	0,18	0,18	38,57	7,62
00143	Sdm-7B2-b	46,64	0,37	0	0,05	0,22	0	0,33	0	0	0	0,15	0,08	0,18	0,09	48,02	0,87
00159	Sdm-7B2-c	60,76	0,13	0	0,27	0	0	0	0	0	0	0	0	0,12	0,14	38,22	0,36
00150	Sdm-7B2-d	57,22	0,61	0	0,12	0,61	0	0	0	0	0	0,18	0,2	0,22	0,08	39,23	1,53
00127	Sdm-7B2-d	59,12	0,64	0	0,12	0,48	0	1	0	0	0	0,16	0	0,31	0,29	35,96	1,93
00152	Sdm-7B2-d	53,82	0	0	0	0,2	0	1,13	0	0	0	0	0,17	0,18	0,21	38,31	5,89
00161	Sdm-7B2-d	67,65	0,88	0	0,2	0,39	0	0,25	0	0	0	0,07	0,11	0,18	0,09	30,04	0,16
00145	Sdm-7B2-f	48,57	0,44	0	0,18	0,31	0	0,31	0	0	0	0	0	0	0	47,65	2,54
00158	Sdm-7B2-g	69,58	0,27	0	0	0,27	0	0,16	0	0	0	0,11	0,16	0,16	0	23,48	5,81
00122	Sdm-7B2-i	50,64	0,5	0	0,07	0,17	0	0	0	0	0	0,09	0,16	0,13	0	48,24	0
00147	Sdm-7B2-i	59,17	0,52	0	0	0,23	0	0,71	0	0	0	0,06	0,07	0,07	0	37,44	1,73
00125	Sdm-7C2-a	55,07	0,56	0	0,06	0,33	0	0	0	0	0	0,2	0,24	0,25	0,11	31,68	1,49
00160	Sdm-7C2-d	35,23	0,27	0	0,05	0,13	0	0,09	0	0	0	0	0,06	0,14	0,14	62,06	1,83

Among the specimens subjected to metallographic analysis, one can see above all a better coin bullion fineness (55,3%) than in the specimens with the crosier facing right (44.7% Ag). The proportion of zinc varies greatly, often specimens included in one variety exhibit completely different percentages of elements in the metal alloy. The denier with inv. no. 129 of the Sdm7A2-a variety, which is related by die combinations to the Saxon deniers CNP 1001 (cf. Fig. 78: 13), has a similar composition to the latter, although with a slightly poorer silver fineness and slightly higher zinc content. In the group of deniers depicted above with the image of the crosier to the left, we also see specimens with higher zinc content and a lower proportion of silver, such as coin no. 160 of the Sdm-7C2-d variety (CNP 986). Similar specimens occurred in the hoard from Kopacz (Nakielski 2012, 156, fig. 5G) and may have been produced in Silesia (Nakielski 2012, 154-155).

We also have data on the alloy type of the four Type VII deniers discovered in a cemetery in Dziekanowice (Table 65).⁴⁴

⁴⁴ The artefacts come from the research of Anna and Jacek Wrzesiński from the Museum of the First Piasts in Lednica, whom I thank for making the results of coin analysis available for my work. The research on the cross deniers from Dziekanowice was carried out in the Laboratory of IAE PAN.

The results obtained from the metallographic study of the artefacts from Dziekanowice do not allow for drawing more general conclusions. Deniers with the depiction of a right-facing crozier of the Sdm-7pB4-a variety (analysis no. 11545 and 11547) contain on average only 1.45% Zn and 36.66% Ag (similar coins from the Słuszków I hoard contain 8.5% and 44.7% respectively). It also appears that the two coins included in the Sdm-7B2-c variety (analysis no. 11546 and 11548) were made from raw material of different proportions. The proportion of silver in the first is only 25.16% and zinc as high as 9.81%. The second coin contains much more pure bullion - 40.63% and half as much Zn as the previous artefact - 4.61%. The coins discovered in the Dziekanowice necropolis have a fairly similar and high proportion of copper in the metal alloy, varying between 54.39% and 62.90%. No Type VII coin from Słuszków exhibited such a high content of this element (copper). Perhaps inferior quality coins were deliberately used as grave gifts in the Dziekanowice cemetery? It is also possible that post-depositional processes significantly changed the structure of the artefacts, which influenced the different results of metallographic analyses.

Table 65. Results of metallographic analysis of cross deniers from the cemetery in Dziekanowice.

No analysis	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
11545	Sdm-7pB4-a	36,79	0,24	0	00,09	0	0,35	0	0	0	0	0	0	0,12	0,08	60,10	2,23
11546	Sdm-7B2-c	25,16	0,16	0	0	0,16	0	0,18	0	0	0	0,16	0,24	0,49	0,74	62,90	9,81
11547	Sdm-7pB4-a	36,54	0	0	0	0,14	0	0,62	0	0	0	0	0	0	0	62,01	0,68
11548	Sdm-7B2-c	40,63	0	0	0	0,17	0	0	0	0	0	0,12	0	0,09	0	54,39	4,61

Apart from Type VIII cross deniers, which are rare in the Polish lands, Type IV deniers with the letter **S** on the obverse are also uncommon (Fig. 122, Tab. 66).



Fig. 122. Cross denier of the CNP 526 variety from the Słuszków I hoard subjected to metallographic analysis (photo: A. Kędzierski)

Table 66. Results of metallurgical analysis of cross denier Type IV variant CNP 526

Inv. no.	Type/difference.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
09064	IV/CPN 526	61.31	0.6	0	0.1	0.23	0	0	0	0	0	0	0	0	0	37.07	0.69

The content of silver, copper and zinc in the alloy of the cross denier of the variety CNP 526 is almost identical to that of the analysed specimen of the CNP 1001 variety. Both coins have good bullion quality with minimal admixture of zinc. They are most likely not the products of Polish mint workshops.

Among the deniers from the Słuszków I hoard subjected to metal analysis is also a specimen with a representation of a head on the obverse, linked to a Wrocław workshop operating at the turn of the 11th and 12th centuries. This is a denier of the CNP 1010 variety (Fig. 123, Tab. 67).



Fig. 123. Wrocław cross denier no. 12524 (CNP 1010) from the Słuszków I hoard subjected to metallurgical analysis (photo: A. Kędzierski)

Table 67. Results of metallographic analysis of the CNP 1010 variety cross denier.

Inv. no.	Type/variety.	Ag	Mg	Ace	Al	Si	S	Pb	Cl	Ca	Sn	Cr	Mn	Fe	Ni	Cu	Zn
12524	VIII/CNP 1010	41.23	0	0	0	0.09	0.07	0	0	0	0	0	0	0.11	0	51.12	7.38

The metal alloy of the CNP 1010 denier with the inventory number 12524 has a fineness of 413/1000, the proportion of zinc is high - 7.3%. Such proportions are known from metal analyses of deniers linked to Polish mints of the dukes Władysław and Zbigniew and count palatine Sieciech. The results of the analysis of the coin with the representation of the head indicate the Polish origin of the artefact.

5.7. Metallographic studies. Conclusions

The analysis of the results of metallographic studies of cross deniers from the Służków I hoard makes it possible to distinguish a large group of coins with an increased zinc content, at the expense of mainly silver. Some of these issues can be associated with Polish workshops, although many varieties of deniers are still difficult to assign to a specific centre at the current state of knowledge. The vast majority of the coins analysed came from the late 11th and early 12th centuries, a period of depletion of silver deposits in the Harz Mountains, but also the beginning of intensive silver and lead mining in Poland.

It is not known from which sources the raw material used in the production of the latest varieties of deniers came, but it can be said with certainty that the oldest issues from the first half of the 11th century were characterised by a much better silver alloy than specimens produced several decades later. In the later specimens, from the late 11th and early 12th centuries, an admixture of zinc is often found. Its proportion in the alloy of silver deniers varies greatly, from values of less than one percent, to as much as a dozen percent. Such a differentiation often occurs even in the case of coins of one variety. This may be related to the quality of the process of obtaining silver from silver-containing polymetallic lead-zinc ores (Chabrzyk, Młodecka 2013, 250). These are found in the border areas of Silesia and Lesser Poland (Rozmus 2014, 21). It is possible that in the case of coins with a high zinc content, copper and galman, zinc ore were added to the alloy. However, it is difficult to determine whether this metal got into the silver alloys used to produce the later issues of cross deniers by accident or whether it was added intentionally. If the latter option is accepted, then the need for the admixture of zinc to achieve better alloy malleability and a lower melting point may come into play. The melting point of pure silver is 962o C and that of an alloy of silver, copper and zinc is below 900o C (Chabrzyk, Młodecka 2013; Kędzierski, Wyczółkowski 2013). Zinc may also have been a component of the brass cores of coins (Suchodolski 1998; Miśta et al. 2015, 72), and may have migrated into the outer layers of the artefacts through post-depositional processes. Indirect evidence for the presence of a brass core can be seen in the metallographic analyses of cross deniers No. 9195 and 9196 of the Sdm-6C20 variety subgroup from the Służków I hoard (cf. Fig. 113). This may be related to the process of manufacturing cross deniers with a core made of a copper-zinc alloy, to which silver outer sheets were attached. The greater degree of ductility of the metal mass obtained by the presence of zinc may have allowed the high edge of the coins to be better formed (and, in relation to the silver-plated specimens, the multi-layered sheet to be more easily bonded). It is possible that the issuers of the latest varieties of cross deniers reduced the pure silver content by adding cheaper alloys as required. These may have included zinc, which, when combined with copper added to silver, better imitated pure silver.⁴⁵

⁴⁵ Metallographic studies of coinage artefacts from England and France have shown that zinc entered coins as an admixture of copper - in the form of brass. It is already present in some Roman coins,

We do not know the raw material sources of Polish coins from the late eleventh and early twelfth centuries, but many indications related to the discovery of silver smelting sites on the border of Lesser Poland and Silesia point to the use of domestic silver. It is not known whether this source was sufficient and whether Polish issuers also used other raw material. We also do not know whether domestic mint owners imported raw material (silver and brass) from Saxony. Among the late issues of cross deniers in the Służków I hoard are also Saxon issues, only partly recognised in material from the late 11th and early 12th centuries.

then in the ninth to tenth centuries in both England and France. This is evident from the study of coins from the hoards of Cuerdale in England (tpq 905) and Fécamp in Normandy (c. 980), Le Puis in France (early 11th century) - there the zinc content was up to 6%. The presence of zinc in the brass, which was added to the silver, is estimated to be around 10% in the Le Puis deposit, and up to 20% at Fécamp. The composition of Anglo-Saxon coins since the reform in 973 shows a reduction in zinc content. French coins show a decrease in zinc content in the 11th century, and the disappearance of such an admixture in the 12th century. Researchers find a dependence of the amount of zinc admixture on the amount of copper admixture, and also show a mutual correlation between the presence of zinc and copper. That is: the worse the silver fineness (and therefore the greater the admixture), the more zinc is present (Bompaire, Guerra 1997).

6. Mint of Cross Deniers in Kalisz

6.1a. Kalisz in early Middle Ages

The analysis of the combination of the dies of large deniers of Sieciech and cross deniers of Type VI with a simple cross on the obverse from the Słuszków I hoard, located near Kalisz, has made it possible to separate a group of several thousand coins which could have been struck in one minting workshop. The first Słuszków hoard is the only group from the turn of the 11th and 12th centuries from the area of the then Polish State, in which the number of Type VI cross deniers with the representation of a simple cross on the obverse exceeds the number of specimens with a crosier. This fact and coin finds from the Kalisz region, as well as the distribution of coins from the turn of the 11th and 12th centuries, may prove that it was in Kalisz that coins of Sieciech with his sign and name on the obverse and a cross pattée on the reverse were produced, as well as some varieties of Type VI cross deniers with a simple cross on the obverse. They were probably issued by the Polish ruler Władysław Herman, his count palatine Sieciech and Duke Zbigniew - Władysław's elder son.

During the reign of the Piast rulers, Kalisz was an important centre of coinage production in Greater Poland, alongside Gniezno and Poznań. At the end of the 12th century, during the reign of Mieszko III the Old, bracteates with Hebrew inscriptions mentioning the name of the city were produced there (Gorlińska 2015). On the other hand, deniers with the inscription MONETA CALIS, minted in Kalisz on behalf of King Kazimierz the Great, are known from the mid-14th century (Paszkievicz 2010). However, the first minting workshop probably operated here as early as the end of the 11th century during the reign of Duke Władysław Herman (Kędzierski 2010).⁴⁶ This is evidenced by an analysis of the dies of count palatine Sieciech's coins and related elements of the varieties of Type VI cross deniers known from the Słuszków hoard, as well as the currently-known distribution of this type of coin in finds from Poland.

Kalisz is located in the Prosna River valley, on the Kalisz Uplands, in south-eastern Greater Poland. From tribal times through the period of Piast rule, it was an important administrative and commercial point in the Polish lands. At the crossing of the river where Kalisz is situated, there was an intersection of several important trade arteries that connected important early medieval centres. One led from the east, from Kyiv via Sandomierz, and there was also a route from the south-east from Hungary via Kraków to Poznań and on to Magdeburg and Halle. Another led

⁴⁶ In the light of the discovery there of the two large hoards discussed in this work, the possibility should be considered that Słuszków was a second likely site for the issuing of large deniers of Sieciech, as well as associated Type VI cross deniers. However, the results of surface excavations carried out in the 1980s and in 2020, as well as the 2021 excavations, do not support the suggestion that a mint could have operated at Słuszków.

from Bohemia and Moravia via Opole and further Łąd and Gniezno to Kołobrzeg, and also via Konin and Kruszwica to Gdańsk (Wąsowiczówna 1960, cf. Fig. 3). In the early mediaeval period, the Kalisz centre had already been developing over a longer period of time from the pre-state period. In the territory of contemporary Kalisz there were two fortified settlements that had probably been developing since the 9th century: in the present city districts of Kalisz-Zawodzie and Kalisz-Ogrody. In time, the first of these sites became a place where the administrative, political-military and economic power of early mediaeval Kalisz was concentrated. A wooden church, probably the oldest in southern Greater Poland, was built on the site of the stronghold at the turn of the 10th and 11th centuries. In its place, perhaps already at the end of the 11th century, a stone church was built (Rodzińska-Choraży, Węclawowicz 1998: 73). Next to the stronghold, a craft and market settlement developed, called Stare Miasto [Old Town] from the 13th century. It was one of the largest in Poland at the time, and in it the remains of a number of specialised craftsmen's workshops have been discovered, associated among other things with the production of glass jewellery (Kędziński, Wyczółkowski 2016, Wyczółkowski 2023). In the 12th century, the settlement cluster in Kalisz included a stronghold at Zawodzie, an adjacent settlement with the church of St. Adalbert, the Stare Miasto settlement with the church of the Blessed Virgin Mary, located at the Prosna River crossing, a settlement with the church of St. Gotard, a settlement at Wydarte Street and a settlement at the Premonstratensian monastery of St. Lawrence in Kościelna Wieś, as well as settlements in Rajsaków and Dobrzec. (Fig. 124).

Kalisz was also the seat of a castellan district. Although this is only attested in the written sources in 1136, it was certainly one of the oldest, chronologically linked to the reign of Bolesław I the Brave (992 to 1025). It may even have been the capital of a province, which might have included several castellanies in southern Greater Poland (Nalepa 1968, 296; Wędzki 1977, 45), probably originally incorporating the lands of Kalisz, Sieradz and Łęczyca. During the period of feudal fragmentation in the 12th and first half of the 13th centuries, Kalisz was the capital of a duchy (Baranowski 2023, 86-87). The Kalisz region was probably not destroyed during the invasion of duke Bretislav I of Bohemia in 1038 and the so-called Folk Uprising, unlike Gniezno and Poznań. Hence, in the second half of the 11th century, the settlement cluster in Kalisz, with a stronghold in the present-day Zawodzie and the Stare Miasto settlement, became a strategic centre of power for the Piast rulers in Greater Poland and an important centre of craft production and trade. There is a hypothesis that it was from Kalisz that Kazimierz the Restorer (1034-1058), returning from exile in Germany around 1040, with the support of the Emperor Henry III, began his campaign to regain his fatherland (Łowmiański 1985, 82). During the reign of Bolesław II the Bold (1058-1079), the Ruthenian prince Izyaslav probably stayed at the Kalisz stronghold, as may be evidenced by his lead bulla discovered here (Fig. 125) and other artefacts of Ruthenian origin discovered in Kalisz.

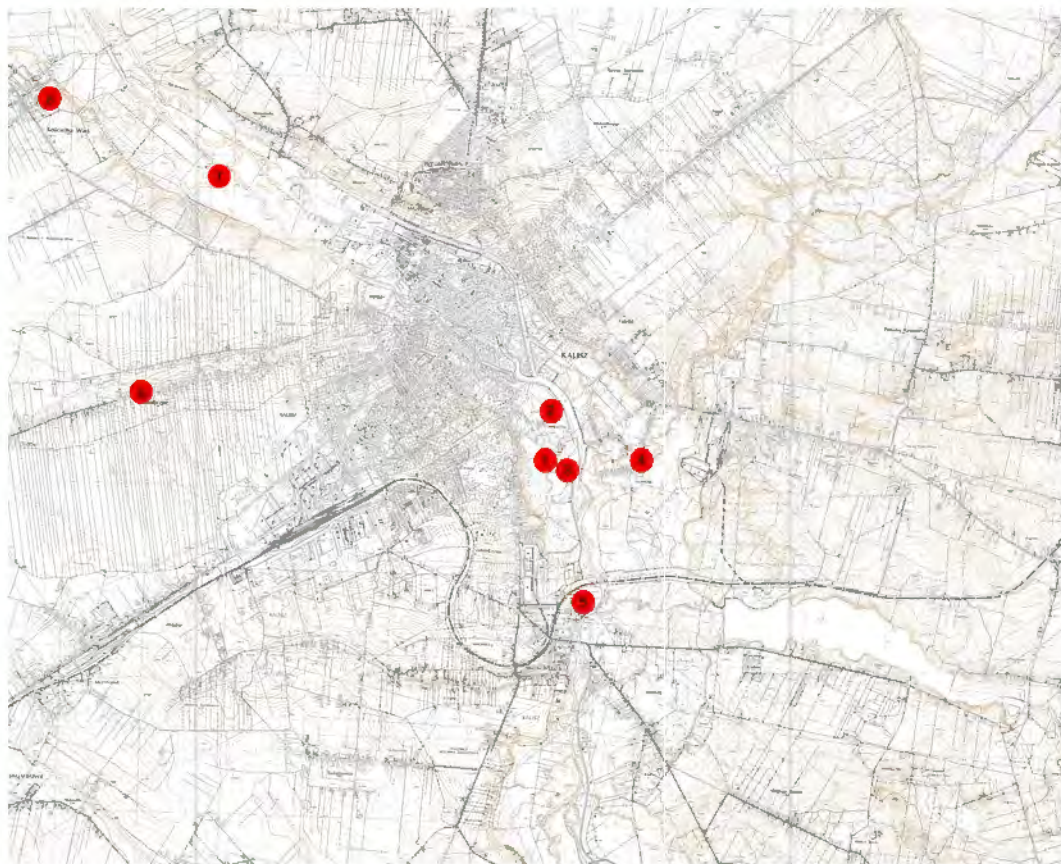


Fig. 124. Kalisz settlement cluster in the 12th century compiled by A. Kędzierski

1-Zawodzie stronghold

2-Stare Miasto settlement

3-Zawodzie-settlement

4-Rajsków settlement

5-Piwonice settlement

6-Dobrzec settlement

7-Ogrody stronghold

8-Kościelna Wieś settlement



Fig. 125: Lead bulla of Izyaslav. Photo by A. Kędzierski

The important role of Kalisz in the second half of the 11th century is also evidenced by the finds of coins of Bolesław the Bold. Seven deniers of this ruler come from Kalisz Stare Miasto, which represents more than half of all known specimens of Bolesław's coins from the territory of Greater Poland (Fig. 126). In the written sources, Kalisz appeared in 1106 on the occasion of the war between Duke Zbigniew and his half-brother Bolesław the Wrymouth. At that time, the Kalisz stronghold at Zawodzie was captured by the army of the second duke (Gallus Anonymus, book 2, ch. 38, p. 108-109). On hearing this, the Chronicler says, the stronghold in Gniezno surrendered (Gallus Anonymus, book 2, ch. 37-38, p. 115-117) and Bolesław took over Greater Poland. The loss of the Kalisz stronghold was so severe that it determined the outcome of the war between the brothers. This demonstrates the pre-eminent role of Kalisz in the state of Duke Zbigniew. For this reason, it seems reasonable to suggest that this centre would have been a good place to have set up a mint for the issue of coins at the end of the 11th century.

An important confirmation of the hypothesis of the functioning of a mint in Kalisz is provided by an analysis of the composition of the coins from the Służków hoards and finds from Stare Miasto in Kalisz, as well as the distribution of finds of later varieties of Type VI cross deniers and the large deniers of count palatine Sieciech with a cross pattée on the reverse.



Fig. 126. Deniers of Bolesław the Bold from the Kalisz Stare Miasto settlement

6.1b. Large and small deniers of Sieciech

In addressing the question of the origin of later types of cross deniers, it is important to consider the time and place of production of both Sieciech's large deniers with his mark and the cross deniers associated with them through the identity or similarity of the dies (Kędzierski 1998).

Research into the chronology of Sieciech's large deniers with his name and sign on the obverse was carried out by Stanisław Suchodolski (1987, 38-41), who took the period 1090-1098 as the time of the production of two types of his large deniers with a cross pattée (Type I) and a so-called monogram (Type II) on the reverse. This is evidenced by the dating of the hoards that included

the coins of the Palatine. They were associated more with the last years of the 11th century than with the 1080s, when Sieciech was probably beginning his career at the side of Duke Władysław Herman. Marian Gumowski dated these issues more precisely to the years 1096-1098 (Gumowski 1924, 211-219). One may wonder whether there were any political factors during Sieciech's tenure as count palatine that favoured him issuing his own coins. One may think that the most appropriate period may have been the years 1093-1097, when his position in the state was strong enough for him to imprison Zbigniew, the first-born son of Władysław Herman, in his own stronghold. Later, Sieciech's role changed dramatically. He was deprived of his influence and privileges, and the hostile sons of Duke Herman were given their own districts. The issue of coinage by Sieciech after this therefore seems doubtful. The dating of the coins of count palatine Sieciech before 1090, on the other hand, is unlikely due to the absence of his distinctive issues in hoards that can be dated to c. 1090 and earlier (cf. Appendix 2, Table II).

The study of written sources and the distribution pattern of count palatine Sieciech's coins led S. Suchodolski to put forward the hypothesis that the workshop producing his Type II deniers with a monogram was located in or near Kraków, while that striking the Type I coins with a cross pattée on the reverse would be found on the territory of his estate in Sieciechów in Mazovia (Suchodolski 1987, 32-39). Due to the distribution of their finds in Lesser Poland, the suggested origin of Sieciech's monogrammed deniers in that region is not in doubt, but the suggestion that the other group of coins were produced in Mazovia is not supported by the distribution pattern of the coins themselves. The findspots of the newly-recognised previously anonymous cross deniers, linked by identity or high similarity of dies to coins of count palatine Sieciech, are not concentrated in Mazovia. The most important discovery of all known varieties of Sieciech Type I deniers with a cross pattée on the reverse is in the deposit of Służków I in the historical region of Greater Poland. There are also three more known finds of them. The first is an assemblage from the village of Rzeczek Wólka in Mazovia, in which at least one specimen of a large Sieciech Type I/1 denier was discovered (Stronczyński 1884, 40). Another large Sieciech denier of Type I/5 occurred in a deposit from Bonin in Pomerania (Horoszko *et al.* 2016, no. 12/4263). The newest finds of large Sieciech deniers have come from the second assemblage from Służków, where a further four Type I coins were discovered (Fig. 127:1). The currently-known finds of large Sieciech deniers with a cross pattée on the reverse are definitely concentrated in the Greater Poland region, more specifically at Służków, near Kalisz. The distribution of documented finds of Type VI cross deniers with the characteristic broad arch on the reverse, associated with Sieciech's minting through analysis and similarity of dies, is concentrated in three parts of the country. The first includes finds from central Poland: Leźnica Mała near Łęczycza (Fig. 131: 3-4; Mikołajczyk 1981), Wodzierady⁴⁷ near Łask (Fig. 139; Mitkowska-Szu-

⁴⁷ The coin from the hoard at Wodzierady, due to the depictions on the obverse, may also belong to the earliest issues of Duke Zbigniew, who probably took over the mint in Kalisz (?) after count palatine Sieciech.

bert 1996) and Masłowice near Wieluń (Fig. 128: 1; Gorlińska *et al.* 2015, no. 83/1). The second group is related to the Greater Poland area, mainly in its south-eastern part: Służków, Ogorzelczyn (Fig. 131: 1-2; Tabaka 2001), Żerniki (?),⁴⁸ Kalisz-Stare Miasto (Fig. 128: 3-4),⁴⁹ Giecz (Syty 2015, nr 277) as well as Santok, reaching furthest into the north-west (Fig. 128: 5).⁵⁰ The last area with finds of Sieciech cross deniers is related to Silesia. These include the hoard from Drożyna near Polkowice (Butent-Stefaniak *et al.* 2013, no. 13/8),⁵¹ an assemblage originating, most probably, from Głogów (Butent-Stefaniak *et al.* 2013, 434/107, a hoard marked as “Silesia XII”)⁵² and an isolated find from Opole (Haisig 1958; Butent-Stefaniak *et al.* 2013, no. 52/2; see Fig. 128: 2). To the above-



Fig. 127. Large and small deniers of Sieciech from the Służków II hoard (photo: A. Kędziński)

mentioned finds, we should also add coins from the hoard in the village of Rzeczek Wólki in Mazovia - specimens from section I, type E according to W. Kostrzębski (1905; cf. Fig. 131). Sieciech cross deniers with a broad arch, however, have not been recorded in some other chronologically similar

48 A small hoard of cross deniers, consisting of late varieties of these, is thought to have come from the village of Żerniki, located 20 km north of Kalisz. The assemblage included deniers of the Sdm-6C18 group (CNP 813/1480), as well as Sdm-6C20 coins (~CNP 813). The deposit remains in private hands.

49 Archaeological investigations in the Stare Miasto at Kalisz yielded two specimens of cross deniers similar to the Sdm-6C14 (CNP 858/1480) and Sdm-6C18 (CNP 813/1480) varieties.

50 A cross denier of the variety Sdm-6C14-c (CNP 858/1480) was discovered in the Santok stronghold. I would like to thank Mr Paweł Kaźmierczak of the Lubuskie Museum in Gorzów Wielkopolski for this information.

51 A hoard with cross deniers, including a specimen of the Sdm-6C12-a variety (the reverse of the denier identical to the reverse of a large Sieciech denier of Type I/2), was discovered in 1847 in Drożyno (German: *Druse*), Polkowice district. No coin survived from the deposit, but only a photograph of 17 specimens, including deniers of Type VIII with the image of the head CNP 1008-1009 (seven examples) and CNP 1010 (one example), as well as the described coin with the reverse identical to coins of Sieciech Type I/2.

52 The hoard in question was illegally discovered in Silesia (probably in Głogów) and, instead of being reported to the authorities as Polish law requires, was sold on the Allegro auction website from November 2004 to February 2005. The coins on sale belonged mostly to the issue of Bolesław the Wrymouth, but it also included the latest varieties of cross deniers, including pieces with reverses similar to the design of the reverses of the coins of count palatine Sieciech.

hoards from the above-mentioned areas, such as the hoard from Parzęczew near Zgierz (Gorlińska *et al.* 2015, no. 106), Kopacz near Złotoryja (Nakielski 2012), or from Jastrzębniki near Kalisz (Kędzierski 2023).

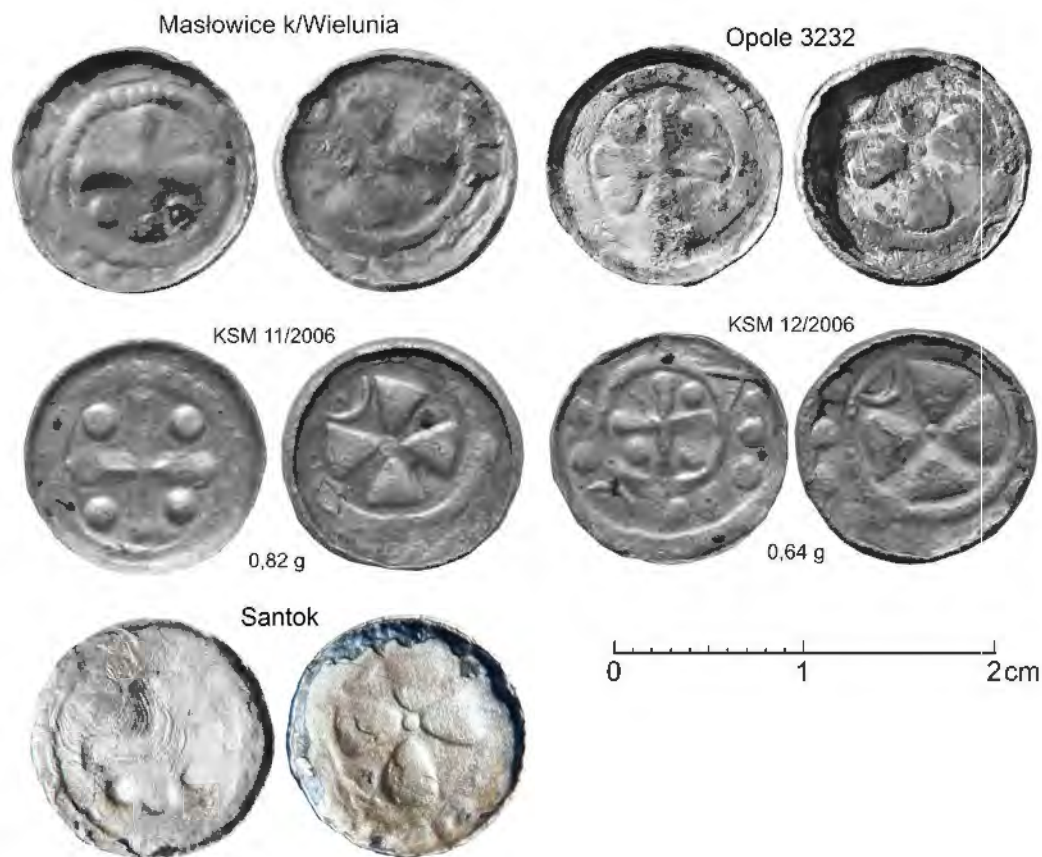


Fig. 128. Cross deniers with reverses similar to the reverses of deniers of Sieciech Type I/1 from Masłowice (1) (photo: A. Kędzierski), Opole-Ostrówek (2) (photo: A. Niedźwiecki) and Kalisz – Stare Miasto (3-4) (photo: A. Kędzierski), Santok (5) (photo: P. Kaźmierczak)

Information may be obtained by the analysis of the distribution of finds of Sdm-6C12 cross deniers (~CNP 858/848) related through the identity of the dies of the reverses to the large Sieciech Type I/2 deniers and coins included in the other groups of the Palatine's coins discussed above, which on their reverses have a wide arch between the arms of a cross pattée (varieties Sdm-6C14-Sdm-6C18=CNP 858, CNP 813 and CNP 860/1480-3). It is evident that Kalisz lies in the focal point of the recorded discoveries of Sieciech's coins, hence Sieciech may have minted his coins there. It seems that due to his function as count palatine and his strong influence on the

reigning duke Władysław Herman in Poland during the second half of his reign, Sieciech could have minted coins not only in his own estates, e.g., in Sieciechów, but most probably in any other stronghold, all the more so as he probably administered the ducal mints at that time (Fig. 129).

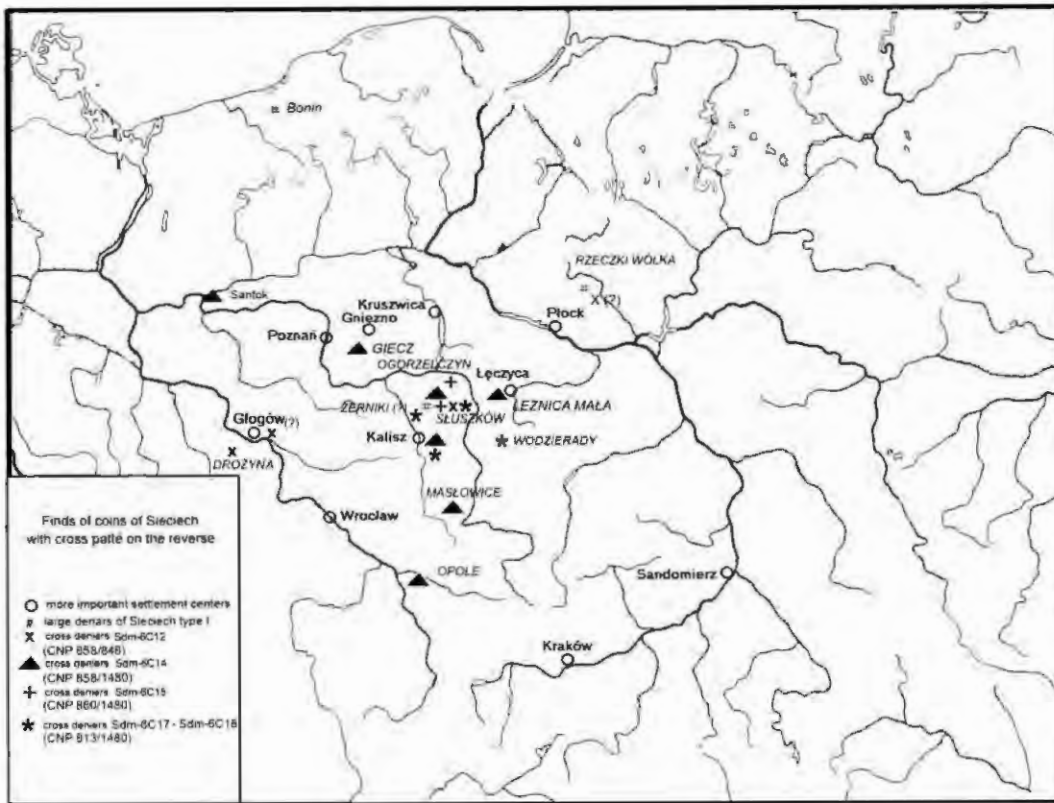


Fig. 129. Finds of coins of Sieciech with cross pattée on the reverse (photo: A. Kędzierski)

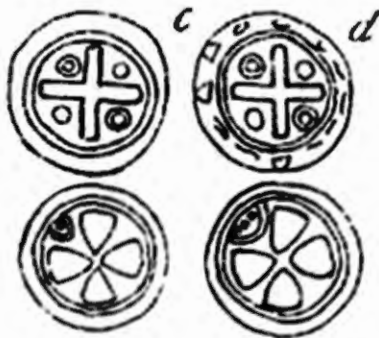


Fig. 130. Small deniers of Sieciech from the Rzeczeki Wólki hoard, group I type E according to W. Kostrzębski (1901, 305-306)

It is worth looking at other assemblages containing Type VI small cross deniers of the count palatine Sieciech. Such deposits include the hoard from Ogorzelczyn, Turek district (Fig. 131:1-2), where there were two specimens of the Sdm-6C15-a variety (CNP 860/1480) with a wide arch between the arms of the cross pattée on the reverse (Tabaka 2001, nos. 116 and 117; Szczurek *et al.* 2017, nos. 168/116-117). Also the assemblage from Leźnica Mała, Łęczyca district, contains coins with a broad arch on the reverse of the subgroup of varieties Sdm-6C14, associated with Sieciech's minting (Fig. 131: 3-4). The latter assemblage has the cross deniers of the Sdm-6C20 subgroup of varieties already mentioned and therefore appears to be slightly later than the Ogorzelczyn assemblage. Unfortunately, neither hoard contains well-dated foreign coins close chronologically to the time of the deposition, allowing more precise determination of the time of deposition of the hoard.



Fig. 131. Deniers with the „wide arch” on the reverse from the Ogorzelczyn hoard (1-2) (photo: A. Kędzierski) and Leźnica Mała hoard (3-4) (photo P. Chabrzyk)

6.1c. Cross deniers - type Sdm-6C9 (CNP 858)

Cross deniers of Sieciech appear in finds around the middle of the last decade of the 11th century. On which coins might they have been modelled? Their reverses are undoubtedly very distinctive - they depict a cross pattée with a dot in the centre and with a broad arch between its arms, with or without dots inside it. The straight cross depicted on the obverse, on the other hand, with four spheres between its arms, is known primarily from representations of coins included in subgroup Sdm-6C9 (-CNP 858). Here we have one of the most common varieties of Type VI cross deniers from the late 11th century, discovered in the then Polish state and absent

from the territory of Polabia. They are the oldest coins that, due to the similarity of the dies, can be associated with Sieciech. In the deposit of Słuszków I, 1101 specimens of Sdm-6C9 varieties (~CNP 858) were discovered. They have an average weight of 0.803 g and a diameter of 12.5 mm. Through the similarities of the obverse, the Sdm 6C8 (CNP 858/864) coins, which do not have the markings between the arms of the cross pattée on the reverse, are also associated with this subgroup. In Cieszyków, not far from Kalisz (see, Fig. 65), a copper plate stamped with a design of this variety was discovered (see Chapter V).

It seems that Sdm-6C9 coins first appear as early as the first half of the reign of Duke Władysław I. This is exemplified by a deposit from Zbiersk near Kalisz (Mitkova-Szubert 1997), a village just 23 km north-west of Kalisz, on the route to Łąd and on to Poznań and Gniezno (Wąsowiczówna 1960, 80). The assemblage was probably hidden in the 1080s.⁵³ It contained one coin of the Sdm-6C9 type (Fig. 132: 1), among the older varieties of cross deniers, mainly classified as Type V with a beaded cross on the obverse. The latest varieties of cross deniers with a crossed crosier of Type VII, present in deposits from Poland from the 1190s, were absent from the deposit. Similarly, only single specimens of Sdm-6C9 coins were recorded in slightly later hoards from Sokołów near Płock (Bogucki *et al.* 2016, no. 228; see Fig. 132: 2) and Zgłowiączka I near Włocławek (Gorlińska *et al.* 2015, no. 208; cf. Fig. 132: 3). They were most probably deposited at the turn of the 1080s and 1090s. Single specimens of late issues of cross deniers with a crosier appeared in their assemblages. The Zgłowiączka assemblage also included Kraków deniers of Władysław Herman of a good style, and probably dating from the early days of the ruler's reign.

There are no cross deniers of the Sdm-6C9 variety (~CNP 858) in the older hoards hidden during the reign of Bolesław the Bold and at the beginning of Herman's reign. These include a hoard from Łagowica (Kiersnowski 1964a) hidden around 1070, or from Siecień-Rumunki from the early 1080s. (Gorlińska *et al.* 2015, no. 147). While deniers of the Sdm-6D4-a (~CNP 867-868) or Sdm-6C20 (~CNP 813) varieties, which will be discussed further below, remained in circulation for a fairly short period of time, deniers of the Sdm-6C9 (~CNP 858) variety were probably produced for several years, to judge from analyses of the composition of assemblages from the late 11th and early 12th centuries. In hoards from Poland hidden in the 1090s, they form a significant group among the Type VI coins. Observing specimens from the oldest deposits containing coins of these varieties, we can assume that the Sdm-6C9-a-d varieties, known from hoards from Zbiersk and Sokołów (having a mark resembling the letter **U** or a shape between **U** and **V**), were produced first. Probably somewhat later, the minting of Sdm-6C9-e-g deniers with a **V**-shaped mark began. Such a specimen occurred in the hoard from Zgłowiączka (see Fig. 80: 3). Among the coins bearing on the obverse side four full spheres between the arms of a straight cross, of particular interest are the unique varieties Sdm-6C16-a (weight 0.992 g and diameter 13.2 mm) and Sdm-6C16-c (0.848 g/12.9 mm) with the representation of a cross pattée without

⁵³ The latest coin from the hoard, dated quite precisely, is the denier of Vratislav minted after 1061.

a dot in the middle, but with a characteristic broad arch. It is possible that these are transitional varieties between the subgroup of Sdm-6C9 crosses (-CNP 858) attributed to Władysław Herman and the specimens associated with the minting of the count palatine Sieciech, which may have begun with the latter's independent activities in this area.

The chronology of the issuing of Sdm-6C9 (CNP 858) cross deniers is linked to the reign of duke Władysław Herman (1079-1102). A number of features of the times of his reign bore little resemblance to those of the preceding rule as monarch of his elder brother, Bolesław II the Bold. For example, as a result of a fundamental change in the international situation, the Polish king's pro-papal and imperial foreign policy had to be abandoned in favour of an alliance with Henry IV. Since he had been elevated to his new position by the magnates, the Duke had to surrender part of his power to them, including above all his governor Sieciech, who could decisively contribute to the change of ruler (Barański 2005, 174-175).

It seems very likely that, due to the situation after Bolesław II had been deposed from the throne, a second, large and thriving minting centre may have been established in Greater Poland, separate from the one in Kraków, which was involved in the large scale production of the cross deniers that are known from finds from all over the territory of the then Polish state. This raises the question of the owner of this 'new' mint. Was it a venture connected with Duke Władysław, or with some magnate, or perhaps a church dignitary? In the first case, the minting of coins of the Sdm-6C9 variety (CNP 858) may have been the start of the Duke's production of his own cross deniers. These imitations of Saxon coins had by then been commonly circulating in Poland for several decades; their dominance in monetary circulation, at least from the middle of the 11th century, was so great that they must have enjoyed the confidence of the Polish public. It should be remembered that the royal deniers from Bolesław II, introduced into circulation in the second half of the seventies of the 11th century, differed significantly from the contemporary cross deniers, which was certainly noticed by their users. Perhaps the Kraków deniers of Bolesław the Bold were so unpopular in Greater Poland that the new ruler decided to allocate to this market imitations of the cross deniers that had been used here for years, with a similar pure silver content to his issues from the Kraków mint. The unpopularity of the official coinage of the Piasts is evidenced by their few isolated finds at early mediaeval archaeological sites in Greater Poland. During archaeological research in Kalisz, at the Zawodzie settlement and the Stare Miasto settlement, only two deniers of Władysław Herman with his name and image from the Kraków mint were discovered (Fig. 133).



Fig. 132. Deniers of the subgroup of variants Sdm-6C from the Zbiersk hoard (1), the Sokołów hoard (2), and the Zgłowiączka hoard (3) (photo: A. Kędzierski)



Fig. 133. Kraków cross deniers of Władysław Herman from the archaeological research in Kalisz

It is possible that the use of this coinage was only associated with payments between the population and the Duke, and that other transactions may have been carried out using other coins, including cross deniers in particular. It is not known how the magnates of Greater Poland behaved during the crisis of 1079, associated with the death of Bishop Stanisław of Kraków and the ousting of King Bolesław the Bold from the throne, or whether there were strong decentralising tendencies in the district. Perhaps the introduction of cross deniers into the local market was well received by the local population and contributed to keeping Greater Poland within the borders of the Polish State?

Deniers of the subgroup of varieties Sdm-6C9 may have been produced by count palatine Sieciech with the permission of Duke Władysław Herman. It should be recalled that the obverses of these coins are very similar to Sieciech's own cross deniers. The feature that distinguishes these varieties from the latter is the placement on the reverse, between the arms of the cross pattée (without the dot in the centre), of a sign resembling the letters **U - V**, instead of a broad arch (Fig. 134).



Fig. 134. Cross deniers, variants Sdm-6C9-c and Sdm-6C12-a, from the Słuszków I hoard (photo: A. Kędzierski)

It has not been possible to find exactly the same obverses of the two varieties, but the observed differences concern minor details, mainly related to the signs of the pseudo-legend in the rim. References of the representations of Sieciech's cross deniers to the Sdm-9C9 (-CNP 858) varieties are evident, but the dating of the former seems to be later. In the 1080s, when the production of cross deniers attributed to the Duke probably began, count palatine Sieciech was probably not

strong enough to organise such a prosperous workshop to issue his own coinage. All the more so because large deniers with the Count Palatine's mark, as mentioned earlier, have been associated only with the last years of the 11th century. Rather, it can be assumed that the minting done for Sieciech in this period was connected with engagement in the earlier action of producing cross deniers for Duke Władysław Herman in Poland.

Cross deniers of the Sdm-6C9 variety have been found in 13 deposits from Greater Poland, with the two deposits from Słuszków comprising the largest number in this area (Table 68, items 1-14). The second largest number of Sdm-9C cross deniers (CNP 858) discovered came from three deposits from Central Poland (Table 68, items 20-22). At the forefront is the assemblage from Parzęczew, in which as many as 152 such specimens occurred out of 1105 cross deniers. Three hoards with Sdm-9C cross deniers were recorded from Lesser Poland (Table 68, items 23-25), two each from Kuyavia (Table 68, items 15-16), Mazovia (Table 68, items 18-19) and Silesia (Table 68, items 26-27), and one from Pomerania (Table 68, item 17).

Table 68. Sdm-9C (CNP 858) cross deniers in hoards from Polish territory

Lp	Location	Province/district	Hoard dating	Number of CNP 858 cross deniers	Number of all cross deniers in hoard
1	Bnin I	Greater Poland/Poznań	1085-1100	1	28
2	Gorzyce (?)	Greater Poland/Pleszew	1085-1100	1	186
3	Gosławice	Greater Poland/Konin	1085-1100	1	over 26
4	Grójec	Greater Poland/Konin	c. 1100	25	over 570
5	Jastrzębniki	Greater Poland/Kalisz	1095-1100	36	922
6	Jordanowo	Greater Poland/Świebodzin	1090-1100	5	99
7	Ogorzelczyn	Greater Poland/Kalisz	1095-1100	3	148
8	Sędzinko	Greater Poland/Szamotuły	after 1090	16	238
9	Słuszków I	Greater Poland/Kalisz	c. 1105	1101	12881
10	Słuszków II	Greater Poland/Kalisz	c. 1105	?	c. 6500
11	Środa	Greater Poland/Środa Wlkp.	c. 1100	105	1182
12	Zbiersk	Greater Poland/Kalisz	c. 1085	1	88
13	Żerków	Greater Poland/Jarocin	1090	12	107
14	Żerniki	Greater Poland/Kalisz	after 1100	1?	?
15	Kaidus IX	Kuyavia/Chełmno	after 1090	1	12
16	Karkowo	Kuyavia/Lipno	c. 1095	1	66

Lp	Location	Province/district	Hoard dating	Number of CNP 858 cross deniers	Number of all cross deniers in hoard
17	Stargard III (?)	Pomerania/Stargard	after 1080	1	4
18	Naruszewo	Mazovia/Płońsk	after 1091	7	796
19	Sokołów	Mazovia/Gostynin	c. 1090	1	193
20	Leźnica Mała	Central Poland/Zgierz	early 12 th c.	7	610
21	Parzęczew	Central Poland/Zgierz	early 12 th c..	152	1105
22	Wodzin	Central Poland/Łódź Wschodnia	early 12 th c.	1	55
23	Grobla	Lesser Poland/Bochnia	c. 1095	10	684
24	Małogoszcz	Lesser Poland/Jędrzejów	after 1095	5	416
25	Ojców	Lesser Poland/Kraków	ok. 1095	10	194
26	Kopacz	Silesia/Złotoryja	po 1097	6	277
27	Głogów (?) - Śląsk XII	Silesia/Głogów (?)	po 1138	?	?

Isolated finds of cross deniers of the Sdm-9C-6 variety are recorded most frequently in Greater Poland. They are known from Dziekanowice, Giecz IV, Kalisz-Zawodzie, Kalisz-Stare Miasto, Dębniaki Kaliskie, Ostrów Lednicki and Rybitwy-Ostrów Lednicki (Fig. 135).



Ryc. 135. Cross deniers of the Sdm-6C9 variety from Kalisz-Stare Miasto, Giecz and Dębniaki Kaliskie

The largest number of these coins came from Giecz, followed by Kalisz. However, when the proportions between the discovered Type VI deniers of the Sdm-6C9 varieties (CNP 858) and the latest issues of Type VII deniers with a depiction of a crossed crosier are taken into account, the percentage of Type VI specimens in Kalisz is higher than in Giecz. Few, isolated finds of the described cross deniers are also known from other parts of Poland. They were reported as loose finds in Silesia (Opole-Ostrówek), or in Central Poland (the stronghold in Łęczyca).

6.1d. Cross deniers - type Sdm-6C20 (~CNP 813)

Cross deniers of varieties included in the Sdm-6C20 subgroup (~CNP 813) are the most numerous in the Słuszków I assemblage, with 1908 whole specimens. The average weight of whole specimens in this assemblage is 0.891 g and the average diameter is 13.3 mm. These deniers are slightly heavier and larger than the numerous coins of the Type VI subgroup of the Sdm-6C9 variety (~CNP 858: 0.806 g / 12.5 mm) and Sdm-6D4-a (~CNP 867-868: 0.889 g / 12.1 mm) found in the Słuszków assemblage. These coins are also very distinctive due to their appearance: a broad outer field with clearly visible elements of a quasi-legend composed mainly of circles and triangles, and a small central field with a straight cross on the obverse and a cross pattée without marks between the arms on the reverse (Fig. 136).



Fig. 136. Cross denier, variant Sdm-6C20 from the Słuszków I hoard (photo: A. Kędzierski)

Their appearance is rather reminiscent of much older cross deniers, due to their wide outer field with clearly legible legend marks. However, both the chain of connections of the dies and their huge collection in the Słuszków I assemblage indicate the time of their production to the turn of the 11th and 12th centuries. The dies of deniers of the Sdm-6C20-b and Sdm-6C20-d varieties were the most carefully made, so these varieties were most likely to have been struck first in this group, while the specimens categorised as Sdm-6C20-a and probably Sdm-6C20-c, with a slight-

ly barbarised design, may have been issues produced at the end of this series. The coins described here are extremely rare as finds. Apart from their occurrence in the two hoards from Słuszków, two examples (Fig.137) have also been found in an assemblage from Leźnica Mała near Łęczyca (Gupieniec 1969; Gorlińska et al. 2015, nos. 65/598-599).⁵⁴



Fig. 137. Cross deniers of subgroups of variants Sdm-6C20 (-CNP 813) from Leźnica Mała (photo: P. Chabrzyk)

This hoard does not contain coins categorised as of the Sdm-6D4-a variety (-CNP 867-868), which may indicate that it was hidden earlier than Słuszków Deposit I. However, the presence of deniers of the Sdm-6C20 variety places this assemblage among the latest known deposits with a predominantly cross deniers content. Sdm-6C20 deniers are also included in the composition of a small assemblage of coins from Żerniki in the Kalisz district. It contains at least six items. In addition to a slightly older Type VII CNP 971 cross denier, there were specimens dating to the first years of the 12th century, including five late variety cross deniers: Sdm-6C20 (-CNP 813), Sdm-6C18-c (-CNP 813/1480), Sdm-6C9 (-CNP 858) and two specimens with crosier imagery: Sdm-7pC1-c (-CNP 991). Also absent from this small assemblage were the latest issues of cross deniers categorised as Sdm-6D4-a (-CNP 867-868).

Finds of Sdm-6C20 cross deniers (Fig. 138) are concentrated in a small territory of south-eastern Greater Poland: Słuszków, Kalisz (?),⁵⁵ Żerniki, and in Central Poland: Leźnica Mała near

⁵⁴ The hoard, preserved in its entirety, contains 619 cross deniers and their fragments, as well as one denier of Otto and Adelaide, ten fragments of cast silver and three temple rings (Gorlińska *et al.* 2014, no. 65).

⁵⁵ Two cross deniers CNP 858 and CNP 813 are in the ownership of a collector from Kalisz. They were reportedly found in the 1950s in the vicinity of that town. This however is not certain, it is even possible that they were recovered from part of the Słuszków hoard revealed at the time.

Łęczyca (see Fig. 138). In addition, such a coin was recorded in an early mediaeval cemetery in Lubień near Piotrków Trybunalski (Gorlińska *et al.* 2015, no. 67/11).⁵⁶

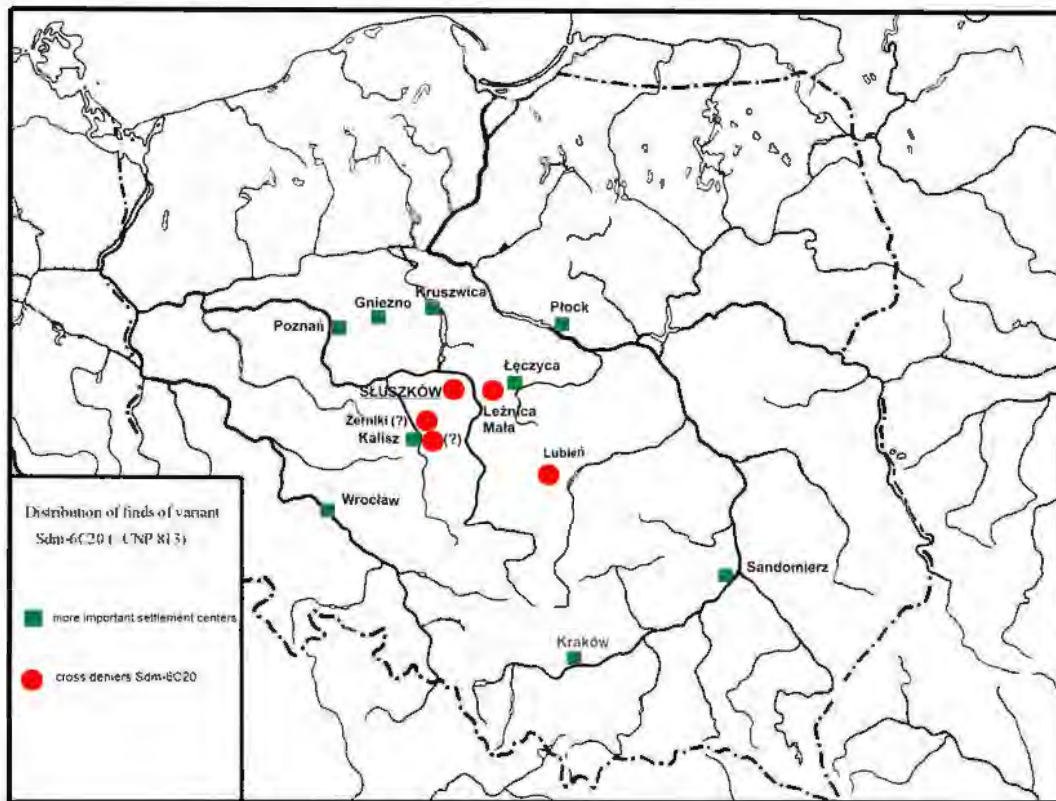


Fig. 138. Distribution of finds of variant Sdm-6C20 (-CNP 813) cross deniers (prepared by: A. Kędzierski)

The area of concentration of their finds is small and partly coincides with the distribution pattern of deniers associated with count palatine Sieciech. However, one notices their absence in Silesia, as well as the slightly later deniers Sdm-6D4 (CNP -867-868). This may be due to the fact that this district was part of the state of Bolesław the Wrymouth after 1097, unlike Kalisz, which belonged to Duke Zbigniew. The Sdm-6C20 deniers are slightly later than the previously described palatine issues, and the time of their production can probably be associated with the first years of Duke Zbigniew's reign in Greater Poland. On the coins attributed to him, the depiction of a broad arch on the reverse was abandoned, perhaps to distinguish them from the Palatine's issue, and the design of the obverse was completely different. It is important to consider which cross deniers preceded the production of the Sdm-6C20 issues. A very characteristic coin type known

⁵⁶ Research of IAE PAN in Lubień near Piotrków Trybunalski, at an early-mediaeval graveyard in Grave 47 (collections of Museum in Piotrków, inv. no. 1567).

from Słuszków and Kalisz-Stare Miasto (Fig. 128: 4) have an obverse reminiscent of the Sdm-6C20 issues and a reverse with a representation of a broad arch between the arms of a cross pattée (CNP 1480-3), designated in this work as varieties Sdm-6C18 (average weight 0.949 g, average diameter 13.2 mm, ~CNP 813 and 858/1480) and Sdm-6C19 (average weight 0.992 g, average diameter 13.4 mm, ~CNP 813/850). The obverses of these coins, with their characteristic small central field and wide outer field with legible marks, are related to the extensive group of varieties of cross deniers Sdm-6C20 (~CNP 813). What is important for establishing their chronology is the fact that, due to the presence of a wide arch between the arms of the cross pattée, their reverses resemble the reverses of Sieciech's Type I coins (Suchodolski 1987, 16-18). A possible interpretation of this is that these were perhaps the first issues of Zbigniew, produced just after his father had ceded part of the Polish territory to him - that is, around 1097, and at the latest around 1100, after the expulsion of the Count Palatine. The reverse dies were partly modelled on those of the deniers minted by Sieciech (Kędzierski 2005), but with a new obverse design - with a characteristic small straight cross and a wide outer field with a clearly legible pseudo-legend. Such specimens, alluding on the one hand to coins with a characteristic large obverse and well legible marks, and on the other hand to deniers with a wide arch between the arms of the cross pattée and a dot in the middle (CNP 1480-3), give the impression of an intermediate link between the latest subgroup of coins designated Sdm-6C20 and coins directly related to Sieciech's minting. A hoard from Wodzierady, Łask district, dated to the late 11th century, only part of which has survived to the present day, contained at least one such coin (Fig. 139; cf. Mitkova-Szubert 1996, 5-6, no. 10; Gorlińska *et al.* 2015, no. 198/1001). It seems that specimens of varieties Sdm-6C18 (~CNP 813 and 858/1480) and Sdm-6C19 (~CNP 813/850) were the first cross deniers issued by Zbigniew, on which the layout of the reverse still reminiscent of the minting of Sieciech are combined with a new design of the obverse. This type of depiction and the chronology of deniers of the Sdm-6C20 varieties argue for their association with Zbigniew, the elder son of Władysław Herman, beginning his reign in Greater Poland, Kuyavia, Sieradz-Łęczyca Land and Mazovia before 1100 (Barański 2005, 184).



Fig. 139. Cross denier similar to variant Sdm- 6C18 (~CNP 813/1480), Wodzierady, Łask district (photo: M. Widawski)

6.1e. Cross deniers, type Sdm-6D4-a (~CNP 867-868)

There are 1486 examples of Sdm-6D4-a cross deniers (~CNP 867-868) in the Słuszków I assemblage. They are also found in the Słuszków II hoard (Fig. 140). If only for their homogeneity and the number of coins in the Słuszków I assemblage, they can be regarded as the product of Polish workshops, as can the group of coins Sdm-6C9 (CNP ~858) and Sdm-6C20 (~CNP 813).



Fig. 140. Sdm-6D4 Cross deniers from the Słuszków II hoard (photo: A. Kędzierski)

These deniers are characterised by a very simple design: on the obverse only a straight cross is visible without beads or other marks between the arms, and on the reverse a cross pattée with a V-like mark between its arms. These coins also have no visible legends, only on specimens with a very large offset of the die imprint, can there be seen marks in the form of narrow wedges near the rim, partially visible in the edges of the outer field exposed in this way. Already in 1939, M. Gumowski classified the similar varieties of CNP 867 and CNP 868 among the last issues of cross deniers (Gumowski 1939, 168).

By analysing the dies of later issues of Type VI cross deniers with a straight cross of the Sdm-6D4 variety, 11 obverse and 13 reverse dies have been singled out (Fig. 141).

Their average weight in the Słuszków hoard is 0.889 g, with an average diameter of 12.1 mm. The very late chronology of Sdm-6D4 deniers (~CNP 867-868) may also be evidenced by their absence from the already mentioned deposits discovered relatively close to Kalisz, such as the hoard from Ogorzelczyn near Turek (Tabaka 2001) or Leźnica Mała near Łęczycza (Gupieniec 1969; Mikołajczyk 1981). Apart from the Słuszków I (Szczurek *et al.* 2017, 235/11429-12898) and Słuszków II deposits,⁵⁷ such coins were also present in a small assemblage of deniers from

⁵⁷ Cross deniers classified as Sdm-6D4-a (~CNP 867-868) were said to have been included in the hoard from Rokosowo near Śrem. The assemblage was donated by the family of Z. Zakrzewski in 1960 to the National Museum in Kraków. It is likely, however, that the coins from this deposit have become mixed with others. The latest issue of the series *Polish Early Mediaeval Hoards* does not mention Sdm-6D4 deniers in this deposit (Szczurek *et al.* 2017, no. 214). Similar specimens are known from other hoards: Grójec, Konin district, and Leźnica Mała, Łęczycza district, but these are similar to the Sdm-6C2-a varieties (~CNP 853/864), with slightly marked spheres between the arms of the straight cross on the obverse and with a residual legend in the outer field.

Kalisz-Stare Miasto (Fig. 142; cf.: Baranowski *et al.* 2005; Kędzierski 2013a, 126; Szczurek *et al.* 2017, no. 100C/1-4). It consists of three Type VI cross deniers: two of Sdm-6D4-a (Fig. 142: 1-2) and one (Fig. 142: 3) of Sdm-6C1-a (~CNP 860). There is also one Type VII: Sdm-7B2-i (Fig. 142: 4; similar to CNP 986-7) and a Type VIII specimen with a representation of a head (Fig. 142: 5; CNP 1013).

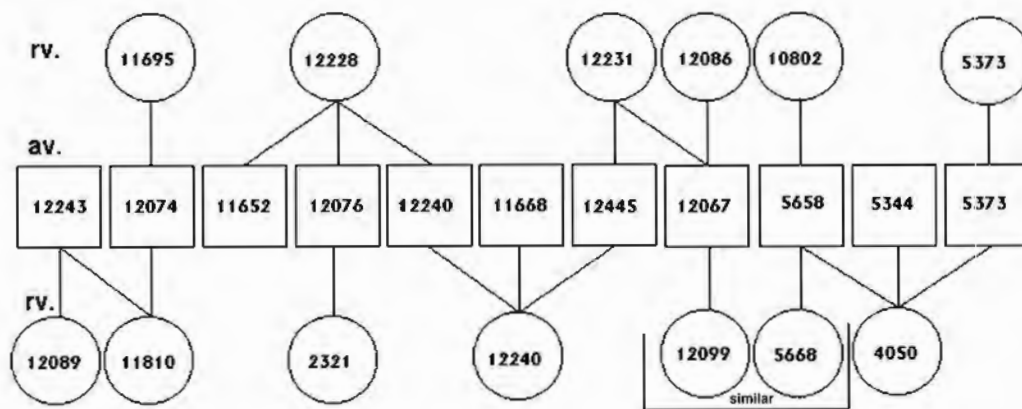


Fig.141. Die-links of variant Sdm-6D4 (~CNP 867-868) (prepared by: A. Kędzierski)



Fig.142. Assemblage of cross deniers from the Stare Miasto site in Kalisz (photo: A. Kędzierski)

Loose finds of variety Sdm-6D4-a cross deniers are also known from Site 4 in Giecz, where two specimens were discovered (Syty 2015, nos. 300-301).

The distribution of cross deniers of Sdm-6D4-a as isolated finds and as part of hoards, shows the limited range of their circulation, covering mainly Słuszków and Kalisz (Fig. 143). Perhaps this is related to the chronology of these issues, for example, minted just before Duke Zbigniew left Greater Poland in 1106.

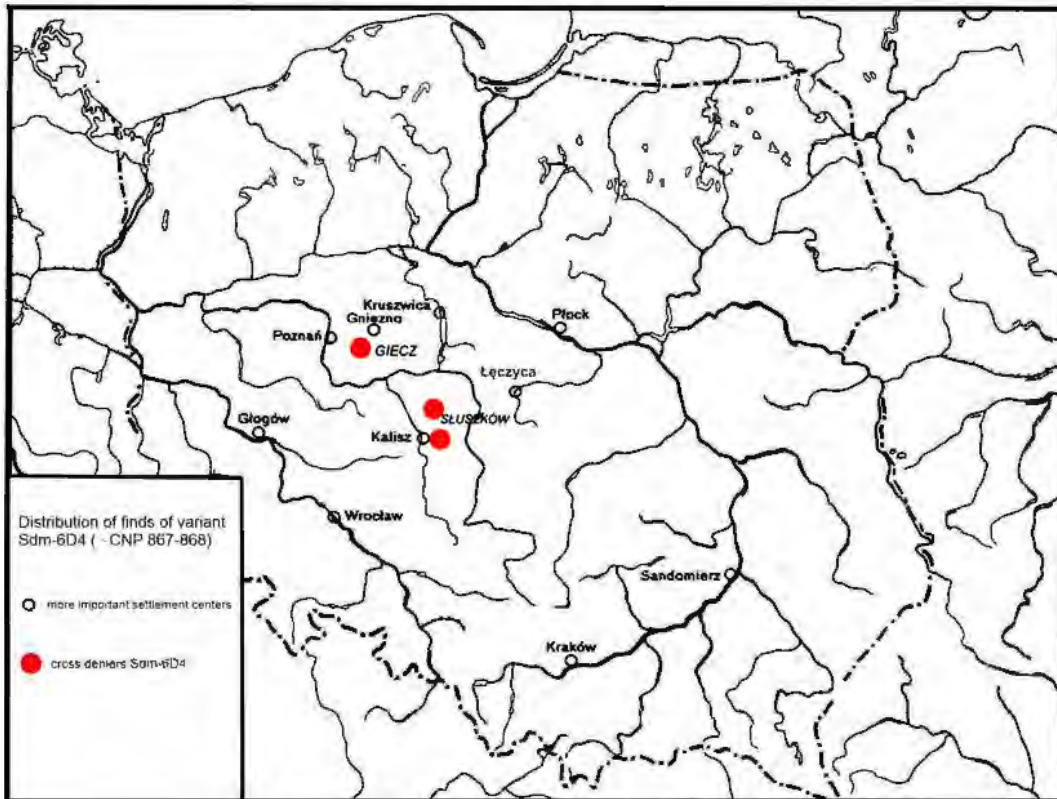


Fig. 143. Distribution pattern of finds of Sdm-6D4 (CNP 867-868) cross deniers (prepared by: A. Kędzierski)

The latest cross deniers from the Słuszków I hoard, and associated with the Kalisz mint, are coins of the varieties: Sdm-6D4 (~CNP 867-868) and probably the slightly older Sdm-6C20 (~CNP 813), attributed to the mint of Duke Zbigniew (Kędzierski 2005). While the former may close the period of the Duke's reign in Greater Poland - i.e., the year 1106, the next subgroup of varieties may have been produced slightly earlier, in the last years of the 11th or the first years of the 12th century. It is worth noting the cross deniers of the varieties Sdm-6C21 (~CNP 813-858/858), the designs of which, due to the shape of a straight cross with widening arms inscribed

in a small field on the obverse, resemble coins of the variety Sdm-6C20 (-CNP 813), and the design of the reverse is already similar to that of the Sdm-6D4-a variety (-CNP 867-8). In contrast, the deniers of variety Sdm-6C23 (-CNP 858) have obverses with a variant form of the features of specimens of the Sdm-6C9 varieties but with single marks visible in the narrow outer field, and reverses with a cross pattée with a V between its arms. This makes them similar to the Sdm-6D4 subgroup. They were probably struck in the early years of the 12th century (Fig. 144).

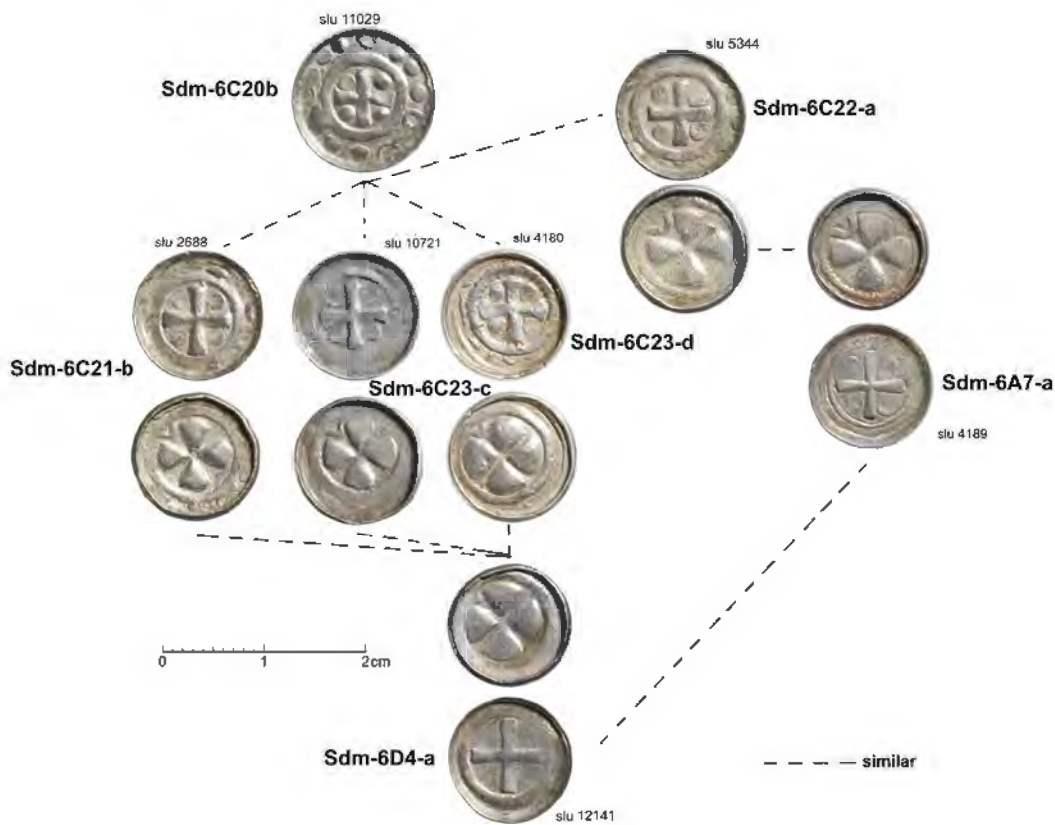


Fig. 144. Similarity of dies of the cross deniers variants attributed to Duke Zbigniew: Sdm-6C20, Sdm-6C21b, Sdm6C23-c, Sdm6C23-d, Sdm-6C22-a, Sdm-6A7-a and Sdm-6D4-a from the Słuszków I hoard (photo and prepared by: A. Kędziński)

Deniers of types Sdm-6C21 and Sdm-6C23 (CNP 813 and -CNP 858) probably represent transitional issues between the three most numerous groups of cross varieties from the Słuszków I hoard: Sdm-6C9 (CNP 858), Sdm-6C20 (-CNP 813) and Sdm-6D4 (-CNP 867-868), and

can probably be dated to the first years of the 12th century. This would also be confirmed by their metric values: an average weight of 0.883 g and an average diameter of 12.6 mm, similar to the results obtained for the three large collections of Type VI cross deniers from the first Słuszków deposit.

The deniers of the Sdm-6C20 (~CNP 813) and Sdm-6D4 (~CNP 867-868) varieties in terms of chronology and distribution of documented finds are related to the time and area of Duke Zbigniew's reign in parts of Poland. While they cannot be unequivocally attributed to him, it is also difficult to propose another issuer. The question arises as to why the Duke issued only cross deniers but did not mint coins with his own name, as Bolesław the Wrymouth did at the turn of the 11th and 12th centuries. This could have been for economic reasons - the populace already being accustomed to the use of coins of this form and appearance as a proven form of currency, known in the Polish lands since the end of the 10th century. The duke probably took over the minting workshop from Sieciech and continued the production of cross deniers there.

It seems possible that Type VI deniers of the varieties Sdm-6D4 (~CNP 867-868) and possibly Sdm-6C20 (~CNP 813), as well as deniers of the varieties Sdm-6C18, Sdm-6C19, Sdm-6C21-23 and Sdm-6C2 (similar to varieties Sdm-6C23 but without the mark between the arms of the cross pattée on the reverse) and possibly Sdm-6A7 (reverse similar to examples of variety Sdm-6C22-a), all belong to the issue of Duke Zbigniew from the years 1097-1105, when he ruled in Greater Poland. Given the area that the state of this ruler occupied, it may be presumed that he took over the workshops, bullion stocks, dies and, above all, the skilled die engravers and moneyers who were working for Władysław Herman and his count palatine Sieciech at the end of the 11th century. This enabled Duke Zbigniew to produce his own cross deniers, now counted among the latest of their issue. This would provide an explanation for the existence of a sequence of combinations of dies of coins minted as late as the late 1090s, when probably the palatine Sieciech began to produce cross deniers on behalf of Duke Władysław Herman, and later also his own. From the last years of the 11th to the middle of the first decade of the 12th century, after losing the war in 1106/7, Zbigniew left Greater Poland. As mentioned earlier, the distribution of cross deniers attributed to Zbigniew is concentrated around Kalisz, so this is where they may have been produced.

7. Conclusions

The cross deniers from the first Słuszków hoard (Słuszków I deposit) analysed in this work are, in terms of size, content and chronology, a unique and invaluable resource for research into monetary circulation in Poland in the early years of the 12th century. This was an extraordinary time when foreign coinage, primarily Saxon cross deniers, began to be displaced by their domestic counterparts. This process, which began at the turn of the 11th and 12th centuries, resulted in virtually all foreign money being driven out of circulation during the reign of Bolesław III the Wrymouth. This is evidenced by even a very cursory observation of the composition of the scattered hoard that was either from Głogów or Krosno Odrzańskie, designated as Silesia XII (Butent-Stefaniak, Malarczyk 2009, 180-181). It contained, apart from issues of coins of Bolesław the Wrymouth, also cross deniers of types V-VIII, which may still have been in circulation in the first quarter of the 12th century. The compulsory exchange of money, introduced during the reign of Bolesław III, probably eliminated the remaining cross deniers in circulation over time. They were probably still of great importance in the exchange of goods and money during the first years of the Wrymouth's independent reign. It was only the cessation of their production in Saxony, together with the exile from the country, and then the death of Duke Zbigniew, to whom the issue of some varieties of deniers was attributed, that deprived the Polish market of a supply of new coins with a high edge. Their finds at archaeological sites in layers dated to the 12th century must be related to the early part of the century, although it is difficult to judge how long they still constituted a significant part of the bullion mass in monetary circulation in Poland (Moździoch, Suchodolski 2006).

The first Słuszków hoard has a unique character. In the introduction to this work, the concealment of the assemblage was linked to wartime events in 1106 and the abandonment of Greater Poland by Duke Zbigniew. As outlined earlier, the composition of this assemblage is unusual. In particular, this is due to the presence of large and small deniers of Sieciech, as well as a large and homogeneous collection of type VI cross deniers, linked by chains of stamps to issues of the Count Palatine. The discovery of the second Słuszków hoard ('Słuszków II' deposit) in autumn 2020 highlighted the uniqueness of the finds at Słuszkow. The newly discovered hoard also contains the listed groups of cross deniers varieties, although only four large Sieciech deniers were encountered in the assemblage. One wonders whether both hoards were not part of Duke Zbigniew's treasury or a deposit of a person from the circle of Duke Zbigniew's officials or close associates. This would explain the presence in the hoards from Słuszków of the above-mentioned homogeneous varieties of type VI coins, probably originating directly from the mint in Kalisz. It seems that due to the proximity of Słuszków, as well as the scattering of finds of deniers of interest attributed to Sieciech and to Dukes Władysław Herman and Zbigniew, the Kalisz centre is a prime candidate

for the place of their production. Numerous traces of the long functioning of highly specialised craft workshops have been discovered in the area of the Kalisz Old Town settlement (Kędzierski, Wyczółkowski 2016). It is known that weaving, lead processing, blacksmithing and glass-making were practised in the settlement area. Numerous finds of cross deniers, also associated with Sieciech and Dukes Władysław and Zbigniew, are even more telling testimony. A large deposit was found on the periphery of the early mediaeval settlement of Kalisz-Dobrzec near the Kalisz district of Stare Miasto and the former stronghold at Zawodzie. It consisted of several hundred silver ingots and two coins, including a cross denier from the turn of the 11th and 12th centuries (Fig. 145, see Kędzierski, Wyczółkowski 2017; Bogucki et al. 2016, no. 256).



Fig. 145. Hoard of silver ingots from Kalisz-Dobrzec (photo: A. Kędzierski)

Research it was determined that this deposit, weighing about 3.8 kg at the time of discovery, was evidence that unprocessed silver, most likely from smelting workshops associated with centres on the border of Lesser Poland and Silesia, was arriving in the Kalisz area (Rozmus 2014, 301-305). Perhaps the bullion was supposed to have gone to the Kalisz mint of the dukes Władysław Herman or Zbigniew? It should be added that during the reign of Mieszko the Old, at the end of the 12th century, we know that there was a mint workshop in Kalisz where bracteates with Hebrew inscriptions were minted (Gorlińska 2015, 217-269).

In the present work, the greatest emphasis has been placed on drawing up a new classification of the earliest issues of cross deniers from the Słuszków I hoard, based on the main types separated by Marian Gumowski (1939), and chronologically related to the reign of Władysław Herman and then Duke Zbigniew in Greater Poland. Type V cross deniers with a beaded cross (including

subtype VA) have been divided into eight groups and 37 subgroups and 47 varieties. Four groups, 49 subgroups and 101 varieties of Type VI deniers with a straight cross have been defined, and type VII specimens with a crosier on the obverse have been divided into 13 groups, 29 subgroups and 81 varieties. Certainly, the first Słuszkow hoard does not include all the known varieties of the later issues of cross deniers, but when working on finds from the turn of the 11th and 12th centuries, it will allow more precise identification of the discovered cross deniers than had previously been the case.

The book also addresses the metrology of the latest cross deniers. Of the three main types analysed, coins of type VII bearing the image of a crosier on the reverse achieved the highest and most equal weights, while deniers of types V and VI showed slightly lower and more varied weights. Thanks to metallographic analyses, it became possible to estimate the pure silver weight of several dozen cross deniers. In this regard, after averaging the results, we can conclude that coins of types V and VII contained higher quantities of bullion, 0.454 g and 0.447 g respectively, while specimens of type VI contained the least, 0.391 g. Some of the latter were characterised by a very low silver fineness, even 176/1000, like as the royal deniers of Bolesław II.

Apart from the creation of a new typology of cross deniers, a large part of the work is occupied by a chapter on the origin and dating of the latest issues of cross deniers. Thanks to the combinations and similarities of the dies, a large group of Type VI cross deniers with the depiction of a simple cross on the obverse has been distinguished, as mentioned earlier, which is related to the Polish minting of count palatine Sieciech, and probably also of dukes Władysław Herman and Zbigniew. However, only the cross deniers of the first-mentioned Piasts qualified to the Sdm-6C9 variety (-CNP 858) are among the more common issues discovered in Poland. The others are generally among the rare finds, the exception being the Słuszków assemblages. A copper alloy plate, discovered in Cieszyków near Kalisz, with imprinted dies of the obverse and reverse of the type VI cross denier, can probably be considered a product of the Kalisz mint. The depictions on this object resemble cross deniers of the Sdm-6C08 variety group. They differ from the coins attributed to Władysław Herman and count palatine Sieciech mainly by the absence of the letter V or of an arch between the arms of the cross pattée on the reverse. The mint located in Kalisz may have been operating under Sieciech's administration as early as the late 1080s. At the time of his greatest political successes in the last decade of the 11th century, Sieciech probably took advantage of his experience and high position in the state and began minting his own money: large deniers with his own name for prestige purposes and small coins modelled on Herman's issues, which were minted for profit. The workshop was probably taken over by Duke Zbigniew after the beginning of his rule in Greater Poland in 1097, and at the latest around 1100.. The district was probably also home to a mint located in Gniezno, probably the origin of a large proportion of the earliest cross deniers with a depiction of a crosier, found in large numbers in hoards from the area of Poland at that time. It should be remembered that the Saxon mints were also still producing

cross deniers, so at this stage of research it is not possible to separate Polish and Saxon material, apart from a few specimens (cf. Chapter 5 - Origins and dating). It is possible that type V cross deniers with a beaded cross were also minted in Greater Poland. Larger series of sub-groups of varieties of these coins, including Sdm-5C10 (-CNP 655/648) and Sdm-5F4 (-CNP 648), occurred in the large collections at Słuszków, as well as in the hoard from Środa Wielkopolska. This prompted Witold Nakielski to attribute them to the mint in Poznań (Nakielski 2013: 70-71). As in the case of coins with a crosier, this issue requires further study. At present, it is not possible to separate most of the later deniers with beaded crosses into Saxon and Polish issues and to identify their places of production.

At the turn of the 11th and 12th centuries, domestic minting also took place outside Wielkopolska, in several centres. There was a workshop in Kraków, which from c. 1070 produced deniers of Bolesław the Bold and subsequent Piast rulers. At the turn of the 11th and 12th centuries, the mint there continued their production, maintaining throughout this time a similar representation of the reverse - a three-tower structure. The coins of Bolesław the Bold, as well as those of Władysław Herman and the oldest coins of Bolesław the Wrymouth coming from the Kraków mint, are discovered in much smaller numbers than the contemporary cross deniers, so they were probably not produced in such large numbers as coins with a raised edge and a representation of a simple cross or a crosier. The Kraków mint, like that of Kalisz, was probably managed by Sieciech. This may be indicated by the surviving Kraków denier of Duke Władysław Herman that has in the outer field a mark known from the obverses of large Sieciech deniers (Zakrzewski 1958). We should also keep in mind the Lesser Poland mint of the Count Palatine, who produced there his large deniers with the so-called monogram. Their finds are mainly associated with the Kraków area, and the visible low edge evokes associations with the poorly raised edges of coins of the Piast rulers. It is possible that both types of coins were produced at the Kraków mint. At the turn of the 11th and 12th centuries, mints were also active in Silesia. A workshop was located in Wrocław, where cross deniers were minted with a representation of a head on one side and a cross on the other. Dated to the last decade of the 11th and first decade of the 12th century, these issues are rare among other types of cross deniers of the time. It is not known whether this mint was owned by the Bishops of Wrocław or belonged to the Piasts, as Witold Nakielski believes (Nakielski 2013, 54-55). There were still two types of coins of Bolesław the Wrymouth minted in Silesia at this time. They depicted on one side a head *en face* with the name of St John, while the other side depicted a facing head or a sign composed of the letters IS and the duke's name in the outer field. These coins were probably issued between 1097 and 1107 in two workshops: Legnica and Wrocław. The Silesian issues may also include deniers of types VI and VII, including specimens known from the Słuszków I assemblage of the varieties Sdm-6C01-a (-CNP 860) and Sdm-7pB1-b (-CNP 991), Sdm-7B2-g and Sdm-7G3-a (-CNP 986-7) (Nakielski 2013, 56).

In addition to the large ones, there were probably smaller mints in Poland, e.g., in Kuyavia (Bogucki 2009), whose issue we are not able to identify today. Forgeries of cross deniers were probably produced in some of them, although this practice must have been carried out also in official mints, as evidenced by the findings of forged cross deniers from Stare Miasto in Kalisz or from Słuszków I.

An important issue in future research on cross deniers is the development of an effective method of metallographic testing, not least to check the quality of their bullion. The non-destructive analyses currently carried out on the surface of the artefacts do not necessarily reflect the actual amount of bullion in the coin. In addition to the processes during production intended to improve the quality of the metal on the surface of flans by leaching, which already gives a biased result of surface analyses, there is the problem of the presence of a core in the coins, made of base metals. Certainly, an unrecognised part of the cross deniers was provided with a copper-based core (Miśta et al. 2015, 72), so it is important to introduce new methods of metal analysis before cleaning them, taking into account the corrosion characteristics of the artefacts and their technology of manufacture (Miśta et al. 2015, 63-64).

Both Słuszkow hoards mark the end of the era of the dominance in Polish monetary circulation of cross deniers, which had been the most widely used type of money in the country since the first half of the 11th century. The two of them also mark the end the period of intensive hoarding of silver. From this time on, both isolated finds and assemblages from the reign of Bolesław the Wrymouth and his sons are much rarer. This was probably influenced by the compulsory exchange of coinage introduced during the reign of his younger brother, Duke Zbigniew.

Annex

Origin of later variants of cross deniers from the Słuszków I hoard – proposal of attribution

Table I

Table I/A. TYPE V

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-5A1-a	672-673/654	Saxony
Sdm-5B1-a	652/ 672	Saxony
Sdm-5B2-a	624/642	Saxony
Sdm-5B3-a	651/652	Poland (?), Saxony (?)
Sdm-5B4-a	624	Saxony
Sdm-5B4-b	624	Saxony
Sdm-5B4-c	624	Saxony
Sdm-5B5-a	624	Saxony
Sdm-5B6-a	655/851-852	Saxony
Sdm-5B7-a	624/635	Saxony
Sdm-5B8-a	624/672	Saxony
Sdm-5B9-a	624/631	Saxony
Sdm-5B10-a	655/672	Saxony
Sdm-5C1-a	655/864	Saxony
Sdm-5C1-b	655/864	Saxony
Sdm-5C2-a	655/652	Saxony
Sdm-5C3-a	655/864	Saxony
Sdm-5C4-a	655/672	Saxony
Sdm-5C5-a	655/652	Saxony
Sdm-5C6-a	655/652	Saxony
Sdm-5C6-b	655/652	Saxony
Sdm-5C6-c	655/652 lub 655/858 (?)	Poland (?), Saxony (?)
Sdm-5C7-a	655/652	Saxony
Sdm-5C7-b	655/652	Saxony
Sdm-5C8-a	620	Saxony
Sdm-5C9-a	620/631	Saxony

TYPE VII

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-5C10-a	655/648	Poland (?), Saxony (?)
Sdm-5C10-b	655/648	Poland (?), Saxony (?)
Sdm-5C11-a	655/648	Poland (?), Saxony (?)
Sdm-5C12-a	664-665	Poland (?), Saxony (?)
Sdm-5C13-a	632/620	Poland (?), Saxony (?)
Sdm-5C14-a	631	Saxony
Sdm-5C15-a	650/649	Poland (?), Saxony (?)
Sdm-5D1-a	655/672	Saxony
Sdm-5D1-b	655/672	Saxony
Sdm-5D2-a	655/672	Saxony
Sdm-5E1-a	-	Saxony
Sdm-5F1-a	646	Saxony
Sdm-5F2-a	646	Saxony
Sdm-5F3-a	648	Saxony
Sdm-5F4-a	648	Poland (?), Saxony (?)
Sdm-5F4-b	648	Poland (?), Saxony (?)
Sdm-5F5-a	659	Poland (?), Saxony (?)
Sdm-5G1-a	- /864	Saxony

Table I/B. Subtype VA

Variety according to Adam Kędzierski	Variety according to CNP	Origin
5A-A1-a	-	Saxony
5A-A2-a	-	Saxony
5A-A3-a	- /864 (?)	Saxony

Table I/C. TYPE VI

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-6A1-a	~840	Poland (?), Saxony (?)
Sdm-6A2-a	~836	Poland (?)
Sdm-6A2-b	~836	Poland (?)
Sdm-6A3-a	~843	Poland (?), Saxony (?)
Sdm-6A3-b	~843	Poland (?), Saxony (?)
Sdm-6A3-c	~843	Poland (?), Saxony (?)

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-6A4-a	~837	Poland (?), Saxony (?)
Sdm-6A4-b	~837	Poland (?), Saxony (?)
Sdm-6A5-a	~848	Poland
Sdm-6A5-b	~848	Poland
Sdm-6A6-a	~836/1480	Poland
Sdm-6A6-b	~836/1480	Poland
Sdm-6A7-a	~847	Poland (?)
Sdm-6A7-b	~847	Poland (?)
Sdm-6A8-a	~846	Poland (?)
Sdm-6A8-b	~846	Saxony
Sdm-6A9-a	~846/861	Poland (?), Saxony (?)
Sdm-6A10-a	~861	Poland (?), Saxony (?)
Sdm-6A11-a	~846/851	Saxony
Sdm-6A12-a	~840/849	Poland (?), Saxony (?)
Sdm-6A13-a	~849	Poland (?), Saxony (?)
Sdm-6A14-a	~869/849	Poland (?), Saxony (?)
Sdm-6B1-a	~839	Poland (?), Saxony (?)
Sdm-6B2-a	~838	Poland (?), Saxony (?)
Sdm-6B2-b	~838	Poland (?), Saxony (?)
Sdm-6B3-a	~836	Poland (?), Saxony (?)
Sdm-6B3-b	~836	Poland (?), Saxony (?)
Sdm-6B4-a	~834	Saxony (?)
Sdm-6B4-b	~834	Saxony (?)
Sdm-6B5-a	~845	Saxony (?)
Sdm-6B5-b	~843	Saxony (?)
Sdm-6B5-c	~843	Saxony (?)
Sdm-6B5-d	~843	Saxony (?)
Sdm-6B6-a	~843	Saxony (?)
Sdm-6B6-b	~843	Saxony (?)
Sdm-6B6-c	~843	Saxony (?)
Sdm-6B7-a	~844	Saxony (?)
Sdm-6B8-a	~851	Saxony (?)
Sdm-6B9-a	~851-852	Saxony (?)
Sdm-6C1-a	~860	Poland
Sdm-6C1-b	~860	Poland
Sdm-6C1-c	~860	Poland

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-6C2-a	~853/864	Poland
Sdm-6C3-a	~853/864	Poland (?), Saxony (?)
Sdm-6C4-a	~854/850	Poland (?), Saxony (?)
Sdm-6C5-a	~860/ -	Poland (?)
Sdm-6C6-a	~860/849	Poland (?)
Sdm-6C6-b	~860/849	Poland (?)
Sdm-6C8-a	~858/ 864	Poland
Sdm-6C8-b	~858/ 864	Poland
Sdm-6C8-c	~858/ 864	Poland (?)
Sdm-6C8-d	~858/ 864	Poland (?)
Sdm-6C8-e	~858/ 864	Poland (?)
Sdm-6C9-a	~858	Poland
Sdm-6C9-b	~858	Poland
Sdm-6C9-c	~858	Poland
Sdm-6C9-d	~858	Poland
Sdm-6C9-e	~858	Poland
Sdm-6C9-f	~858	Poland
Sdm-6C9-g	~858	Poland
Sdm-6C10-a	~858/840	Poland
Sdm-6C11-a	~853 and 867-868/861	Poland (?)
Sdm-6C12-a	~858/848	Poland
Sdm-6C12-b	~858/848	Poland
Sdm-6C12-c	~858/848	Poland
Sdm-6C13-a	~858/863	Poland
Sdm-6C14-a	~858/1480	Poland
Sdm-6C14-b	~858/1480	Poland
Sdm-6C14-c	~858/1480	Poland
Sdm-6C14-d	~858/1480	Poland
Sdm-6C14-e	~858/1480	Poland
Sdm-6C14-f	~858/1480	Poland
Sdm-6C15-a	~860/1480	Poland
Sdm-6C16-a	~858/858 and 1480	Poland
Sdm-6C16-b	~858/858 and 1480	Poland
Sdm-6C16-c	~858/858 and 1480	Poland
Sdm-6C17-a	~858/1480	Poland
Sdm-6C17-b	~860/1480	Poland

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-6C18-a	~ 813 and 858/1480	Poland
Sdm-6C18-b	~ 813 and 858/1480	Poland
Sdm-6C18-c	~ 813 and 858/1480	Poland
Sdm-6C18-d	~ 813 and 858/1480	Poland
Sdm-6C18-e	~ 813 and 858/1480	Poland
Sdm-6C18-f	~ 813 and 858/1480	Poland
Sdm-6C19-a	~ 813 and 858/858	Poland
Sdm-6C19-b	~ 813 and 858/858	Poland
Sdm-6C20-a	~ 813	Poland
Sdm-6C20-b	~ 813	Poland
Sdm-6C20-c	~ 813	Poland
Sdm-6C20-d	~ 813	Poland
Sdm-6C21-a	~ 813 and 858/858	Poland
Sdm-6C21-b	~ 813 and 858/858	Poland
Sdm-6C22-a	~ 813 and 858/858	Poland
Sdm-6C23-a	~ 858 and 860/858	Poland
Sdm-6C23-b	~ 858 and 860/858	Poland
Sdm-6C23-c	~ 858 and 860/858	Poland
Sdm-6C23-d	~ 858 and 860/858	Poland
Sdm-6D1-a	~ 867-868/839	Saxony
Sdm-6D2-a	~ 867	Poland (?)
Sdm-6D3-a	~ 868	Poland (?)
Sdm-6D4-a	~ 867-868	Poland

Table I/D. subtype 7p (crossier to the right)

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-7pA1-a	~990-991	Poland, Saxony (?)
Sdm-7pB1-a	~990-991	Saxony (?)
Sdm-7pB1-b	~990-991	Poland (?), Saxony (?)
Sdm-7pB1-c	~990-991	Saxony (?)
Sdm-7pB2-a	~990-991	Saxony (?)
Sdm-7pB3-a	~990-991	Poland, Saxony (?)
Sdm-7pB4-a	~990-991	Poland (?)
Sdm-7pB5-a	~990-991	Poland, Saxony (?)
Sdm-7pC1-a	~990-991	Poland, Saxony (?)
Sdm-7pC1-b	~990-991	Poland, Saxony (?)
Sdm-7pC2-a	~990-991	Poland, Saxony (?)
Sdm-7pC3-a	~989-990	Poland, Saxony (?)
Sdm-7pC4-a	~990-991	Poland, Saxony (?)
Sdm-7pD1-a	~991-3	Poland, Saxony (?)
Sdm-7pD1-b	~991-3	Poland, Saxony (?)
Sdm-7pE1-a	~994	Saxony (?)
Sdm-7pE2-a	~989-990	Saxony (?)
Sdm-7pE3-a	~989-990	Poland, Saxony (?)
Sdm-7pE4-a	~989-990	Saxony (?)
Sdm-7pE4-b	~989-990	Saxony (?)
Sdm-7pF1-a	~993/858	Poland (?)
Sdm-7pF2-a	~992	Saxony
Sdm-7pF3-a	~990/672	Poland, Saxony (?)
Sdm-7pF4-a	~990/633	Poland, Saxony (?)
Sdm-7pF5-a	~989-990	Poland (?)

Table I/E. Subtype 7 (crossier to the left)

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-7A1-a	~986-987	Saxony (?)
Sdm-7A1-b	~986-987	Saxony (?)
Sdm-7A1-c	~986-987	Saxony (?)
Sdm-7A2-a	~986-987	Saxony (?)
Sdm-7A2-b	~986-987	Saxony (?)

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-7A2-c	~986-987	Saxony (?)
Sdm-7A2-d	~986-987	Saxony (?)
Sdm-7A2-e	~986-987	Saxony (?)
Sdm-7A2-f	~986-987	Saxony (?)
Sdm-7A2-g	~986-987	Saxony (?)
Sdm-7A2-h	~986-987	Saxony (?)
Sdm-7A2-i	~986-987	Saxony (?)
Sdm-7B1-a	~986-987	Poland (?), Saxony (?)
Sdm-7B1-b	~986-987	Poland (?), Saxony (?)
Sdm-7B1-c	~986-987	Poland (?), Saxony (?)
Sdm-7B1-d	~986-987	Poland (?), Saxony (?)
Sdm-7B2-a	~986-987	Poland (?), Saxony (?)
Sdm-7B2-b	~986-987	Poland (?), Saxony (?)
Sdm-7B2-c	~986-987	Poland (?), Saxony (?)
Sdm-7B2-d	~986-987	Poland (?), Saxony (?)
Sdm-7B2-e	~986-987	Poland (?), Saxony (?)
Sdm-7B2-f	~986-987	Poland (?), Saxony (?)
Sdm-7B2-g	~986-987	Poland (?), Saxony (?)
Sdm-7B2-h	~986-987	Poland (?), Saxony (?)
Sdm-7B2-i	~986-987	Poland (?), Saxony (?)
Sdm-7B2-j	~986-987	Poland (?), Saxony (?)
Sdm-7B2-k	~986-987	Poland (?), Saxony (?)
Sdm-7B2-l	~986-987	Poland (?), Saxony (?)
Sdm-7B2-m	~986-987	Poland (?), Saxony (?)
Sdm-7B2-n	~986-987	Poland (?), Saxony (?)
Sdm-7B2-o	~986-987	Poland (?), Saxony (?)
Sdm-7B3-a	~986-987	Poland (?), Saxony (?)
Sdm-7C1-a	~986-987	Poland (?), Saxony (?)
Sdm-7C1-b	~986-987	Poland (?), Saxony (?)
Sdm-7C1-c	~986-987	Poland (?), Saxony (?)
Sdm-7C1-d	~986-987	Poland (?), Saxony (?)
Sdm-7C2-a	~986-987	Poland (?), Saxony (?)
Sdm-7C2-b	~986-987	Poland (?), Saxony (?)
Sdm-7C2-c	~986-987	Poland (?), Saxony (?)
Sdm-7C2-d	~986-987	Poland (?), Saxony (?)
Sdm-7D1-a	~985/986	Poland (?), Saxony (?)

Variety according to Adam Kędzierski	Variety according to CNP	Origin
Sdm-7E1-a	~985/986	Poland (?), Saxony (?)
Sdm-7F1-a	~985/986	Saxony (?)
Sdm-7F1-b	~985/986	Saxony (?)
Sdm-7F1-c	~985/986	Saxony (?)
Sdm-7F1-d	~985/986	Saxony (?)
Sdm-7G1-a	~997	Saxony (?)
Sdm-7G2-a	~986-987/860	Poland (?), Saxony (?)
Sdm-7G3-a	~986-987/860	Poland (?)
Sdm-7G4-a	?/860	Poland (?)
Sdm-7G5-a	~986-987/846	Saxony (?)
Sdm-7G6-a	~986-987/672	Saxony (?)
Sdm-7G6-b	~986-987/672	Saxony (?)
Sdm-7G7-a	~986-987/648	Saxony (?)
Sdm-7G7-b	~986-987/648	Saxony (?)

Dating of newer variants of cross deniers from the Słuszków I hoard

Table II.

Table II/A. TYPE V

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-5A1-a	~672-673/654	3	0.795	12.0	1095-1105
Sdm-5B1-a	~652/672	14	0.812	11.8	1090-1100
Sdm-5B2-a	~624/642	1	0.93	13.2	1085-1095
Sdm-5B3-a	~651/652	1	0.666	12.3	1090-1100
Sdm-5B4-a	~624	4	0.796	13.1	1090-1100
Sdm-5B4-b	~624	3	0.903	12.8	1090-1100
Sdm-5B4-c	~624	3	0.967	13.3	1090-1100
Sdm-5B5-a	~624	1	0.861	12.6	1090-1100
Sdm-5B6-a	~655/851-852	1	0.819	11.8	1095-1100
Sdm-5B7-a	~624/635	2	0.907	13.5	1085-1095
Sdm-5B8-a	~624/672	28	0.846	13.1	1085-1095
Sdm-5B9-a	~624/631	1	0.855	13	1085-1095
Sdm-5B10-a	~655/672	1	0.739	11.5	1095-1100

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-5C1-a	~655/864	5	0.904	12.9	1085-1095
Sdm-5C1-b	~655/864	1	0.83	12	1090-1100
Sdm-5C2-a	~655/652	1	0.974	13.1	1085-1095
Sdm-5C3-a	~655/864	1	0.799	12.8	1090-1100
Sdm-5C4-a	~655/672	2	1.023	12.7	1090-1100
Sdm-5C5-a	~655/652	16	0.783	11.4	1095-1105
Sdm-5C6-a	~655/652	26	0.840	12.5	1085-1095
Sdm-5C6-b	~655/652	12	0.741	13.1	1085-1095
Sdm-5C6-c	~655/652 lub 655/858 (?)	1	0.754	12.4	1085-1095
Sdm-5C7-a	~655/652	1	0.904	12.9	1090-1100
Sdm-5C7-b	~655/652	2	0.88	12.7	1090-1100
Sdm-5C8-a	~620	4	1.003	12.9	1080-1090
Sdm-5C9-a	~620/631	3	0.864	13.2	1080-1090
Sdm-5C10-a	~655/648	23	0.910	12.9	1095-1100
Sdm-5C10-b	~655/648	100	0.823	12.4	1095-1100
Sdm-5C11-a	~655/648	54	0.825	12.3	1095-1100
Sdm-5C12-a	~664-665	106	0.848	12.2	1095-1100
Sdm-5C13-a	~632/620	5	0.752	11.8	1095-1100
Sdm-5C14-a	~631	3	0.768	13.1	1085-1095
Sdm-5C15-a	~650/649	63	0.824	12.4	1095-1100
Sdm-5D1-a	~655/672	3	0.895	12.1	1090-1100
Sdm-5D1-b	~655/672	1	0.97	12.2	1090-1100
Sdm-5D2-a	~655/672	2	0.885	12.0	1095-1100
Sdm-5E1-a	-	6	0.755	13.2	1090-1100
Sdm-5F1-a	~646	24	0.856	13.3	1080-1090
Sdm-5F2-a	~646	19	0.804	12.8	1085-1095
Sdm-5F3-a	~648	26	0.848	12.9	1080-1090
Sdm-5F4-a	~648	211	0.834	12.5	1095-1100
Sdm-5F4-b	~648	79	0.833	12.7	1095-1100
Sdm-5F5-a	~659	29	0.869	12.1	1090-1100
Sdm-5G1-a	- /864	1	0.91	12.5	1090-1100

Table II/B. subtype VA

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-5A-A1-a	-	1	0.942	12.9	c. 1090
Sdm-5A-A2-a	-	1	0.932	12.3	c. 1090
Sdm-5A-A3-a	- /864	1	0.88	12.9	c. 1090

Table II/C. TYPE VI

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-6A1-a	~840	2	0.860	13.1	1090-1100
Sdm-6A2-a	~836	1	0.882	12.8	1090-1100
Sdm-6A2-b	~836	1	1.031	12.6	1090-1100
Sdm-6A3-a	~843	16	0.912	13.6	1085-1095
Sdm-6A3-b	~843	8	0.926	13.8	1085-1095
Sdm-6A3-c	~843	1	0.993	13.3	1085-1095
Sdm-6A4-a	~837	7	0.745	13.3	1085-1095
Sdm-6A4-b	~837	3	0.743	13.1	1085-1095
Sdm-6A5-a	~848	16	0.839	12.2	1095-1100
Sdm-6A5-b	~848	1	0.798	12.5	1095-1100
Sdm-6A6-a	~836/1480	1	0.917	12.3	1095-1100
Sdm-6A6-b	~836/1480	1	0.919	13.1	1095-1100
Sdm-6A7-a	~847	5	0.933	12.5	c. 1100
Sdm-6A7-b	~847	1	0.531	11.8	c. 1100
Sdm-6A8-a	~846	7	0.814	12.5	1090-1100
Sdm-6A8-b	~846	17	0.889	12.5	1090-1100
Sdm-6A9-a	~846/861	1	0.953	13.1	1080-1090
Sdm-6A10-a	~861	27	0.848	11.9	1090-1100
Sdm-6A11-a	~846/851	6	0.760	12.7	1090-1100
Sdm-6A12-a	~840/849	1	0.679	13.1	1090-1100
Sdm-6A13-a	~849	3	0.975	12.2	1090-1100
Sdm-6A14-a	~869/849	1	0.94	12.3	1090-1100
Sdm-6B1-a	~839	2	1.043	13.2	1085-1095
Sdm-6B2-a	~838	1	0.968	13.2	1085-1095
Sdm-6B2-b	~838	29	0.927	13.4	1085-1095
Sdm-6B3-a	~836	13	0.918	13.5	1085-1095

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-6B3-b	~836	2	0.879	13.2	1085-1095
Sdm-6B4-a	~834	2	0.854	13	1085-1095
Sdm-6B4-b	~834	25	0.963	13.9	1085-1095
Sdm-6B5-a	~845	2	0.965	13.2	1085-1095
Sdm-6B5-b	~843	4	0.960	13.8	1085-1095
Sdm-6B5-c	~843	2	1.038	13.3	1085-1095
Sdm-6B5-d	~843	1	0.892	13.6	1085-1095
Sdm-6B6-a	~843	5	0.8758	13.3	1090-1100
Sdm-6B6-b	~843	3	1.035	13.5	1090-1100
Sdm-6B6-c	~843	10	0.955	13.4	1090-1100
Sdm-6B7-a	~844	20	0.938	13.2	1090-1100
Sdm-6B8-a	~851	18	0.966	13.5	1085-1095
Sdm-6B9-a	~851-852	3	0.952	12.9	1085-1095
Sdm-6C1-a	~860	17	0.982	12.5	1095-1100
Sdm-6C1-b	~860	1	0.872	12.5	1095-1100
Sdm-6C1-c	~860	1	1.046	12	1095-1100
Sdm-6C2-a	~853/864	5	0.748	11.5	1095-1100
Sdm-6C3-a	~853/864	1	0.734	11.5	c. 1100
Sdm-6C4-a	~854/850	1	0.839	12.4	1080-1090
Sdm-6C5-a	~860/ -	1	1.052	12.9	1090-1100
Sdm-6C6-a	~860/849	6	0.995	12.3	c. 1100
Sdm-6C7-a	~860/849	1	0.7	11.7	c. 1100
Sdm-6C8-a	~858/ 864	118	0.807	12.7	1085-1100
Sdm-6C8-b	~858/ 864	18	0.788	12.5	1085-1100
Sdm-6C8-c	~858/ 864	8	0.827	13.2	1085-1100
Sdm-6C8-d	~858/ 864	1	0.88	13.4	1085-1100
Sdm-6C8-e	~858/ 864	3	0.934	12.4	1085-1100
Sdm-6C9-a	~858	197	0.801	12.6	1085-1100
Sdm-6C9-b	~858	11	0.767	12.5	1085-1100
Sdm-6C9-c	~858	36	0.771	12.5	1085-1100
Sdm-6C9-d	~858	10	0.822	12.4	1085-1100
Sdm-6C9-e	~858	762	0.809	12.4	1085-1100
Sdm-6C9-f	~858	3	0.830	12.6	1085-1100
Sdm-6C9-g	~858	82	0.801	12.5	1085-1100
Sdm-6C10-a	~858/840	1	0.815	12.4	1090-1100

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-6C11-a	~ 853 i 867-868/861	1	1.169	12.1	1100-1105
Sdm-6C12-a	~ 858/848	15	0.944	12.5	1095-1100
Sdm-6C12-b	~ 858/848	1	0.866	12.8	1095-1100
Sdm-6C12-c	~ 858/848	1	0.923	13.2	1095-1100
Sdm-6C13-a	~ 858/863	1	0.956	12.5	1095-1100
Sdm-6C14-a	~ 858/1480	9	0.893	12.9	1095-1100
Sdm-6C14-b	~ 858/1480	2	0.903	12.5	1095-1100
Sdm-6C14-c	~ 858/1480	7	0.883	12.4	1095-1100
Sdm-6C14-d	~ 858/1480	2	1.005	12.5	1095-1100
Sdm-6C14-e	~ 858/1480	1	0.944	12.4	1095-1100
Sdm-6C14-f	~ 858/1480	2	1.018	12.8	1095-1100
Sdm-6C15-a	~ 860/1480	4	0.975	12.5	1095-1100
Sdm-6C16-a	~ 858/858 and 1480	1	0.992	13.2	1095-1100
Sdm-6C16-b	~ 858/858 and 1480	1	0.898	13.5	1095-1100
Sdm-6C16-c	~ 858/858 and 1480	1	0.848	12.6	1095-1100
Sdm-6C17-a	~ 858/1480	3	0.887	13.2	1095-1100
Sdm-6C17-b	~ 860/1480	2	0.894	12.6	1095-1100
Sdm-6C18-a	~ 813 and 858/1480	7	0.929	13.2	1095-1100
Sdm-6C18-b	~ 813 and 858/1480	2	0.883	12.8	1095-1100
Sdm-6C18-c	~ 813 and 858/1480	1	0.93	12.9	1095-1100
Sdm-6C18-d	~ 813 and 858/1480	1	1.18	13.6	1095-1100
Sdm-6C18-e	~ 813 and 858/1480	1	0.845	13.6	1095-1100
Sdm-6C18-f	~ 813 and 858/1480	3	0.938	13.1	1095-1100
Sdm-6C19-a	~ 813 and 858/858	1	0.955	13.1	1095-1100
Sdm-6C19-b	~ 813 and 858/858	2	1.019	13.6	1095-1100
Sdm-6C20-a	~ 813	342	0.886	13.2	c. 1100
Sdm-6C20-b	~ 813	1563	0.892	13.3	c. 1100

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-6C20-c	~ 813	9	0.839	13.5	c. 1100
Sdm-6C20-d	~ 813	3	0.862	13.2	c. 1100
Sdm-6C21-a	~ 813 and 858/858	1	0.797	12.8	1100-1105
Sdm-6C21-b	~ 813 and 858/858	29	0.879	12.4	1100-1105
Sdm-6C22-a	~ 813 and 858/858	2	0.899	12.5	1100-1105
Sdm-6C23-a	~ 858 and 860/858	13	0.860	11.9	1100-1105
Sdm-6C23-b	~ 858 and 860/858	3	0.941	12.3	1100-1105
Sdm-6C23-c	~ 858 and 860/858	1	0.781	12.4	1100-1105
Sdm-6C23-d	~ 858 and 860/858	1	1.019	12.6	1100-1105
Sdm-6D1-a	~ 867-868/839	2	0.811	12	1100-1105
Sdm-6D2-a	~ 867	1	0.794	12.6	1100-1105
Sdm-6D3-a	~ 868	1	1.012	11.7	1100-1105
Sdm-6D4-a	~ 867-8	1486	0.889	12.1	c. 1105

TYPE VII

Table II/D. Subtype 7p – crosier to the right

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-7pA1-a	~ 990-991	1	0.734	12.6	1090-1100
Sdm-7pB1-a	~ 990-991	8	0.941	12	1095-1100
Sdm-7pB1-b	~ 990-991	4	0.866	12.2	1095-1100
Sdm-7pB1-c	~ 990-991	5	0.795	11.9	1095-1100
Sdm-7pB2-a	~ 990-991	1	0.753	12.5	1095-1100
Sdm-7pB3-a	~ 990-991	239	0.875	11.8	1095-1105
Sdm-7pB4-a	~ 990-991	231	0.913	12.6	1090-1100
Sdm-7pB5-a	~ 990-991	3	1.076	12.4	1090-1100
Sdm-7pC1-a	~ 990-991	1	0.804	11.3	1095-1105
Sdm-7pC1-b	~ 990-991	6	0.878	12.3	1090-1100
Sdm-7pC2-a	~ 990-991	19	0.821	11.7	1095-1105

Sdm-7pC3-a	~989-990	1	0.805	12.4	1095-1100
Sdm-7pC4-a	~990-991	5	0.870	12.1	1095-1100
Sdm-7pD1-a	~991-993	1	1.184	12.3	1090-1100
Sdm-7pD1-b	~991-993	1	0.805	11	1095-1100
Sdm-7pE1-a	~994	1	0.692	12.2	1095-1100
Sdm-7pE2-a	~989-990	2	0.866	12.5	1090-1100
Sdm-7pE3-a	~989-990	4	0.833	11.7	1095-1100
Sdm-7pE4-a	~989-990	2	1.026	12.9	1080-1090
Sdm-7pE4-b	~989-990	1	0.87	12.8	1080-1090
Sdm-7pF1-a	~993/858	2	0.892	11.1	c. 1105
Sdm-7pF2-a	~992	9	0.905	12.2	1095-1105
Sdm-7pF3-a	~990/672	1	0.841	12	1095-1100
Sdm-7pF4-a	~990/633	3	0.972	12.2	1095-1100
Sdm-7pF5-a	~989-990	1	0.778	11.8	c. 1100

Table II/E. Subtype 7 – crosier to the left

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-7A1-a	~986-987	3	0.877	12.9	1090-1100
Sdm-7A1-b	~986-987	313	0.812	12.5	1090-1100
Sdm-7A1-c	~986-987	5	0.750	12.3	1090-1100
Sdm-7A2-a	~986-987	13	0.804	12.5	1090-1100
Sdm-7A2-b	~986-987	128	0.856	12.5	1090-1100
Sdm-7A2-c	~986-987	10	0.913	12.0	1090-1100
Sdm-7A2-d	~986-987	2	0.757	12.1	1090-1100
Sdm-7A2-e	~986-987	2	0.802	12.2	1090-1100
Sdm-7A2-f	~986-987	30	0.912	12.4	1090-1100
Sdm-7A2-g	~986-987	169	0.947	12.5	1090-1100
Sdm-7A2-h	~986-987	5	1.049	12.8	1090-1100
Sdm-7A2-i	~986-987	8	0.767	12.3	1090-1100
Sdm-7B1-a	~986-987	31	0.758	12.4	1090-1100
Sdm-7B1-b	~986-987	5	0.846	13.1	1090-1100
Sdm-7B1-c	~986-987	616	0.881	12.2	1090-1100
Sdm-7B1-d	~986-987	97	0.835	12.5	1090-1100
Sdm-7B2-a	~986-987	447	0.863	11.9	1095-1105
Sdm-7B2-b	~986-987	901	0.882	12.4	1090-1100
Sdm-7B2-c	~986-987	14	0.845	12.6	1090-1100

Variety according to Adam Kędzierski	Variety according to CNP	Number of whole items	Average weight	Average Ø	Dating
Sdm-7B2-d	~986-987	8	0.958	12.5	1090-1100
Sdm-7B2-e	~986-987	34	0.824	12.5	1090-1100
Sdm-7B2-f	~986-987	279	0.847	12.4	1090-1100
Sdm-7B2-g	~986-987	125	0.876	13.0	1090-1100
Sdm-7B2-h	~986-987	17	0.805	12.9	1090-1100
Sdm-7B2-i	~986-987	21	0.834	12.3	1090-1100
Sdm-7B2-j	~986-987	3	0.991	12.6	1090-1100
Sdm-7B2-k	~986-987	3	0.781	11.5	1095-1105
Sdm-7B2-l	~986-987	198	0.885	12.5	1090-1100
Sdm-7B2-m	~986-987/990	168	0.846	11.6	1095-1105
Sdm-7B2-n	~986-987	58	0.869	13.2	1090-1100
Sdm-7B2-o	~986-987	11	0.907	12.3	1090-1100
Sdm-7B3-a	~986-987	2	0.944	12.8	1090-1100
Sdm-7C1-a	~986-987	25	0.852	12.3	1090-1100
Sdm-7C1-b	~986-987	23	0.875	12.2	1090-1100
Sdm-7C1-c	~986-987	5	0.917	12.5	1090-1100
Sdm-7C1-d	~986-987	8	0.797	12.3	1090-1100
Sdm-7C2-a	~986-987	191	0.881	12.2	1090-1100
Sdm-7C2-b	~986-987	13	0.978	12.0	1095-1105
Sdm-7C2-c	~986-987	3	0.813	11.9	1095-1105
Sdm-7C2-d	~986-987	9	0.800	11.8	1095-1105
Sdm-7D1-a	~985/986	26	0.907	12.2	1095-1105
Sdm-7E1-a	~985/986	16	0.836	11.4	1095-1105
Sdm-7F1-a	~985/986	6	0.872	12.8	1090-1100
Sdm-7F1-b	~985/986	1	0.764	12.9	1090-1100
Sdm-7F1-c	~985/986	1	0.777	12.4	1090-1100
Sdm-7F1-d	~985/986	3	0.946	12.7	1090-1100
Sdm-7G1-a	~997	1	0.972	12.4	1090-1100
Sdm-7G2-a	~986-987/860	1	0.789	11.3	1095-1105
Sdm-7G3-a	~986-987/860	2	0.869	11.8	1095-1105
Sdm-7G4-a	?/860	3	0.974	12.4	1090-1100
Sdm-7G5-a	~986-987/846	13	0.982	12.3	1090-1100
Sdm-7G6-a	~986-987/672	5	0.818	12.2	1090-1100
Sdm-7G6-b	~986-987/672	6	0.883	12.6	1090-1100
Sdm-7G7-a	~986-987/648	1	0.742	12.4	1090-1100
Sdm-7G7-b	~986-987/648	1	0.692	12.9	1090-1100

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The first hoard from Słuszków near Kalisz, discovered in 1935, is the largest group of late varieties of cross deniers. Its preserved part consists of over 13 thousand coins, as well as ornaments and silver plates. The deposit was hidden in the first years of the 12th century. It contains, among others, 120 copies of extremely rare large deniers of the palatine Sieciech, with his sign on the obverse and the knight's cross on the reverse. A comparative analysis of the voivode's coins and cross deniers allowed us to connect a large group of previously anonymous cross coins, previously attributed by most researchers to Saxon workshops, with Polish coinage. Based on research on cross deniers from the turn of the 11th and 12th centuries from the Słuszków I hoard, a new classification of these coins was presented, as well as their metrology, chronology and origin. The publication presents the period of dynamic development of Polish coinage during the reign of Władysław Herman and his son Zbigniew.

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