

Bavarian Cloth Seals in Hungary

Maxim Mordovin*

Eötvös Loránd University, Faculty of Humanities, Institute of Archaeological Sciences

The import of cloth was one of the most important sectors of international trade throughout the European Middle Ages and early modern period. Its history and impact on medieval economies have been studied by scholars for quite a long time, creating the impression that there are no new sources waiting to be found. Improved methods of archaeological excavations, however, have produced data significant to the international trade connections. This data was hidden in small leaden seals that were attached to the textile fabrics indicating their quality and origin. In this paper, I examine the cloth seals originating from Bavaria that have been found so far in the Carpathian Basin and compare the information provided by them with that already known from the available written sources. This comparison leads to several important conclusions. Perhaps most importantly, the dating range of the known cloth seals can be convincingly limited within the fifteenth and sixteenth centuries for all the nineteen known textile production centers. Also, the cloth marked by these seals indicates that some serious changes arose in textile consumption at the end of the Middle Ages. In this study, I identify some new places of origin not mentioned in the written sources and trace their distribution in the medieval Kingdom of Hungary.

Keywords: international trade, textile production, medieval Bavaria, cloth seals, cloth and linen trade

Introduction

The reshaping and transformation of the Western European economy in the late Middle Ages had several consequences, including an increase in the role of the southern German and Silesian textile industry¹ and an ever greater presence of its fabrics on the Hungarian markets.² By the end of the Middle Ages, the cloth import of the Kingdom of Hungary had become dominated by the production from the Holy Roman Empire, and a large portion of these fabrics consisted of cloth from southern Germany.³ The appearance of such textiles

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1 On Silesian cloth production in Hungary most recently see Mordovin, “Sziléziai posztó,” 439–54.

2 The most relevant works include: Schenk, *Nürnberg und Prag*; Ammann, *Die wirtschaftliche Stellung*; von Stromer, *Die Gründung der Baumwollindustrie*; Holbach, *Frühformen von Verlag und Großbetrieb*.

3 Ember, *Magyarország nyugati külkereskedelme*.

and the changes in their temporal and geographical distribution can be very clearly traced in the contemporary written sources. Fortunately, this part of the research has already been successfully accomplished by scholars of Hungarian medieval economic history, such as György Székely and Walter Endrei. Székely evaluated the available written sources on German cloth in Hungary in his 1975 article,⁴ and Endrei discussed the “rest” of the archival material in his book published in 1989.⁵

In this paper, I introduce a new – archaeological – type of source in the research on late medieval and early modern Hungarian cloth imports. This source is a group of small lead seals, which can help in identifying the origins of particular finds.⁶ These seals, however, indicate the provenance of the product, but not the route by which it was transported or the origin of the merchants. Certainly, I am not the first person to notice the significance of such finds in the region. Along with the work of Walter Endrei, some articles on the subject were written by Lajos Huszár, Ján Hunka, Radu Popa, and others.⁷ Nevertheless, the number of cloth seals in the last two decades has increased significantly, enabling one to pursue more detailed research according to smaller regions of the provenance of such finds.⁸

Although the cloth seals are very well known and widely evaluated in the Western scholarly literature, until about ten years ago their significance as a source was greatly underestimated in East Central Europe.⁹ The use and function of these seals and the institutional background of the authentication process in the larger textile centers are thoroughly analysed and described in the works of Nicolaas Wilhelmus Posthumus, Geoff Egan and Dieter Hittinger.¹⁰ Here, therefore, I concentrate only on the seals as a new type of source omitting the details of the production process.

4 Székely, “Posztófajták,” 765–95.

5 Endrei, *Patyolat és posztó*.

6 See Egan and Endrei, “The Sealing of Cloth in Europe,” 47–75; Hittinger, *Tuchplomben*, 7–17; Kocińska and Maik, *Średniowieczne i nowożytnie plomby tekstylne*, 11–16.

7 Huszár, “Merchant’s seals,” 187–94; Hunka, “Nálezy olovených plómb,” 295–309; Popa, “Plumburi de postav medieval,” 237–39. For a brief research history in Hungary see Mordovin, “Late Medieval and Early Modern Cloth Seals,” 193–94.

8 For Silesia once again Mordovin, “Sziléziai posztó,” 439–54.

9 Idem, “A 15–17. századi távolsági textilkereskedelem,” 267–82; Idem, “Late Medieval and Early Modern Cloth Seals”; Idem, “Egy négy évszázados bűntény,” 107–14.

10 Posthumus, *De Geschiedenis van de Leidsche lakenindustrie*; Egan, *Provenanced Leaden Cloth Seals*; Hittinger, *Tuchplomben*.

The last two decades of archaeological excavations and the intensive use of metal detectors (both legally and illegally) in several countries of the Carpathian Basin have produced a relatively large number of cloth seals the provenance of which lie in very different European regions, including Flanders, the Netherlands, the Holy Roman Empire, Bohemia, Silesia, Italy, etc. A significant group among them consists of finds connectable to the southern German regions, most of all to present-day Bavaria.

The borders of the huge number of principalities, counties, and duchies were continuously changing throughout the history of the Holy Roman Empire, so it is very hard to choose a single larger political-historical unit within the southern German region. This persuaded me to do an analysis of the items from the medieval and early modern finds that can be connected to the cities of the present-day Free State of Bavaria. Modern Bavaria includes parts of the historical regions of Franconia, Upper Palatinate, and Swabia. Unfortunately, the limits of the present study do not permit me to evaluate the whole German territory.

The temporal frames of the analysis are given by the dating of the earliest and latest known cloth seals provenanced from Bavarian cities. Thus, at the present stage of the research, the period in question can be limited to the fifteenth, sixteenth, and seventeenth centuries.

In his 1975 article, György Székely mentions six southern German cities as origins of cloth exports to Hungary: Bamberg, Eichstätt, Schwabach, Ulm, Nuremberg, and its suburb, Wöhrd. All of them appear in the contemporary written sources evaluated by Székely.¹¹ He at the same time emphasizes that despite the obvious and well-known significance of textile production of Augsburg, he found no written evidence indicating that its cloths ever made it to Hungary.¹² Endrei names eight additional Bavarian cities: Dinkelsbühl, Isny, Kempten, Memmingen, München, Öttingen, Rothenburg, and Waldsee. Altogether, the available Hungarian written sources give us a list of fourteen textile production centers, which undoubtedly exported their fabrics to the Kingdom of Hungary in the period beginning in the fourteenth century and ending in the seventeenth.

Nevertheless, the total number of cities in the region in question that produced textiles in the late Middle Ages and early modern time was much

¹¹ Székely, "Posztófajták," 778.

¹² *Ibid.*

higher. According to Rudolf Holbach's monograph, at least 46 settlements had significant cloth industry.¹³

The Purely Written Evidence (Bamberg, Eichstätt, Öttingen, and Wöhrd)

Some of the aforementioned places, such as Bamberg, Eichstätt, and Wöhrd, can be discussed very briefly. Despite their intensive and significant cloth production in the fifteenth–sixteenth centuries, so far no archaeological evidence has been found indicating that their fabrics were sold in Hungary. No cloth seals from these cities have been found so far in any other parts of Europe. This is surprising because their cloth fabrics are mentioned relatively frequently in the Hungarian written sources.¹⁴

The cloth of Bamberg as *Pabenperger* is first mentioned in the so-called Sybenlinder-register from 1436.¹⁵ This register was compiled by Hans Sybenlinder, the royal castellan of Óbuda and Solymár in 1436, and it specified the tariff articles imported to Hungary. According to it, the Bamberg cloth appeared as the second-to-last cheapest item.¹⁶

The situation with Eichstätt, Öttingen, and Wöhrd on the one hand, was similar to that of Bamberg since no indisputably identifiable cloth seals connected to these cities have been found so far. On the other hand, the state of the research is a bit worse, because their fabrics are only rarely mentioned in the available written sources. The largest of the three cities is Eichstätt. Goods from Eichstätt appear in the Sybenlinder account in 1436 (*de panno Achsteter*) among the cheapest articles.¹⁷ The other known source for its cloth is the 1457–58 custom register from Pozsony (Pressburg, today Bratislava, Slovakia) – *tuch aechstetar*.¹⁸ The quality of the cloth imported to Hungary from Eichstätt can be considered medium according to the duties paid for it.¹⁹ Öttingen appears in the sources only in the sixteenth century, alongside other southern German linen fabrics traded in Hungary by the Funck Trading Company. Balázs of Csepreg (*Wallasch zu Tschapring*) bought twenty rolls between 1517 and 1522.²⁰

13 Holbach, *Frühformen von Verlag und Großbetrieb*, 127–40, 763 (Karte 5).

14 Székely, “Posztófajták,” 778.

15 Kumorovitz, *Monumenta Diplomatica* (hereafter BTOE 3/2.), 272.

16 Székely, “Posztófajták,” 778.

17 BTOE 3/2. 272.

18 Kováts, *Nyugatmagyarország áruforgalma*, 102, 171.

19 Székely, “Posztófajták,” 783.

20 Endrei, *Patyolat és posztó*, 140.

The identification of Wöhrd was problematic even in the written sources. György Székely was the first person who convincingly identified the *werderjyn*, *werder* cloth as a product of a Nuremberg-suburb, present-day Wöhrd. Known as an important textile production settlement, its fabrics appear in the Hungarian sources as early as the first half of the fifteenth century: in the Sybenlinder account²¹ and in the Pozsony custom register.²² They are mentioned in custom registers and north-western toll accounts from the end of the century in Nagyszeben (Hermannstadt, today Sibiu, Romania).²³ Most probably, its disappearance from the later sources and the lack of the cloth seals can be explained by the fact that from the end of the Middle Ages the craftsmen of Wöhrd were actually citizens of Nuremberg. Therefore, they produced the same sort of cloth as the imperial city and – most probably – sealed it the same way. The regulations of the Nuremberg City Council from 1489 and 1522 clearly imply this practice,²⁴ and behind some of the Nuremberg seals, actually Wöhrd may be hiding (see the Nuremberg chapter).

Written and Probable Archaeological Evidence (Schwabach, Isny, Kempten)

The cloth from Schwabach is mentioned only once in the Hungarian sources. In 1501, the royal city of Bártfa (today Bardejov, Slovakia) was allowed to pay part of its taxes in cloth from Schwabach.²⁵ The coat of arms of Schwabach depicts two crossing beer kettles with long handles combining the lion and the symbol of the Hohenzollern family (*Quarterly Argent and Sable*).²⁶ This coat of arms is interesting because a similar but very damaged image is familiar from two cloth seals. Both of them are stray finds but while the find location of the first is unknown (somewhere in south-eastern Hungary), the second one was discovered in the vicinity of Szolnok. The image visible on the obverse side depicts two crossing rods with some kind of basket at the ends. Thus, it resembles the charge of the Schwabach coat of arms. The background of the escutcheon is *quarterly* indicating the two different tinctures of the Hohenzollern coat of arms. According to the fragments of an inscription on the seals they can be dated to the late fifteenth or the sixteenth century (Fig. 1a).

21 BTOE 3/2. 272.

22 Kovács, *Nyugatmagyarország áruforgalma*, 160, 168.

23 Székely, “Posztófajták,” 782–83; Ember, *Magyarország nyugati külkereskedelme*, 75–78.

24 Sakuma, *Die Nürnberger Tuchmacher*, 321.

25 Székely, “Posztófajták,” 784.

26 Tyroff, *Wappenbuch der Städte*, 61.



Fig. 1. Cloth seals from Schwabach (a), Isny (b) and Kempten (c)

Another city of origin which might be traceable among the archaeological finds is Isny im Allgäu. The coat of arms of Isny includes a one-headed eagle holding a smaller escutcheon with a horseshoe.²⁷ No sources have been published on this in detail yet, but Endrei mentions the appearance of *aisner* or *eisner* linen fabrics in Hungary.²⁸ So far, only one cloth seal can be connected with Isny. It was found on the site of a deserted village destroyed in the late sixteenth century, located near Nagyszénás in south-eastern Hungary. The obverse side of the seal shows a well-executed horseshoe in a pearled circle, and a one-headed eagle-like bird can be seen on the reverse side. Since this is the only such find known both in and outside Hungary, the identification cannot yet be confirmed. It is not possible to date the find more precisely than sometime in the fifteenth or sixteenth century based on the style of the details and the *ante quem* dating given by the destruction of the settlement (Fig. 1b).

The third more-or-less probable identification concerns the products of Kempten. The linen fabrics of the city were well known in the sixteenth century,²⁹ and they can be traced on the Hungarian markets.³⁰ The coat of arms of Kempten is party per pale with a demi-eagle and a tower³¹ or party per pale

27 The most authentic contemporary depiction of the city coat of arms is known from a manuscript: *Sammelband mehrerer Wappenbücher*, Bayerische Staatsbibliothek, BSB Cod.icon. 391 [S.l.] Süddeutschland (Augsburg?) um 1530, f. 80.

28 Endrei, *Patyolat és posztó*, 141.

29 Holbach, *Frühformen von Verlag und Großbetrieb*, 160; Sakuma, *Die Nürnberger Tuchmacher*, 129.

30 Endrei, *Patyolat és posztó*, 141.

31 Tyroff, *Wappenbuch der Städte*, 40.

with a double-headed eagle united by a crown (without a tower).³² The cloth seal identifiable as being from the Kempten linen or fustian is very damaged. However, the impressions on the obverse side recognisable as a double-headed eagle (without the crown) and a small fragment of a tower. The precise find location of the item is unknown but it was discovered in the vicinity of Szolnok, most probably beside a crossing over the Tisza River. There is no firm evidence to date this find. Only the bent sides of the escutcheon with the eagle suggest the sixteenth or seventeenth century (Fig. 1c). Cloth seals from Kempten have been found in Bremen (Germany),³³ London,³⁴ and Salisbury³⁵ but all three of them are quite different from the Hungarian one. The German find and the one from London can be dated to the seventeenth century, while the item from Salisbury is undated.

The Most Popular Cloth in Hungary (Nuremberg)

According to the fifteenth–sixteenth-century registers, Hungary had the most intense relationship with Nuremberg, of all the Bavarian cities in that period.³⁶ This is indicated not only by the large amount of different goods imported from the city³⁷ but also by strong family relations of the Nuremberg and Hungarian urban patriciate.³⁸ Cloth imports played a significant role in this.

The written evidence documents the appearance of the Nuremberg fabrics on the Hungarian markets as early as the fifteenth century. The earliest reference to this can be found in the custom register of Pozsony from 1457–1458, which mentions medium quality cloth from Nuremberg. In 1497, the fabrics of the city appeared in the Saxon region of Transylvania.³⁹

From the first quarter of the sixteenth century, the import of the Nuremberg cloth production increased significantly, a process which is reflected in the custom registers. At the same time, the available written sources report

32 *Sammelband mehrerer Wappenbücher*, f. 155.

33 Hittinger, *Tuchplomben*, 139, Taf. 9/8.

34 Egan, *Lead Cloth Seals*, 107, 192, Fig. 41/314.

35 Idem, “Cloth seals,” 71, 85, Fig. 26/155.

36 Westermann and Denzel, *Das Kaufmannsnotizbuch*, 129–31; Ammann, *Die wirtschaftliche Stellung der Reichsstadt*, 42–44, 80–83, Karte IV.

37 Schenk, *Nürnberg und Prag*, 47.

38 Ibid., 168–72.

39 Székely, “Posztófajták,” 779.

on at least two types of cloth brought from Nuremberg: more expensive long and medium-priced short fabrics.⁴⁰ These products are often mentioned in the custom accounts of Brassó (1529–56, Kronstadt, today Braşov, Romania) and Zsolna (1530–31, today Žilina, Slovakia). The local regulations of Kolozsvár (Klausenburg, today Cluj-Napoca, Romania) also recorded two types of the Nuremberg cloth.⁴¹ It seems that from the 1540s the import of the higher quality textiles into Hungary became dominated by the cloth from Nuremberg. Thus, Nuremberg provided 73.67 percent of the more expensive fabrics but only 4 percent of the medium-quality fabrics, and even including the cloth from Wöhrd this figure climbs only to 16 percent. At the same time, there were no Nuremberg textiles within the cheapest group.⁴² The intensity of this trade was so important that the German city became seriously dependent on sales in Hungary. The collapse of the Hungarian market in the late sixteenth century caused notable financial difficulties in Nuremberg.⁴³

Despite the wars and financial obstacles, from the mid-sixteenth century onward the cloth from Nuremberg was the most popular higher quality textile in the Kingdom of Hungary. It is mentioned in hundreds of letters and inventories, even if in some cases the contemporaneous spelling of the Nuremberg cloth may be confusing, causing it to be conflated with the cloth from Löwenberg (today, Lwówek Śląski, Poland).⁴⁴ In 1551, the Transylvanian Chamber of Salt paid its employees (salt cutters) with *short lurnberg cloth*. During the Ottoman wars, this cloth was transported to occupied territories and sold there by the Hungarian merchants throughout the second half of the sixteenth century.⁴⁵

The cloth production of Nuremberg was thoroughly analysed in 1993 by Hironobu Sakuma. According to his monograph, the textile was produced and dyed here from the late thirteenth century onward, while the differentiation of the fabrics began in the following centuries. Sources from 1504 already mention seven sorts of cloth produced in the city.⁴⁶

40 Ember, *Magyarország nyugati külkereskedelme*, 77–78. The differentiation of the fabric quality according to the sizes is presented in Nuremberg from the 1340s (Sakuma, *Die Nürnberger Tuchmacher*, 122).

41 Székely, “Posztófajták,” 780.

42 Ember, *Magyarország nyugati külkereskedelme*, 77.

43 Sakuma, *Die Nürnberger Tuchmacher*, 146–48.

44 Mordovin, “Sziléziai posztó,” 448–50.

45 Székely, “Posztófajták,” 781.

46 Sakuma, *Die Nürnberger Tuchmacher*, 50–53, 122.

The practice of sealing the local products first appears in the archival sources in ca. 1300 but with no indication of whether wax or lead seals were used.⁴⁷ The earliest reference to detailed regulation dates to the second half of the fifteenth century. According to this regulation, at the time, the quality of the cloth was indicated by the number of lead seals. There were three sorts, which had respectively one, two or three seals. Unfortunately, the source does not discuss the imprints on the seals.⁴⁸ By the beginning of the sixteenth century, the information concerning the seals becomes more detailed. The table given below summarizes the available data concerning the seals used for the Nuremberg cloth⁴⁹

Table 1. Types of the Nuremberg cloth sealed according to the regulations

Bleached cloth	15 th	Seal with a cross	single seal ¹
Dyed cloth		Seal with N	three seals according to the three examiners ²
Dyed cloth of different origin but examined in Nuremberg	1569 ³	Painted N and F.A.R.B.	no lead seals, except those traded in Italy. They received a usual N
Fustian		Ox, Lion, Grape and Letter	
English wool 1		Saint Lawrence and Imperial Eagle	
English wool 2		Coat of arms of Nuremberg, twice	
English wool 3		Divided coat of arms of Nuremberg and N	
English wool (<i>other cloth</i>)	1570 ⁴	N and Shield [probably the coat of arms of the city without the eagle]	

1 Sakuma, *Die Nürnberger Tuchmacher*, 50–53, 122.

2 Ibid.

3 Ibid., 137–38.

4 Ibid., 139.

47 Ibid., 49–50.

48 Ibid., 122.

49 Similar table is given in Hittinger, *Tuchplomben*, Anhang 1.

The data given in the table is well reflected in the cloth seal finds in Hungary. There are four types, which can undoubtedly be connected to Nuremberg (Fig. 2).

Table 2. Main types of the Nuremberg cloth seals found in the Carpathian Basin

T1	Obverse: Saint Lawrence holding book and gridiron; reverse: Gothic minuscule or Renaissance type NUE/REMBE/RG	5 finds	Eastern Slovakia, Stapar (Serbia: József Géza Kiss' Collection), vicinity of Szolnok (3 items)
T2	Coat of arms of Nuremberg on both sides of the seal	14 finds	2 from southern Transdanubia (Private collection and Hungarian National Museum [hereafter HNM]); northern Transdanubia (HNM) Unknown (HNM) Bácska-Bánság (József Géza Kiss' Collection) Csomorkány; Ópusztaszer; Szeged vicinity; Orosháza-Csorvás; Orosháza–Szentetornya; 3 from the vicinity of Szolnok; Paks-Cseresznyés, Pápa
T3	Coat of arms of Nuremberg and Renaissance W with floral ornament	12 finds	Orosháza–Gerendás; Orosháza–Nagyszénás; Kunágota; Bácska-Bánság (József Géza Kiss' Collection) Unknown (2 items in private collections) Castle of Bács, 3 from the vicinity of Szolnok, Paks-Cseresznyés
T4	Coat of arms of Nuremberg and Renaissance N with floral ornament	7 finds	Unknown (HNM) Battonya–Basarága; Castle of Diósgyőr; Castle of Bajcsa; Castle of Sempte (today Šintava, Slovakia); Orosháza-Szentetornya, Feltót

As the two tables make clear, the known cloth seals most of all fit the category either of textiles produced from English wool or English cloth dyed in Nuremberg. The first type of seals unambiguously corresponds to the first group of “English” fabrics from the sixteenth-century regulation, since there is no other version with an image of Saint Lawrence. The only difference is the lack of the imperial eagle and the inscription on the reverse side. The reason for this might be that, according to the type of NUE/REMBE/RG, these seals seem to precede this regulation chronologically. They are datable to the late fifteenth or early sixteenth century (Fig. 2a). Unfortunately, all four such seals are stray finds and cannot be dated any more precisely. The one found near Szolnok with the Renaissance [...]RE[...] / [...]RK[?] inscription indicates the use of this type until at least the mid-sixteenth century. A very interesting fact about these finds is that there are no known similar cloth seals from other countries.



Fig. 2. Cloth seals from Nuremberg: Type 1 (a), Type 2 (b), Type 3 (c) and Type 4 (d)

The second type completely corresponds to the regulation. These seals have identical coats of arms of Nuremberg on both sides (Fig. 2b). Four out of the fourteen such seals are stray finds without even a precise location. Two were found somewhere in southern Transdanubia, another one in northern Transdanubia, while in case of the fourth find there is no data available at all.⁵⁰ Five more seals from different private and museum collections found in the vicinities of Szeged and Szolnok should also be considered stray finds since there is no data regarding their precise localisations. At the same time, there are several luckier finds from Ópusztaszer, Csomorkány, Paks-Cseresznyés, Orosháza-Csorvás, and Orosháza-Szentetornya on which considerably more information is available. Four of them were found during archaeological field surveys, while the fifth (the one from Ópusztaszer) was discovered during the excavations of an abandoned rural settlement and monastic site.⁵¹ The stratigraphy does not help in these cases but the historical events define the *ante quem* data of the finds. All five villages were more-or-less significant settlements before the Ottoman expansion in the mid-sixteenth century. Surviving the first period of military activity, all of them fell victim to the 1596 Ottoman campaign, the first phase of the Long Turkish War (or Fifteen Years War: 1591–1606).⁵²

50 Three of them have been already published: Mordovin, “Late Medieval and Early Modern Cloth Seals,” 213, Cat: 28–29; 214, Cat: 32.

51 Cloth seals from Ópusztaszer and Csomorkány were published: Vályi, “A távolsági kereskedelem,” 62, Fig. 1–2. The rest are unpublished. I am grateful to Zsófia Mesterházy-Ács (Paks), Gyöngyvér Bíró, and Zoltán Rózsa (Orosháza) for this information.

52 Vályi, “A távolsági kereskedelem,” 66; Béres, “Csomorkány-Pusztatemplom,” 23.

The cloth seals with the coat of arms of Nuremberg on one side and a Renaissance W letter on the other cannot be directly connected to any of the versions described in the regulations (Fig. 2c). However, the coat of arms seems identical with that on the second type. All of the twelve such finds were discovered either around Szolnok (three items) or in the southern part of the Great Hungarian Plain: Orosháza-Gerendás; Nagyszénás; Kunágota; Bácska-Bánság (József Géza Kiss' Collection); unknown (two items in private collections) and the Castle of Bács (today Bač, Serbia). The chronology of this group can be also given according to the *ante quem* date of the sites: all the settlements around Orosháza (Gerendás, Nagyszénás, Kunágota) were destroyed at the end of the sixteenth century, which means that these seals must have been brought there earlier. The Renaissance details around the letter W and the coat of arms suggest that they date back to the sixteenth century. Since the known regulation does not give any hints concerning the interpretation of the fabrics marked with these seals, in my opinion, it should be identified with textiles not necessarily produced locally. It is very important that in the sixteenth century not only fabrics that were made in Nuremberg were given Nuremberg cloth seals, but also cloths that were imported from different places. Certainly, this product was also checked to be sure it met the required standards, and then it was sealed. After 1566, the local and the foreign cloths were marked differently.⁵³ At the same time, the most plausible explanation for the simultaneous appearance of the coat of arms of Nuremberg and a W on the same seal is that such fabrics were also produced in Wöhrd. In this case, the W refers to the name of the suburb. The fact that the Hungarian accounts and registers drew a distinction between the cloth from Wöhrd and Nuremberg⁵⁴ proves that this difference was somehow recognisable and that for some reason it was important to separate these fabrics. The easiest way to present the different origin was to mark it on the seals.

The fourth group of the known Nuremberg seals seems the best datable one. This is the type with a coat of arms on the obverse side and a letter N on the reverse side with a clear Renaissance character (Fig. 2d). According to the contemporary regulations, this version appeared in the late 1560s.⁵⁵ Altogether seven such finds are known so far, and they are all from the Carpathian Basin. Except the already published stray find,⁵⁶ three were discovered in castles:

53 Sakuma, *Die Nürnberger Tuchmacher*, 137–38.

54 Ember, *Magyarország nyugati külkereskedelme*, 77.

55 Sakuma, *Die Nürnberger Tuchmacher*, 137–38.

56 Mordovin, "Late Medieval and Early Modern Cloth Seals," 213, Cat: 31.

Bajcsa,⁵⁷ Diósgyőr,⁵⁸ and Feltót (today Tauți, Romania). Two more were found around Orosháza (the deserted villages of Szentetornya and Battonya). The last one, from Sempte, cannot be identified indisputably as a cloth seal from Nuremberg, because apart from the letter N, it bears no other characteristic details of the group.⁵⁹ As is known from the case of Switzerland, the letter N may also refer to Nördlingen.⁶⁰ The situation with the dating is in some ways similar to that with the other groups of Nuremberg finds since at least four of the seven sites existed until the last decade of the sixteenth or the first of the seventeenth century.

Summarizing the Nuremberg cloth seal finds from Hungary, two details are very conspicuous. One is that there are no known published analogies from outside the territory of the medieval Kingdom of Hungary, except a single stray find of the third type from Bohemia.⁶¹ The other such detail is that the dating of all known Nuremberg cloth seals fits within the sixteenth century, with slight variance towards the late fifteenth and early seventeenth. Both of these observations are hard to explain. Perhaps the lack of foreign analogies is primarily the result of the different states of the research. The reason for the second one might be explained by the relatively late introduction of lead cloth seals in the textile production in Nuremberg. The interruption at the beginning of the seventeenth century must have been the consequence of the collapse of the cloth market in Hungary during and after the Long Turkish War.

Written Sources and Rich Archaeological Evidence (Ulm)

The case of Ulm is somewhat clearer than the previous ones. The connections between Hungary and the city are well documented from the fourteenth century when Ulm became an important importer of Hungarian wool. From as early as the mid-fifteenth century, medium quality Ulm cloth can be traced in the Carpathian Basin. In the Sybenlinder list it appears as VLNER.⁶² Even if its quality decreased during the Ottoman period, it was still presented in the sixteenth–seventeenth-century custom records.⁶³ Beginning in the late Middle

57 Kovács, *Bajcsa-vár*, 179–206.

58 Czeglédy, *A diósgyőri vár*, XLVI/b.

59 Hunka, “Nálezny mincí zo Šintavského hradu,” 49.

60 I am grateful to Rahel C. Ackermann for this information.

61 Unpublished, found on a web-forum.

62 BTOE 3/2. 272.

63 Endrei, *Patyolat és posztó*, 131, 140, 150–51.

Ages, Ulm was producing mainly two types of textiles: woollen cloth and cotton fabrics. However, there is not yet any contemporary evidence for differences in the sealing practices used with these types of textiles. The written sources from Ulm itself show a gradually developing cloth industry up until the early seventeenth century, when it was interrupted by the Thirty Years' War and never recovered.

As archaeological finds, there are three types of cloth seals from Ulm in the Carpathian Basin, and all of them include the coat of arms of the city: party per fess Sable and Argent.⁶⁴

- 1) obverse: coat of arms of Ulm; reverse: imperial eagle (Fig. 3a)
- 2) obverse: coat of arms of Ulm; reverse: party per pale, demi-eagle at the pale (Fig. 3b)
- 3) obverse: coat of arms of Ulm; reverse: inscription ULM written in Humanist capital letters (Fig. 3c)



Fig. 3. Cloth seals from Ulm: Type 1 (a), Type 2 (b) and Type 3 (c)

There is a fourth type known in Germany, on which the coat of arms on the obverse is supplemented with Renaissance letters V-L-M⁶⁵ or a date (for example 1518), and the imperial eagle of the reverse is replaced with the Gothic minuscule type ULM. However, at the moment no examples of this version of the Ulm seals have been found in East Central Europe.

64 *Sammelband mehrerer Wappenbücher*, f. 80, 155, 171.

65 A similar one is known from Rheinau (Switzerland): Ackermann and Zäch, "Plomben Marken und Zeichen," 100, Abb. 1a.

The largest collection of the Ulm seals in Hungary originates from the excavations of the old market square in the small western Hungarian town of Pápa. These finds represent the first two of the known types of such items. In Pápa the 14 seals were found in very different layers. Apart from three stray finds, two more came from modern features in secondary positions. The stratigraphy of the rest of the eight items can be dated from the late fifteenth to the early seventeenth centuries. The layers datable by coins indicate significant strata from the mid-sixteenth century. They are connected most of all to the layers associated with the rearranging of the market square when some new houses were built on the formerly paved surface. This process took place between 1526 and the late 1560s.⁶⁶ According to the numismatic finds from the same layers, the dating can be narrowed to the 1550s or 1560s. Some other Ulm seals were found in a destruction or levelling layers datable not later than to the beginning of the seventeenth century. These layers indicate a huge catastrophe that struck the town around 1600. There were two such events in the history of Pápa in this period, which may have led to the destruction of all the buildings at the market square. The first was the siege of 1597 when the explosion of the gunpowder destroyed the castle and burnt most of the town to the ground.⁶⁷ The next event, which was less likely to have been the cause, took place in 1600. The unpaid Walloon mercenaries revolted and turned to the Ottoman side. This led to another siege, which might have caused damage to the town as well. In any case, from the first decade of the seventeenth century, the market square of Pápa was again rearranged and new stone houses were constructed on the site of the earlier timber-framed ones.⁶⁸ This construction activity was preceded by a significant levelling of the debris of the earlier structures. This is the levelling layer that contained the Ulm cloth seals. To conclude these observations, all the datable seals from Pápa come from the second half of the sixteenth century. The similar finds from Germany⁶⁹ and Great Britain confirm this dating,⁷⁰ indicating at the same time the earlier appearance of this type of Ulm seals.

Apart from the fourteen items found at Pápa, there are sixteen more cloth seals with the coat of arms of Ulm found in Hungary. All of them are metal-detector finds and thus cannot be dated properly. Eight seals were collected in

66 Mordovin, “Előzetes jelentés,” 248–49.

67 Pálffy, *A pápai*, 47.

68 Mordovin, “Előzetes jelentés,” 249–50.

69 Hittinger, *Tuchplomben*, 144, Taf. 11/7.

70 Egan, “Lead Seals for Textiles,” 196.

the vicinities of Szolnok, and five additional seals were found in the plain region of Hungary: Révbépuszta, Hajdúböszörmény, Nagyszénás, Orosháza-Fecskés, and Orosháza-Szentetornya, one more not far from Bény (today Bíňa, Slovakia). The last one is a stray find from a private collection. The finds from the plain region can be dated to before the end of the sixteenth century, because the deserted villages were destroyed in that time, during the so-called Long Turkish War (or Fifteen Years War: 1591–1606). Most of the stray finds (six seals) belong to the first group (arms and a whole eagle). Five more represent the second group with the demi-eagle. Only two items have the inscription VLM on the reverse, and three more were identified only on the basis of the fragments of the coat of arms. At the present stage of the research, there is not enough data to make any chronological distinction between the three types of seals from Ulm.

Scarce Written and Firm Archaeological Evidence (Augsburg, Dinkelsbühl, Memmingen, Rothenburg, and Waldsee)

The absence of the written sources concerning a particular production center does not necessarily mean the complete absence of its fabrics in the Kingdom of Hungary. This is the case of Augsburg. Cloth production in the city began in the thirteenth century. Its fabrics were very widespread all across the Europe. This fact is well documented not only by the contemporary written sources⁷¹ but also by a large number of the cloth seals with the coat of arms and symbols of Augsburg. The most popular product from the Augsburg textile industry was the fustian, which can be dated from the thirteenth century onward, and by the end of the Middle Ages was represented by fabrics of different quality and colours.⁷² According to Székely, there is no mention of Augsburg in the Hungarian sources. However, he checked primarily the sources on the north-western section of the border of the Hungarian Kingdom referring exclusively to the cloth fabrics (i.e. woollen production). He did not collect references for the linen or cotton textiles, which, however, was also regularly imported to Hungary. Correspondingly, the fustian – which was made of cotton – was omitted from his collection. At the same time, it is perfectly possible that the products from Augsburg were used as duties paid elsewhere, probably crossing the northern or western borders.

71 Stromer, *Die Gründung der Baumwollindustrie*, 31–32.

72 Sakuma, *Die Nürnberger Tuchmacher*, 130, 179; Holbach, *Frühformen von Verlag und Großbetrieb*, 183, 188–90.

Walter Endrei in his study states that the Augsburg fustian was traded in Hungary. Thus, for example, in 1519 the Funck Trade Company sent some rolls of this textile to Kőszeg.⁷³ The presence of the Augsburgian fustian in the Kingdom of Hungary can be confirmed so far on the basis of two cloth seals. One of them is known from the private collection of József Géza Kiss. It was found originally in the south-eastern part of Hungary (Fig. 4a). The other was discovered during a field survey in Kóny (north-west Hungary) (Fig. 4b). Both of them represent a very characteristic type of seal with a Gothic majuscule A referring to the name of the city on the obverse and the pine cone on the reverse. The last one appears in the coat of arms of the city from the Middle Ages.⁷⁴



Fig. 4. Cloth seals from Augsburg (a-b) and Memmingen (c-d)

This type of cloth seal was in relatively widespread use all across Europe, and it is familiar from at least five countries: England,⁷⁵ Germany,⁷⁶ Poland,⁷⁷ Denmark,⁷⁸ and the Netherlands.⁷⁹ Since the seals from Hungary are stray finds,

73 Endrei, *Patyolat és posztó*, 150.

74 *Sammelband mehrerer Wappenbücher*, f. 80, f. 167.r; Tyroff, *Wappenbuch der Städte*, 18.

75 Egan, “Cloth seals,” 70, 84, Fig. 25/143; 85, Fig. 26/144–50.

76 Hittinger, *Tuchplomben*, 126–27, Taf. 2/1–8.

77 Kocińska and Maik, *Średniowieczne i nowożytne plomby*, 62–64; Bobowski, *Plomby tekstylne z wykopalisk*, 80–90.

78 Orduna, *Middelalderlige kladepomber*, 253–56.

79 Baart et al., *Opgravingen in Amsterdam*, 53–54.

their dating can be done according to similar finds from other sites. The form of the coat of arms and the size of the Hungarian finds are very common for most of the similar European seals. These analogies enable us to date the item from the private collection to the sixteenth century and the one from Kóny to the seventeenth century. However, the style of the cone of the seal from Kóny and the fact that the reverse side of the seal has specific iconography suggest an even later date for this item, sometime around the late seventeenth or even the eighteenth century.

There is a relatively large group of southern German cities known as exporters of linen or fustian fabrics to Hungary in the late Middle Ages. The written sources from the first half of the sixteenth century mention Dinkelsbühl, Memmingen, Rothenburg, and Waldsee.⁸⁰ These places were relatively well known for their high and medium quality textile production in the late Middle Ages, up to the sixteenth and seventeenth centuries.⁸¹ There is no information concerning the quality of their fabrics sold in Hungary or the quantities that were sold. Nevertheless, the number of the identifiable cloth seals is relatively small. The most widespread type is from Memmingen, which can be identified by its coat of arms blazoned party per pale demi-eagle and cross gules.⁸² When readable, the reverse side in most of the cases shows a Gothic minuscule M referring to the name of the city. Altogether, six indisputable finds (i.e. finds that bear a recognisable coat of arms) are known from the Carpathian Basin: Pápa (Fig. 4c), Csejte (today Čachtice, Slovakia), Bény, Battonya-Kovácsháza, Szolnok, and one in a private collection (Fig. 4d). There are two more finds, which can be identified as originating in Memmingen on which only the Gothic M survived. Both finds were discovered at the market square of Pápa. Concerning the dating, only the finds from Pápa and Csejte have any stratigraphical data. In the first case, the seals with the letter M came from the layers datable to the fifteenth and sixteenth centuries. The one from Csejte, which was improperly identified by Ján Hunka as a cloth seal from Opole (Silesia, Poland), was accompanied by two coins, the younger of which was a *quarting* of King Sigismund from 1430–37.⁸³ As they are almost identical with the stray finds, the dating seems to have

80 Endrei, *Patyolat és posztó*, 131, 140–41.

81 Stromer, *Die Gründung der Baumwollindustrie in Mitteleuropa*, 15, 38, 54, 95; Holbach, *Frühformen von Verlag und Großbetrieb*, 135, 161–62, 183.

82 Tyroff, *Wappenbuch der Städte*, 46; *Sammelband mehrerer Wappenbücher*, f. 80, f. 157. r.

83 Hunka, “Nálezý olovených plómb,” 300, 302, Obr. 3/3.



Fig. 5. Cloth seals from Dinkelsbühl (a-b), Waldsee (c) and Rothenburg (d)

been the same, roughly the period from the mid-fifteenth until the mid-sixteenth century.

All four cloth seals connected to Dinkelsbühl should be regarded as stray finds, including the two from the vicinity of Szolnok. The find locations of two others are completely unknown: one is in a private collection (Fig. 5a), the other, which is in the Hungarian National Museum (Fig. 5b), has already been published but as of unknown provenance.⁸⁴ These items can be identified according to the three corns in the ear from the coat of arms of the city.⁸⁵ The reverse side of the seals depicts an imperial eagle. In one case, only the reverse side survived with the eagle but its characteristic shape enables one to identify the seal firmly. There is no data so far for dating this group of seals more precisely than the fifteenth or sixteenth centuries, based mostly on historical references on the settlement structure of the Great Hungarian Plain, where these finds might have been discovered. I have not yet found any published seals from Dinkelsbühl outside the Carpathian Basin.

The last two cities, Rothenburg and Waldsee, have relatively simple and thus not unambiguously identifiable coats of arms. The coat of arms of Rothenburg is *Argent a castle with two towers Gules*;⁸⁶ for Waldsee, the coat of arms is even

84 Mordovin, “Late Medieval and Early Modern Cloth Seals,” 228, Cat: 92.

85 Tyroff, *Wappenbuch der Städte*, 29; *Sammelband mehrerer Wappenbücher*, f. 80, f. 155.

86 *Ibid.*, 154.

simpler: Sable a fess Argent.⁸⁷ The identification of the seals was possible due to the inscriptions on them: ROTEN/BVRG and WALDSEE. Two seals from Waldsee were found in the course of the excavations at Pápa, and another one comes from the vicinity of Szolnok (Fig. 5c). The latter is a stray find, but those from Pápa were discovered on the sixteenth–seventeenth-century surface layers of the market. The reverse side of the seals in all cases depicts the coat of arms of the city. There is only one known item firmly identifiable with Rothenburg, also found somewhere around Szolnok, but with no information that would make it possible to identify the location any more precisely (Fig. 5d). The dating can be deduced only from the type of inscription. The antique style of the fonts suggests dating not earlier than the first half of the sixteenth century.

Only Archaeological Evidence (Munich, Regensburg, Hof, Kulmbach, and Kaufbeuren)

The list of the cities the textile products of which were imported to the Kingdom of Hungary (as we know from the written sources) can be extended by five more places. This information comes from the archaeological finds. All five cities, namely, Munich, Regensburg, Hof an der Saale, Kulmbach, and Kaufbeuren, played more or less notable roles in the textile industry of southern Germany, but none of them appears in the known contemporary written documents as an exporter of textiles to Hungary. The most significant center for them was Munich,⁸⁸ the cloth seal of which found at Castle Szitnya (today Sitno, Slovakia) was first identified by Ján Hunka.⁸⁹ Since then, one more has been found in the vicinity of Szolnok and at least eight at the market square of Pápa (Fig. 6a–b). The basis for the identification of them is a monk's head on the obverse, which at the same time refers to the name of the city and to its coat of arms.⁹⁰ The reverse of the seals varies considerably, presenting at least five different imprints: a stylized image of a church (a triangle or rectangle with a cross on top), a Gothic minuscule letter M or flowers. Only the last type recurs twice. There is no convincing explanation for this phenomenon, but it might indicate that these marks were some kind of privy marks. The Munich seals found in Pápa can be dated predominantly to the sixteenth century, even if two items

87 Ibid., f. 164.

88 Steck, *Das Münchner Loder- und Tuchmachergewerbe*.

89 Hunka, "Nálezy olovených plómb," 300, 302, Obr. 3/4.

90 *Sammelband mehrerer Wappenbücher*, f. 15.r.; Tyroff, *Wappenbuch der Städte*, 47–49.



Fig. 6. Cloth seals from Munich (a-b) and Regensburg (c-d)

were discovered in later layers. It seems that no cloth from Munich arrived to Pápa after the occupation of the town by the Ottoman army in 1594 and its destruction during the siege in 1597.⁹¹ The seal found at Castle Szitnya has been dated to the fifteenth century.⁹² The last one from Szolnok is a stray find, but the characteristic late Renaissance style fonts from the fragmented inscription on the reverse ([...]HA) suggest a relatively late dating, maybe even to the seventeenth century.

Outside the territory of medieval Hungary, only two cloth seals that can be connected to Munich are known so far, both of them from the metal detectorists' web forums. The monk's head on the obverse is almost identical with that on the Hungarian finds, while the reverse shows privy mark-like symbols.⁹³ Their dating is uncertain, as are their find locations.

The textile production of Regensburg was as important as that of Munich, but only four cloth seals that can be indisputably connected to the city have been found so far (both in and outside of Hungary). The unquestionable identification is possible only when the imprints on the seals included the name of the city, because the relatively widespread crossed keys in its coat of arms may refer, for example, to Leiden, Lubań or Weil der Stadt. The obverse of all four certain finds shows the head of St Cassian (the patron of the oldest parish

91 Mordovin, "Előzetes jelentés," Some cloth seals from Munich found in Pápa have already been published: Mordovin, "A 15–17. századi távolsági textilkereskedelem," 273, 3, image 5–6.

92 Hunka, "Nálezy olovených plómb," 300.

93 Sources for this information: www.detektorforum.de.

church of Regensburg), with the circumscribed text RATISPONENSIS (Latin for *of Regensburg*). In some cases, the reverse side has also survived, presenting the coat of arms, i.e. the crossed keys. Three of the seals from Regensburg are stray finds: one was found in the vicinity of Győr (Fig. 6c), two others are still in a private collection with no indication of their find locations (Fig. 6d). The fourth item was found during rescue excavations carried out at the Buda castle. However, no archaeological dating is available for it either.⁹⁴ The chronology of these finds is based only on stylistic features, namely the fonts of the inscription, suggesting most convincingly that they were made in the fifteenth century.

There are some more cloth seals with crossed keys but with no other identifying details. According to their quality and comparing them with the reliably identified seals from Leiden and Lubań, they may be connected to Regensburg. Such seals have been found during field surveys in the vicinity of Szécsény and in the deserted village of Orosháza-Pereg.

Hof an der Saale was a less significant textile production center⁹⁵ but it is nonetheless relatively well represented in Hungary by its cloth seals. The obverse of these seals usually shows the coat of arms of the city: Gules two towers Argent in escutcheon between them Sable with Lion rampant Or.⁹⁶ The reverse could have been executed in two ways: a large Renaissance H referring to the name of the city, or a ligature HOF. Altogether, five cloth seals can be identified as provenanced from Hof. Four of them have been found in Pápa, predominantly on the sixteenth-century surface of the market (Fig. 7a). The fifth similar item has already been published but only as an unidentified find datable to the seventeenth century⁹⁷ (Fig. 7b). It was donated to the Hungarian National Museum as part of a larger collection and thus has no data concerning its origin. There are no other known seals from Hof elsewhere.

Another city not mentioned in the Hungarian written sources but represented in Hungary by its cloth seals is Kulmbach. The place was known primarily for its fustian production, which reached its peak in the late Middle Ages.⁹⁸ The cloth seals, both of which were found at the Market Square of Pápa, can be identified

94 Preliminary evaluation of the cloth seal from Buda was recently prepared by Viktória Horváth in her MA thesis. Viktória Horváth, “Színesfémleletek a 14–17. századi budavári palotából.”

95 Holbach, *Frühformen von Verlag und Großbetrieb*, 135–36, 195–97; Ammann, *Die wirtschaftliche Stellung der Reichsstadt Nürnberg*, 85.

96 Tyroff, *Wappenbuch der Städte*, 39.

97 Mordovin, “Late Medieval and Early Modern Cloth Seals,” 231, Cat: 103.

98 Holbach, *Frühformen von Verlag und Großbetrieb*, 195–96; Stromer, *Die Gründung der Baumwollindustrie in Mitteleuropa*, 89–92, 123–25.



Fig. 7. Cloth seals from Hof an der Saale (a-b), Kulmbach (c) and Kaufbeuren (d)

by the inscription CVLM/BACH (Fig. 7c) or by the easily recognisable coat of arms: party per pale with Hohenzollern arms on the left and Azure Lion and Eagle Argent on the right.⁹⁹ Seals from the Kulmbach-fabrics have been discovered in the layers dated by fifteenth and sixteenth-century coins. Most probably, the cloth was imported to Pápa in the time of the heyday of the city, i.e. in the middle of the sixteenth century.

The last city represented by only two items is Kaufbeuren. This relatively small place was not too significant but it produced reasonably good quality fustian.¹⁰⁰ There are two seals that can be connected to Kaufbeuren, in both cases on the base of the coat of arms visible on them: Gules bend Or with two stars Or.¹⁰¹ The one discovered in Pápa has been published. It can be dated to the sixteenth century according to the stratigraphy of the excavation site¹⁰² (Fig. 7d). The second cloth seal was recently acquired within a larger collection from

99 Tyroff, *Wappenbuch der Städte*, 26.

100 Stromer, *Die Gründung der Baumwollindustrie in Mitteleuropa*, 15–22.

101 *Sammelband mehrerer Wappenbücher*, f. 80.

102 Mordovin, “A 15–17. századi távolsági textilkereskedelem,” 273, 3, image 8.

the vicinity of Szolnok. Unfortunately, there is no data available concerning the find location of the seal. According to the similar features of the coat of arms, it must be dated correspondingly to the sixteenth century. There is a single known analogy for cloth seals from Kaufbeuren in Switzerland.

Conclusion

An evaluation of the written and archaeological sources together produces a complex image of textile imports from the southern German region to the Kingdom of Hungary in the late Middle Ages and early post-medieval period (more precisely, the fifteenth–sixteenth centuries). The most important result of this analysis is the creation of a long list consisting of nineteen textile production centers, fabrics from which undoubtedly reached Hungary in the period in question. The analysis also illustrates the importance of interdisciplinary approaches, even in questions concerning economic history. The archaeological finds function as contemporary written documents, offering important details concerning geography and chronology and creating a special puzzle missing from the early approaches, which relied entirely on traditional written sources. By evaluating cloth seals, we not only learn the names of other medieval cities, which from now can be connected to Hungary, we also can identify the very last stop of the fabrics of the city-exporters, the very places of consumption, where the rolls of cloth, fustian, or linen were finally sold in retail (Fig. 8).

Summarizing the information gained from the different sources, the chronological framework can be limited to a bit less than two centuries, from the mid-fifteenth century until the first decades of the seventeenth century. The lack of the cloth seals from the seventeenth century still needs explanation. Despite continuing reports in the written sources about the trade in German fabrics, the gradually shrinking market of the Kingdom of Hungary, which was devastated by endless wars with the Ottoman Empire, resulted in a spectacular decrease in the cloth import by the end of the Long Turkish War. The transformation in the composition of the goods consumed must have begun even earlier. According to the archaeological evidence (primarily from Pápa), the decrease in the overall value of the textiles consumed must have begun in the second quarter of the sixteenth century. While there is strong evidence for the presence of higher quality products (from centers like Nuremberg, Memmingen, and Dinkelsbühl) in the first half and middle of the sixteenth century, products which were marked with large, nicely elaborated seals, by the end of the century the size and

the quality of the seals declined noticeably. The drop in the import and sale of quality textiles can also be seen in the appearance of a large quantity of relatively cheap fabrics (Hof, Waldsee, Munich, etc.). Trends in the import of cloths from other regions (e.g. the Low Countries, Silesia, Bohemia, and Austria) confirm and reflect this tendency.

This work should be regarded as preliminary, as there are still many unidentified cloth seals that have been found in the Carpathian Basin. From a longer perspective, an interdisciplinary analysis of all available finds will give a more detailed overview of this topic.

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