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The recent digital resources of websites Internet auctions as a research source for the circulation of the Prague groschen in Ukraine

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Abstract. The article was aimed at updating the content of digital and digitised numismatic data of the Ukrainian segment of the Internet, in particular the antiques auction website "Violity", for searching, identifying, processing, grouping and researching information on the findings of Prague groschen in Ukraine in 2019-2024. The research methodology was based on an interdisciplinary approach that integrates the subject matter and tasks of specific research practices in numismatics and the history of monetary circulation with historical science methods, source studies and mathematics. In particular, the study used the digital data analysis and synthesis methods of numismatic sources, their quantitative content analysis, classification methods and source criticism. The study had shown that in the notional category of the Late Middle Ages treasures, Bohemian groschen thesauri occupy a leading position. There is a relatively significant number of offers of entire treasures of these coins, which are evenly distributed throughout the territory of the Prague groschen circulation in Ukraine. The digital data sample analysis by the criterion of "location" allowed obtaining conditionally reliable data on the number of new finds of Prague groschen in certain regions of Ukraine. The finds geographical distribution practically coincides with the area of the coinage type circulation in the Ukrainian lands in the 14th-15th centuries. The digital data sample content analysis by the issuer criterion showed the absolute predominance of coins minted by Wenceslas IV (1378-1419). The second largest group of coins is the coinage of Charles I (1346-1378), and the third is the issue of John I of Luxembourg (1310-1346). The finds selection of clipped Prague groschen based on the criterion of "location" indicated that they belonged to John I and Charles I and originated from Lviv and Khmelnytskyi regions within the historical regions of Galicia and Podillia. A small group consists of coins with countermarks of German cities, which are recorded exclusively on the coins of King Wenceslas IV (1378-1419). The practical significance of the study lies in the introduction of a group of digital data from the newest numismatic sources into scientific circulation, which allows to clarify the geography and chronology of the Prague groschen circulation in Ukraine in the 14th-15th centuries

Keywords: coin complex; treasure; numismatic content; digitalisation; digital numismatics

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Introduction

An important feature of modern research on the Ukrainian coinage history of different periods is the active informatisation and digitalisation of numismatic sources content. Today, not only virtual museum exhibitions or electronic publications of treasures, coinage and individual coins are available on the Internet, but also entire layers of digitised visual and textual numismatic data. Such platforms include, for example, regional and global digital numismatics projects that host digitised data on numismatic objects found at different times in Ukraine, online forums for numismatists and searchers, and online numismatic auction platforms with digital data on lots auctioned.

A negative and deviant trend of our time, a challenge for the scientific community of historians, archaeologists and numismatists, and the antique market in general, is the legally unregulated and uncontrolled spread of amateur metal detecting in Ukraine. The growing popularity of this activity in recent decades has led to controversial consequences. The removal of coins and metalwork from the surface of cultural layers of archaeological monuments is a clear violation of the current monument protection legislation of Ukraine. As a result of such deviant actions of amateur searchers, specific archaeological sites are looted, and scientists are deprived of the opportunity to use numismatic material for their dating and historical and cultural reference.

According to the authoritative opinion of a British researcher of illicit trafficking in cultural property, criminologist, historian and archaeologist Samuel Andrew Hardy from the Institute of Archaeology, University College London (Institute of Archaeology, University College London), the world's largest online trading platform for cultural and historical property sale is currently the online auction site "Violity" (Hardy, 2016). This resource is an intermediary and moderator of transactions for cultural property sale, including numismatic, that are suspicious from the point of view of international and Ukrainian monument protection legislation.

The obvious consequence of amateur metal detecting spreading is a multiple increase in the number of numismatic objects found. Most of them fill the "black" market and end up in private collections, while a certain part of the found coins, and sometimes entire coin treasures, later become lots of antique numismatic online auctions, leaving a digital trace in the form of electronic information data. In this context, digital information from the Internet portal servers "Violity" can serve as a channel for updating source information in the form of digital data on specific numismatic objects available to users.

Digitised coin images with data on their locations, of course, on condition that relevant methods of analytical and synthetic criticism of this digital information type are applied, can constitute an important and sometimes irreplaceable additional set of sources for a coinage researcher. Despite the formal limitations of the

information content of these data, their number, ordinariness of origin, homogeneity of content, and uniformity of form allow analysing the content according to the parameters chosen by the researcher, such as the dynamics of geography or the chronology of the spread of a certain coinage type in the circulation of a region, state, or group of states (Luzanova, 2020).

Probably the most popular, and therefore the most widespread, coinage type on the money market of the Ukrainian lands of the 14th-15th centuries was Prague groschen. The relatively high mintage and retail-friendly weight standard of these late medieval coins led to their widespread use for a long time in the markets of different regions of Ukraine and contributed to the active loss of Prague groschen in treasures.

The issue of using digital network resources in numismatic research still lacks a systematic vision among Ukrainian scholars. Against the background of the categorical rejection by some archaeologists of the possibility of using "black" materials from Internet forums and auctions in research on numismatics and the history of monetary circulation, there is another, more pragmatic approach to this controversial issue. Emphasising the harmfulness and illegality of both "black" archaeology and its derivative process of reselling historical and cultural property, domestic scholars V. Kotsur (2016) and V. Kotsur *et al.* (2023) prove the futility of blindly ignoring the array of numismatic sources that have in fact already become an integral part of digital numismatics.

In the last decade, the problem of using information computer technologies and web resources in the coins study, coin treasures and the monetary circulation history has received some coverage in Ukrainian numismatics. One of the first to demonstrate the application of the Internet digital information resources in the study of the Crusader states coinage were V. Orlyk & S. Orlyk (2019). The capabilities of computer software in numismatic research were analysed by I. Khromova (2013) studied the information capabilities of museum institutions official websites. O. Shportun (2016a; 2016b) studied the information potential of numismatic websites in Ukraine.

A new direction in information and computer technology development in coins and coinage research is the digitalisation of numismatic objects. The digitisation projects of classical Greek and Roman coin finds from the territory of Ukraine are the subject of publications by K. Myzgin (2018a; 2018b) and M. Pyzyk (2023). The technical and technological aspects and methods of numismatic objects digitisation, in particular the digitalisation of the stamp analysis method, are discussed in several publications by O. Shvets (2021; 2022). A. Boiko-Haharin *et al.* (2022) have recently reviewed the current state of research on the circulation of the Prague groschen in Ukraine, in particular, by analysing in stages the chronology of the receipt and distribution of this coin and its circulation area.

The study was aimed at updating the latest digital and digitised numismatic data of the Ukrainian segment of the Internet, in particular the website of the antiques auction “Violity”, to investigate the problem of distribution and circulation of the Grosso Pragensis coin type in the Ukrainian lands in the 14th-15th centuries, search, detection, processing and grouping of information on the findings of these coins made in Ukraine in 2019-2024.

Materials and Methods

The research methodology is based on an interdisciplinary approach that integrates the subject matter and tasks of specific research practices in numismatics and the history of monetary circulation with the methods of historical science, source studies, and mathematics. The study uses analysis and synthesis methods of digital data from numismatic sources, as well as the mathematical method of their quantitative content analysis. To group the digital data of numismatic finds, the general scientific method of classification was used, which allowed to divide the discovered Prague groschen into appropriate groups for research. In order to process the data from the available digital sources, methods of working with mass sources were used, in particular, to form a natural and artificial sample of coin lots. The mathematical method of content analysis was used to obtain objective data on the chronology and geography of the penetration and spread of the Prague groschen to the markets of Ukrainian lands, as the dynamics of this process.

The natural sample in the study was the total set of digital information with metadata of Prague groschen

lots stored on online auction servers, in particular on the Violity.com platform, for the period from March 2019 to February 2024. In order to minimise random data, the authors formed an artificial sample, including complexes and treasures of Prague groschen with the number of coins of three or more, united by a common location and the seller identity.

The structure analysis of the natural sample of Prague groschen lots posted on the “Violity” online auction platform allowed to divide this digital numismatic content into five groups, a) single finds of Prague groschen; b) single lots of coins that probably come from coin complexes and treasures; c) groups of single lots of Prague groschen from complexes and treasures; d) coin complexes (“wallets”) and parts (fragments) of treasures; e) coin treasures with Prague groschen. In the authors opinion, single finds of Prague groschen and single lots of these coins, which only hypothetically come from complexes and treasures, may not correlate with the location data indicated in the lot descriptions. Taking this data into account is likely to distort the results of quantitative content analysis. In order to minimise the risk of including knowingly unreliable or rather unreliable data in the study, we did not include the first two categories of lots (a, b) in the artificial sample of digital numismatic sources. The artificial sample included only groups of digital data that can be considered conditionally reliable, namely c) groups of single lots of Prague groschen from whole complexes and treasures; d) coin complexes (“wallets”) and fragments of treasures; e) coinage treasures with Prague groschen. The artificial sample of digital data thus formed reached more than 100 lots.

Numismatic Sources

Table 1. Topography 1. Digital data of lots of coin complexes and treasures of Prague Groschen of John I of Luxembourg (1310-1346) and Charles I (1346-1378) from the online auction “Violity” (May 2019 – February 2024)¹.

No	Location of coins	Date of placement on the website	Number/weight of coins		URL
			Complexes	Treasures	
1	2	3	4	5	6
Kyiv region					
1.	Obukhiv, Kyiv region	13.05.2019	3 ⁴		http://surl.li/tzbeq
2.	Kyiv region	04.06.2020	2 ⁴ +1 ⁵		http://surl.li/tzkfc http://surl.li/tzkfr http://surl.li/tzkgi
Khmelnyskyi region					
3.	Khmelnyskyi region ²	08.06.2019	5 ⁴ +1 ³		http://surl.li/tzeaa
4.	Khmelnyskyi region ²	14.12.2020	1 ⁴ +1 ³		http://surl.li/tzvhe http://surl.li/tzvgs
5.	Khmelnyskyi region ²	08.09.2020	4 ⁴ +2 ³		http://surl.li/tzvoq
6.	Podillia	04.04.2020	3 ⁴ +2 ³		http://surl.li/tzjoo
Lviv region					
7.	Stanimyr, Lviv region ²	30.06.2019	2 ⁴ / ⁶		
8.	Lviv region ²	23.06.2020		36 ³	http://surl.li/tzmer
9.	Zolochiv, Lviv region ²	26.01.2024	7 ⁴ +3 ³		http://surl.li/uamrd
		31.01.2024	2 ⁴ +4 ³		http://surl.li/uamuy

Continued Table 1.

No	Location of coins	Date of placement on the website	Number/weight of coins		URL
			Complexes	Treasures	
1	2	3	4	5	6
Ternopil region					
10.	Pochaiv, Ternopil region	24.12.2021 29.12.2021	6 ⁴ / 16,90 6 ⁴ / 16,10		http://surl.li/ualnj http://surl.li/ualou

Notes: ² – Cropped coins.³ – Coins of Jan I of Luxembourg (1310-1346).⁴ – Coins of Charles I (1346-1378).⁵ – Coins of Vaclav IV (1378-1419).⁶ – Other coins of the complex: 2 quarters of Vladislav Opole; 2 quarters of Louis of Hungary; quartnik of Casimir III

Source: auction of antiques "Violity" (2005-2024)

Table 2. Topography 2. Digital data of lots of coin complexes and treasures of Prague Groschen of Vaclav IV (1378-1419) from the Internet auction "Violity" (May 2019 – February 2024)¹

No	Location of coins	Date of placement on the website	Number/weight of coins		URL
			Complexes	Treasures	
1	2	3	4	5	6
Cherkasy region					
1.	Cherkasy, Cherkasy region	16.05.2019	3/ 2.34; 2.43; 2.57		http://surl.li/tzdtv http://surl.li/tzdue http://surl.li/tzduk
2.	Cherkasy region	01.01.2020		34	http://surl.li/tzevt
3.	Cherkasy region	30.10.2021 31.10.2021	7		http://surl.li/ualeg http://surl.li/ualfy
Chernihiv region					
4.	Petrushyn, Chernihiv district, Chernihiv region	24.06.2019	5		
5.	Kozelets district, Chernihiv region	05.07.2019	12		
6.	Chernihiv region	18.12.2019		?/687.0	http://surl.li/tzevf
7.	Chernihiv region	02.03.2020	3		http://surl.li/tzezp
8.	Chernihiv, Chernihiv region	22.05.2020	7/ 16.20		http://surl.li/tzlrc
Chernivtsi region					
9.	Chernivtsi, Chernivtsi region	06.03.2020		120	http://surl.li/tzfaq
10.	Chernivtsi, Chernivtsi region	27.03.2020		±230/620.0	http://surl.li/tzjjo
Kyiv region					
11.	Berezan, Kyiv region	13.05.2019	3		http://surl.li/tzbeq
12.	Middle Dnieper	31.05.2019		54	http://surl.li/tzdvc
13.	Kyiv region	06.08.2019	4		http://surl.li/tzejr
14.	Kyiv region	01.10.2019	3		http://surl.li/tzema
15.	Kyiv, Kyiv region	03.02.2020	4+3 ²		http://surl.li/tzexx
16.	Kyiv, Kyiv region	04.06.2020 07.05.2020	3+2 ²		http://surl.li/tzkax http://surl.li/tzkdj
17.	Kyiv region	25.12.2020	5+1 ² /15.3		http://surl.li/tzvsm
18.	Kyiv region	26.04.2020 01.03.2021	2		http://surl.li/tzvwe http://surl.li/tzvxa
Kharkiv region					
19.	Kharkiv region	16.06.2019	8+1 ²		http://surl.li/ualqp
20.	Kharkiv region	22.02.2022	3		http://surl.li/ualsr
Khmelnyskyi region					
21.	Khmelnyskyi, Khmelnyskyi region	19.07.2019	2+1 ²		http://surl.li/tzeis
22.	Khmelnyskyi region	16.09.2019	10		http://surl.li/tzeky
23.	Khmelnyskyi	07.10.2019	5+2 ²		http://surl.li/tzemx

Continued Table 2.

No	Location of coins	Date of placement on the website	Number/weight of coins		URL
			Complexes	Treasures	
1	2	3	4	5	6
24.	Podillia	13.12.2019		12	http://surl.li/tzeqn
25.	Khmelnyskyi region	01.04.2020 05.04.2020	18		http://surl.li/tzjmc http://surl.li/tzjnm
26.	Kamianets-Podilskyi, Khmelnyskyi region	12.04.2020	1/ 1.40; 1 ³ / 1.80		http://surl.li/tzjsr
27.	Khmelnyskyi region	04.09.2020	5		http://surl.li/tzvei http://surl.li/tzvet http://surl.li/tzvfh
28.	Khmelnyskyi region	14.12. 2020	7		http://surl.li/tzvju http://surl.li/tzvkk http://surl.li/tzvkr http://surl.li/tzvlg http://surl.li/tzvlv http://surl.li/tzvmr http://surl.li/tzvnn
29.	Khmelnyskyi region	26.02.2022	3+1 ² +1 ⁴		http://surl.li/uamau
Lviv region					
30.	Pluhiv, Zolochiv district, Lviv region	03.06.2019		23	http://surl.li/tzdyl http://surl.li/tzdyw
31.	Lviv, Lviv region	01.08.2020 02.09.2020	8/ 19.75		http://surl.li/tzuxf http://surl.li/tzuzk
32.	Lviv region	11.06.2023		40	http://surl.li/uamnp http://surl.li/uamox
33.	Zhydachiv, Lviv region	05.02.2024	9/ 22.60		http://surl.li/uandm
Poltava region					
34.	Poltava region	14.08.2021		120/ 294.50	http://surl.li/tzyst
Rivne region					
35.	Rivne, Rivne region	08.05.2019	12		http://surl.li/tzbdl
36.	Rivne, Rivne region	27.11.2019	6		http://surl.li/tzeoe
37.	Rivne region	17.01.2020	7		http://surl.li/tzewk
Sumy region					
38.	Sumy region	20.08.2019	7		http://surl.li/tzekd
39.	Sumy, Sumy region	24.11.2019	5		http://surl.li/tzeno
40.	Sumy, Sumy region	29.04.2020	2		http://surl.li/tzjxe
41.	Sumy region	12.07.2020 04.08.2020 23.09.2020 13.11.2020 25.11.2020 25.12.2020 10.05.2021	13+3 ²		http://surl.li/tzlh1 http://surl.li/tzlip http://surl.li/tzljf http://surl.li/tzljw http://surl.li/tzilx http://surl.li/tzllz http://surl.li/tzlmq http://surl.li/tzlnz http://surl.li/tzlnz http://surl.li/tzlnz http://surl.li/tzlnz
42.	Sumy region	01.04. 2021	21		http://surl.li/tzwbo
43.	Bilopylyya, Sumy region ⁶	03.08.2022		120	http://surl.li/uamed
Ternopil region					
44.	Ternopil region	31.07.2020		220(?) ²	http://surl.li/tzmln
45.	Pochaiv, Ternopil region	07.06.2021	6+22/ 28.5		http://surl.li/tzylv
46.	Pochaiv, Ternopil region	12.07.2021		50+/120.0	http://surl.li/tzypw
47.	Ternopil region	21.07.2021	8+2 ²		http://surl.li/tzyrw
Vinnytsia region					
48.	Vinnytsia region	07.05.2019		124/265.0	http://surl.li/tzbco
49.	Vinnytsia region	22.09.2019	4		http://surl.li/tzeln

Continued Table 2.

No	Location of coins	Date of placement on the website	Number/weight of coins		URL
			Complexes	Treasures	
1	2	3	4	5	6
50.	Vinnitsia region	28.02.2020	4		http://surl.li/tzeyt
51.	Haysyn, Vinnitsia region	14.04.2020	3/ 6.70		http://surl.li/tzjvz
52.	Vinnitsia region ⁵	13.05.2020		750+ /2.070	http://surl.li/tzmda
53.	Vinnitsia region	16.10.2020	12/ 23.3		http://surl.li/tzvqf
Volyn region					
54.	Lutsk, Volyn region	23.04.2019	4		http://surl.li/tzbax
55.	Kovel, Volyn region	13.11.2022		60/ 164.7	http://surl.li/uamjj
56.	Volyn region	23.09.2019	3/7.41		http://surl.li/tzelv
57.	Lutsk, Volyn region	27.05.2019 16.02.2020	13		http://surl.li/tzopr http://surl.li/tzexp http://surl.li/tzexp http://surl.li/tzeqf
58.	Volyn region	26.05.2020	3+1 ² / 10.17		http://surl.li/tzltv
59.	Kovel, Volyn region	01.12.2021		72/ 201.5	http://surl.li/ualri
Zhytomyr region					
60.	Zhytomyr, Zhytomyr region	17.04. 2021	10		http://surl.li/tzyit

Notes: ² – Coins of Charles I (1346-1378)

³ – Coins of Vladislav II (1471-1516)

⁴ – Coins of Jan I of Luxembourg (1310-1346)

⁵ – The treasure was found in a thick-walled red clay pot with a chipped neck. The weight of the coins with the pot is 3.085 gr. Along with the coins of Wenceslas IV (1378-1419), the treasure contained the Prague groschen of Charles I (1346-1378)

⁶ – The treasure was found in a small bronze pot

Source: auction of antiques "Violity" (2005-2024)

Table 3. Topography 3. Digital data of lots of Prague Groschen with countermarks from the Internet auction "Violity" (May 2019 – February 2024)

No	Location of coins	Number/weight of coins/issuer	Complimentary ticket	URL
1	2	3	4	5
1.	Vinnitsia region/ 16.02. 2020	1/ Vaclav IV	Überlingen, Swabia, 223, (Smolík, 1971: 119)	http://surl.li/uavta
2.	Ukraine/ 30.04. 2020	1/ Vaclav IV	Neumarkt? Nördlingen? Rottwell? Donauwörth?, 119 (Smolík, 1971: 118)	http://surl.li/uavuq
3.	Kyiv region/ 18.08. 2020	3/ 7,0/ Vaclav IV	Schaffhausen, 166; Rauschenberg, 152, (Smolík, 1971: 118)	http://surl.li/uavxt
4.	Ukraine/ 17.06. 2020	1/ Vaclav IV	Ulm, 216 (Smolík, 1971: 119)	http://surl.li/uawbr
5.	Lviv, Lviv region/ 07.09. 2020	1/ Vaclav IV	Regensburg, 158, (Smolík, 1971: 118)	http://surl.li/uawdk
6.	Khmelnitskyi, Khmelnytskyi region / 25.08.2020	1/2,17/ Vaclav IV	Schaffhausen, 166, (Smolík, 1971: 118)	http://surl.li/uawek
7.	Lviv, Lviv region/ 14.10.2020	1/ Vaclav IV	Warburg, 229, (Smolík, 1971: 119)	http://surl.li/uawfo
8.	Lviv, Lviv region/ 19.10. 2020	1/ Vaclav IV	Warburg, 229, (Smolík, 1971: 119)	http://surl.li/uawgp
9.	Lviv, Lviv region/ 29.10. 2020	2/ Vaclav IV	Regensburg, 158, Warburg, 229, (Smolík, 1971: 118-119)	http://surl.li/uawht
10.	Lviv, Lviv region/ 23.12. 2020	2/ Vaclav IV	Regensburg, 158, Warburg, 229, (Smolík, 1971: 118-119)	http://surl.li/uawix
11.	Lviv, Lviv region / 23.12.2020	2/ Vaclav IV	Ulm, 216; Augsburg, 16, (Smolík, 1971: 118-119)	http://surl.li/uawkg
12.	Ukraine	1/ Vaclav IV	Regensburg, 158, (Smolík, 1971: 118)	http://surl.li/uawmf

Source: auction of antiques "Violity" (2005-2024)

Results and Discussion

Information and computer technology and digital numismatics development in recent years has made it possible to search, identify, and bring into scientific circulation a whole layer of digitised and digital information about the finds of Prague groschen, which were popular in the Ukrainian lands in the 14th-15th centuries.

The largest array of available digital data on the finds of Prague groschen in Ukraine for 2019-2024 is currently hosted on the servers of the "Violity" antiques auction website. The natural selection made by the search queries "Prague groschen / Prague groschen treasure" included hundreds of lots representing digital textual and visual data on single coins, coin complexes, and even entire treasures. The lots metadata, in addition to the title, contain information about the seller, the start and end dates of the auction. The lot descriptions contain information about the location (region, more rarely city, district), photographs of coins, coin complexes or treasures, and sometimes additional information about the nature of the finds, the weight of individual coins or the total weight of coin complexes and treasures (A treasure of Prague money..., 2019).

The analysis of the sample metadata by the "added" indicator allows to conditionally reliably distribute coin finds by the time they were discovered. In particular, in 2019, users added 29 lots with Prague groschen (groups c, d, e) to the website. In 2020, 57 similar offers were "traded" on the online auction platform. Subsequently, we observe a sharp drop in the number of Prague groschen offers from 14 lots in 2021, to 4 lots in 2022, 2 lots in 2023, and 3 lots in early 2024.

The analysis of digital numismatic sample data by groups of finds shows the actual parity of coin complexes and treasure fragments (45) and single coins that probably came from the same complexes and treasures (47), which is evidence of the predominantly treasure nature of modern finds of Prague groschen of the 14th-15th

centuries, most of which are found in the form of small and medium-sized coin complexes or small treasures, which subsequently appear at auction mostly in the form of separate group or single lots. A breakdown of these finds by the year they were added to the website shows that in 2019 there were 29 of them (5 single finds, 20 coin complexes, 4 treasures). In 2020, the largest number of lots with Prague groschen was recorded with 57 (32 single lots, 19 complexes, and 6 coin treasures). At the same time, the period of 2021 – early 2024 comprises only 15 coin complexes and 3 treasures with Prague groschen (Table 4). Observation of the available array of digital data from the servers of the "Violity" website shows that in the conditional category of treasures of specific coin types of the Late Middle Ages, Bohemian groschen thesauri occupy a leading position. An indicative fact characterising the role and importance of Grosso Pragensis in the coinage market of the Ukrainian lands is the presence among the lots of the 2019-2024 auction of a relatively large number of these coins' entire treasures offers (14 lots), which are evenly distributed throughout the territory of Prague groschen circulation in Ukraine (Orlyk, 2011). In particular, the location of two coin treasures is claimed to be Kovel, Volyn region. One of them, consisting of 72 coins with a total weight of 201.5 grams, contained worn-out in circulation money of Charles I and mainly Wenceslas IV issued in the second half of the 14th and early 15th centuries (Topogr. 2: 59). Another treasure, auctioned by the same user about a year later, contained 60 worn-out coins of Wenceslas IV minting with a total weight of 164.7 grams (Topogr. 2: 55). It is quite possible that both sets of Prague groschen are parts of one large treasure found by treasure seekers in Volyn. More than 220 coins were found in the treasure, the location of which the seller indicated as Ternopil region. Judging by the photographs on the lot page, the treasure consisted mainly of coins of Wenceslas IV worn-out in the process of intensive circulation (Topogr. 2: 44).

Table 4. A selection of digital numismatic data on lots of Prague groschen from the online auction "Violity" by region, type of finds and number of coins for the period from May 2019 to February 2024

Region	Number of finds by type			Total coins	
	Total	Single lots from the complexes and treasures	Coin complexes and treasure fragments		
	2	3	4	5	6
Volyn region	9	4	3	2/132	156
Vynnytsia region	6		4	2/874+	898+
Zhytomyr region	1		1		10
Kyiv region	10	3	6	1/54	90
Rivne region	3		3		25
Lviv region	15	8	5	2/59	145
Poltava region	1			1/120	120
Sumy region	14	9	4	1/120+	171+
Ternopil region	5		4	1/220	300+
Kharkiv region	2	2			13
Khmelnyskyi region	23	14	9		93

Continued Table 4.

Region	Number of finds by type				Total coins
	Total	Single lots from the complexes and treasures	Coin complexes and treasure fragments	Coin treasures	
1	2	3	4	5	6
Cherkasy region	4	1	2	1/34	40
Chernihiv region	5		4	1/100+	126+
Chernivtsi region	2			2/350+	350+
Total	100	41	45	14	2,537+

Source: compiled according to the data: Auction of antiques "Violity" (2005-2024)

The sellers indicated Chernivtsi as the location of two treasures of Prague groschen. One of them contained 120 coins of Wenceslas IV (Topogr. 2: 9). The other treasure, discovered together with fragments of a narrow-mouthed earthenware pot, contained over 230 coins. The photographs on the lot page show that the weight of the individual coins of the thesaurus ranges from 2.6 to 2.8 grams (Topogr. 3: 10). Two treasures of Prague groschen were located in the Vinnytsia region. One of them contained 124 worn-out coins of Wenceslas IV weighing about 265 grams (Topogr. 2: 48). Of particular interest, however, is the discovery of a large (over 750 coins) treasure of Prague groschen. The coins were in a thick-walled red clay pot with a hollowed-out neck. The weight of the treasure with the pot was over 3 kilograms, and the weight of the coins was over 2 kilograms (Topogr. 2: 52). A small treasure of 34 Bohemian groschen of Wenceslas IV, weighing about 73 grams, probably comes from the territory of Cherkasy region (Topogr. 2: 2).

A number of treasures with Prague groschen have been found in recent years in the Left Bank of Ukraine. For example, a treasure of 54 Prague groschen of Wenceslas IV weighing about 60 g, fragments of leather and fragments of a ceramic pot were found on the site of the old Dnipro riverbed, probably in the left-bank part of the Kyiv region (Topogr. 2: 12). The treasure, weighing 687 grams, was found in Chernihiv region. Judging by the weight of the thesaurus, it contained about two hundred Prague groschen (Topogr. 2: 6). A treasure of 120

Bohemian groschen coins with a total weight of 294.5 g comes from Poltava region (Topogr. 2: 34). The same number of coins, which were hidden in a bronze pot, comes from Bilopillia, Sumy region (Topogr. 2: 43).

The analysis of the digital information sample by the criterion of "location" allowed to obtain conditionally reliable data on the number of new finds of Prague groschen in certain regions of Ukraine (Table 4). In particular, the largest number of auction lots was added by users who indicated their location within the boundaries of Lviv (15), Volyn (9), Khmelnytskyi (23), and Kyiv (10) regions, and the largest number of coins (897) came from four complexes and two treasures located in Vinnytsia region. Slightly fewer lots of Prague groschen are located in Ternopil (4 coin complexes, 1 treasure, over 300 coins), Chernivtsi (2 treasures, over 350 coins), Rivne (3 coin complexes, 25 coins), Zhytomyr (1 complex, 10 coins), Cherkasy (single lot, 2 coin complexes and a small treasure, 40 coins) regions. This geography is quite relevant to the historical regions of Ukraine recognised in numismatics where Prague groschen was in circulation, namely Galicia, Volyn, Podillia, Bratslav and Kyiv regions, as well as Bukovyna, which was part of the Moldavian principality in the 14th and 15th centuries. On the Left Bank, the area of Bohemian groschen circulation is marked by finds from Chernihiv region (4 complexes and a treasure of more than 120 coins), Poltava region (a treasure of 120 coins), Sumy region (9 single lots, 4 coin complexes and a treasure totalling more than 170 coins), and Kharkiv region (2 finds of 13 coins) (Table 5).

Table 5. A sample of digital numismatic data of Prague groschen lots from the online auction "Violity" for the period from May 2019 to February 2024 by region, number of coins and their issuers

Region	Number of finds	Total coins	Coin issuers			
			John I (1310-1346)	Charles I. (1346-1378)	Wenceslas IV (1378-1419)	Vladyslav II (1471-1516)
1	2	3	4	5	6	7
Volyn region	9	156		1	155	
Vinnytsia region	6	898+			898+-	
Zhytomyr region	1	10			10	
Kyiv region	10	90		9	81	
Rivne region	3	25			25	
Lviv region	15	145	43	13	90	

Continued Table 5.

Region	Number of finds	Total coins	Coin issuers			
			John I (1310-1346)	Charles I. (1346-1378)	Wenceslas IV (1378-1419)	Vladyslav II (1471-1516)
1	2	3	4	5	6	7
Poltava region	1	120			120	
Sumy region	14	171+		5	166+	
Ternopil region	5	300+		14	286+	
Kharkiv region	2	13		1	12	
Khmelnyskyi region	23	93	8	16	71	1
Cherkasy region	4	40		2	38	
Chernihiv region	5	126+			126+	
Chernivtsi region	2	350+			350+	
Total	100	2,537+	51	61	2,428	1

Source: compiled according to the data: Auction of antiques "Violity" (2005-2024)

An analysis of digital data samples by the issuer criterion shows an absolute predominance of coins minted by Wenceslas IV (1378-1419). According to our estimates, in the period from May 2019 to February 2024, the supply of Prague groschen with the name of this monarch recorded in the digital auction data amounted to about 2,500 coins (Table 5). It is noteworthy that among the finds of Bohemian groschen, the location of which is indicated in Vinnytsia, Zhytomyr, Rivne, Poltava, Chernihiv, and Chernivtsi regions, we have not recorded any coins of other issuers, except for those of Wenceslas IV. At the same time, it is assumed that the composition and resolution of the digital photographs of large treasures and coinage added to the relevant pages of the website did not allow to distinguish these coins from the huge mass of Wenceslas IV Prague groschen. The second largest group of coins (61 specimens) is the Prague groschen of Charles I (1346-1378). Digital data on the finds of Bohemian groschen of this monarch are localised within the Ukrainian historical territories of Galicia, Volyn, Podillia, Kyiv, Chernihiv-Siverskyi region within the modern administrative boundaries of Volyn, Kyiv, Lviv, Sumy, Ternopil, Kharkiv, Khmelnytskyi, and Cherkasy regions. The third largest group of Prague groschen issues are coins minted by John I of Luxembourg (1310-1346). According to the criterion of "location", almost all finds of these coins are concentrated in Lviv (43) and Khmelnytskyi (8) regions (Table 5).

A separate category of Prague groschen finds recorded in the digital data of the online auction is clipped coins. A sample of such lots made by the authors showed that all of them originate from the territories of two regions – Lviv (3 lots – 52 coins) and Khmelnytskyi (4 lots – 19 coins) and are localised within the Ukrainian historical regions of Galicia and Podillia. The clipped coins belong to two issuers, John I of Luxembourg (50) and Charles I (21). A typical example of this group of coins is a complex of 36 clipped Prague groschen from the mint of John I from Lviv region, described as a "purse" and a "forest find" (Topogr. 1: 8). 16 clipped Bohemian

groschen (7 coins of John I and 9 of Charles I) were found in Zolochiv, Lviv region (Topogr. 1: 7). From Podillia comes a lot consisting of three clipped Prague groschen of John I and two coins of Charles I (Topogr. 1: 6). The seller, who indicated his location in the Khmelnytskyi region, offered for sale a lot of six Prague groschen, two coins of John I and four coins of Charles I (Topogr. 1: 5). Another lot of clipped Bohemian groschen from the Khmelnytskyi region contained a coin of John I and five coins of Charles I (Topogr. 1: 3).

A small group of Prague groschen lots in our sample (17 coins) consists of coins with countermarks bearing the German cities' coats of arms. Characteristically, all countermarks are made on coins of King Wenceslas IV (1378-1419). In this group, there are two complexes that have signs of origin from treasures. In particular, a complex of three "treasure" coins originates from the Kyiv region, two of which have countermarks of the Swiss city of Schaffhausen, and one coin has a Rauschenberg mint in Hesse (Topogr. 3: 3). The seller identified the Lviv region as the location of a complex of eight coins with countermarks from Regensburg (3), Warburg (3), Augsburg, and Ulm (Topogr. 3: 5, 7-11). The location of three more coins found in Ukraine with countermarks of Ulm, Regensburg and Neumarkt (?) is not localised in detail (Topogr. 3: 2, 4, 12). The analysis of a new group of numismatic sources, a selection of digital and digitised data of Prague groschen from the website "Violity" by groups of finds, issuers and location of lots, allowed us to make some clarifications within the framework of the long-standing discussion on the chronology of circulation and the ways of receipt and distribution of Bohemian groschen in the Ukrainian lands of the Galicia-Volhynia principality, the Crown of Poland and the Grand Duchy of Lithuania in the 14th-15th centuries (Savov, 2013).

The Russian numismatist Alexander Sivers was the first to propose his version of the spread of the Prague coinage to the lands of Eastern Europe. In his opinion, Prague groschen came to Ukraine by the northwestern route, through Lithuania and Belarus (Sivers, 1922).

However, the scientist had few grounds for this conclusion, as the finds of early Prague groschen of John I of Luxembourg (1310-1346) – Charles I (1346-1378) are extremely few in his topography, and there are no treasures with coins of Wenceslas II (1300-1310) in Lithuania and Belarus. Later, contradicting his colleague, the scientist V. Ryabtsevich (1965) identified two ways this coin came to the Ukrainian lands, the southwestern one through the Kingdom of Poland and Chervona Rus and the northeastern one through Chernihiv region. The main argument in favour of this conclusion was the geographical location of the 28 known treasures and 11 individual finds of Prague groschen in Belarus. The fact that the majority of these finds, namely 14 treasures and 3 single finds (1051 coins), were in the southeast of Belarus, allowed the numismatist to assume that the main route of Prague groschen to the Ukrainian lands was the southeastern one, through the Gomel and Chernihiv regions. Such conclusions of the Belarusian scientist are not confirmed by the results of the analysis of our digital data sample. A simple comparison of the number of finds of coin complexes and treasures with Prague groschen shows that the Middle Dnipro region is significantly inferior to Podillia and Galicia in this respect. In particular, our topography does not record any finds of Prague groschen in the first-third quarter of the 14th century in the same Chernihiv, Poltava, or Zhytomyr regions, where these coins, according to V. Ryabtsevich's logic, should have come from Belarus. The earliest finds of Prague groschen of Charles I (1346-1378) are in the Kyiv, Sumy, and Kharkiv regions, but even here they are found as part of treasures or coin complexes as an admixture among the mint of Wenceslas IV (1378-1419) (Table 5).

N. Soboleva (1970) divided all known treasures with Prague groschen found at different times on the territory of the USSR, including Ukraine, into three periods. The treasures of the first period contain coins of Wenceslas II (1300-1305), John I of Luxembourg (1310-1346), and Charles I (1346-1378) and were minted in the 14th century. According to the researcher, at that time the Prague groschen served as an international means of payment in the markets of Central and Eastern Europe and had not yet penetrated local markets. Our topography of digital data of Prague groschen lots from the "Violity" online auction includes 9 such finds. Almost all of them, with the exception of one complex of 12 coins of Charles I from Poचाiv in Ternopil region (Topogr. 1: 10), are clipped and come from Lviv and Khmelnytskyi regions, that is from the historical territories of Galicia and Podillia (Topogr. 1: 3), as well as from Kyiv region (Topogr. 1: 1-2). The second period is characterised by treasures and isolated finds of coins of Wenceslas IV (1378-1419), dating from the 15th century, the time when, according to the researcher, Prague groschen became the main means of payment in the local markets of the Ukrainian lands. Our topography is dominated by such lots (Topogr. 2: 1-60). The third period of Prague

groschen circulation in the Ukrainian lands is represented by treasures of the 16th-17th centuries, in which Prague groschen of various issuers constitutes only a small admixture, acting rather as a relic of monetary circulation. In our topography, there is a Prague groschen minted by Vladyslav II (1471-1516) in combination with a coin of Wenceslas IV, which comes from Kamianets-Podilskyi, the Khmelnytskyi region (Topogr. 2: 26).

N. Soboleva (1966) argued for the relatively early arrival of the Prague groschen to the markets of Galicia and Volyn in the first half of the 14th century, rightly noting that the largest number of Prague groschen coins of Wenceslas II – Charles I were found in the territory of the Galicia-Volhynia principality. The researcher attributed the arrival and spread of Bohemian groschen in circulation in the Ukrainian lands to the functioning of several trade routes, including Prague – Wrocław – Kraków – Volodymyr – Kyiv and Kraków – Lviv.

Analysing the known treasures and isolated finds of Prague groschen in Ukraine, Ukrainian medievalist and numismatist Mykola Kotlyar argued with O. Sivers, N. Soboleva, and V. Ryabtsevich about the time and ways of penetration of *Grosso Pragensis* into the circulation of Ukrainian lands. According to the scientist, numismatic material clearly shows that Prague groschen first appeared in the Galicia-Volhynia principality in the first half of the 14th century, and from there it spread to other Ukrainian lands. According to M. Kotlyar (1981), almost every second Ukrainian treasure of the 14th-15th centuries contained Prague groschen (74 finds out of 164). The analysis of the sample of digital numismatic data compiled by the authors of the current study confirmed these arguments, and the findings distribution geography practically coincides with the area of Prague groschen circulation in the Ukrainian lands outlined in the scientist works.

Important clarifications about the time, ways and dynamics of the Prague groschen entering the markets of Rus have been made relatively recently by the Ukrainian archaeologist and numismatist G. Kozubovsky (2012). Based on an analysis of previously known and new numismatic sources, the scholar argues that the vast majority of finds of the first Prague groschen of Wenceslas II (1300-1305) and John I of Luxembourg (1310-1346) come from western Ukraine and are concentrated in the area of the largest cities and fortresses of the Galicia-Volhynia principality, salt mines and on the routes to them in Podnistrovia and Bukovyna. According to the author, the absolute predominance of John I of Luxembourg's coins in Ukrainian finds dating from the first half of the 14th century indicates that Bohemian groschen began to arrive in the region no earlier than 1320-1330. The researcher believes that large-scale construction works carried out by Polish King Casimir III the Great in the newly conquered territories were a significant stimulus for the arrival of Prague groschen in Galicia and Volyn in the second half of the 14th century. The scholar

attributes the spread of Bohemian groschen to the southwest of Ukrainian lands in the same period to the Tatar, Moldavian, and Kamianets trade routes that geographically covered the cities of Podnistrovia, Bukovyna, and Podillia. According to the author, the massive influx of Prague groschen coinage of Wenceslas IV in the early 15th century could be due to a number of political, economic, and social factors, but from the second quarter of the 15th century, the movement of significant volumes of Bohemian groschen in the Ukrainian lands of the Grand Duchy of Lithuania was primarily due to its internal redistribution, as evidenced by the significant degree of wear and tear of Wenceslas IV coins due to their prolonged use in circulation until almost the end of the 15th century (Gumowski, 1921).

The new digital data obtained by the authors on the finds of Prague groschen in Ukraine complement the list of coats of arms known from the study of G. Kozubovsky (2011), who summarised the treasure material known to him by identifying 82 coins with such over-engravings, that the Prague groschen found in the Ukrainian treasures with overstrikes have countermarks of Ulm (15), Regensburg (10), Augsburg (8), Salzburg (6), Zoest (3), Kempen, Hoekster, Goslar, Schletistaden, Storgard, Bamberg, Nuremberg, Kassel (2), Swabian Union (1) (Topogr. 3: 1, 3, 6, 710). According to the scientist's observations, most of the groschen was countermarked in the cities of Southern Germany, Swabia, Westphalia, Braunschweig, and Saxony in the second quarter of the 15th century. Our study has supplemented this list with countermarks of Warburg (4), Schaffhausen (2), Huberlingen, and Rauschenberg (1).

■ Conclusions

A review of the current content from the servers of the "Violity" antiques auction website has shown some possibilities of using digital and digitised numismatic data from the Internet resources for searching, identifying, processing, grouping and analysing information about the latest finds of Prague groschen made on the territory of Ukraine. The analysed sample of digital data from the outlined group of numismatic sources allowed to clarify the ways and chronological boundaries of the penetration, spread and circulation of the Prague groschen in the regions of Ukraine in the 14th-15th centuries.

The study showed that in the conditional category of Ukrainian treasures of the Late Middle Ages, Bohemian groschen thesauri occupy a leading position. An indicative fact is the relatively large number of these coins entire treasures offers, which are evenly distributed throughout the territory of Prague groschen circulation in Ukraine, from Galicia and Volyn, Podillia and Kyiv region on the Right Bank of the Dnipro River, to Chernihiv-Siversk, Poltava and Slobozhanshchyna regions on the Left Bank.

The analysis of digital information sample by the criterion of "location" allowed to obtain conditionally

reliable data on the number of new finds of Prague groschen in certain regions of Ukraine. The geography of the finds practically coincides with the area of circulation of this coinage type in the Ukrainian lands in the 14th-15th centuries, outlined by Galicia, Volyn, Podillia, Kyiv, and to a lower extent the northern Left Bank. The content analysis of the numismatic digital data sample according to the issuer criterion shows the absolute predominance of coins minted by Wenceslas IV (1378-1419). The second group of coins, which is many times smaller in number, is the Prague groschen minted by Charles I (1346-1378), and the third group consists of earlier issues of John I of Luxembourg (1310-1346). This ratio of the number of finds of Bohemian groschen of different issuers illustrates the dynamics of the penetration and distribution of these coins in different regions of Ukraine. In particular, the coins of John I recorded in the sample come from Lviv and Khmelnytskyi regions, which may indicate an earlier penetration of Prague groschen in Galicia and Podillia. Coins of Charles I are localised over a much wider area, mostly in Galicia (Lviv and Ternopil regions) and Podillia (Khmelnytskyi region), less in Kyiv region, and a few coins of this monarch are recorded in Volyn, Cherkasy, and Kharkiv regions. Such a localisation of finds of Prague groschen in the first-third quarter of the 14th century is an argument in favour of the spread of this coin from the west to the east of the Ukrainian lands. The massive finds of very worn-out Prague groschen of the Wenceslas IV coinage of the last quarter of the 14th and first quarter of the 15th century in most regions of western Ukraine, the Right Bank and the Middle Dnipro confirm the version of the long and active use of this coin in monetary circulation.

Finds of clipped Prague groschen originate from Lviv and Khmelnytskyi regions, are localised within the Ukrainian historical regions of Galicia and Podillia, and belong to two issuers, John I of Luxembourg and Charles I. It is characteristic that the distribution of clipped Bohemian groschen in these regions chronologically coincides with the period of minting and circulation of Lviv and Podillia half-groschen, which are similar in weight. A small artificial sample of lots of Prague groschen consists of coins with countermarks of southern German cities, which are recorded on coins of King Wenceslas IV in the centres of international trade of the time, in Galicia and Kyiv region.

Prospects for further research on the digital data of Prague groschen finds are related to the identification, attribution, and updating of new numismatic sources to solve the problem of chronology and ways of penetration and distribution of Prague groschen in the markets of Ukrainian lands of the 14th-15th centuries.

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None.

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Новітні цифрові ресурси веб-сайтів Інтернет-аукціонів як джерело дослідження обігу празького гроша в Україні

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Анотація. Мета статті – актуалізація контенту цифрових та оцифрованих нумізматичних даних українського сегменту мережі Інтернет, зокрема веб-сайту аукціону антикваріату «Violity», для пошуку, виявлення, обробки, групування та дослідження інформації про знахідки празьких грошів в Україні у 2019-2024 рр. Методологія дослідження ґрунтувалась на міждисциплінарному підході, що інтегрував предмет і завдання конкретних дослідницьких практик з нумізматики та історії грошового обігу з методикою історичної науки, джерелознавства та математики. Зокрема, під час дослідження застосовано методи аналізу та синтезу цифрових даних нумізматичних джерел, їх кількісного контент-аналізу, методи класифікації та джерелознавчої критики. Дослідження показало, що в умовній категорії скарбів періоду Пізнього Середньовіччя тезаврації богемських грошів займають лідируючу позицію. Існує порівняно значна кількість пропозицій цілих скарбів цих монет, що рівномірно розподілені по всій території обігу празького гроша в Україні. Аналіз вибірки цифрової інформації за критерієм «місцезнаходження» дозволив отримати умовно достовірні дані про кількість новітніх знахідок празьких грошів в окремих регіонах України. Географія поширення знахідок практично збігається з ареалом обігу цього монетного типу на українських землях у XIV-XV ст. Контент-аналіз вибірки цифрових даних за критерієм емітента показав абсолютну перевагу монет карбування Вацлава IV (1378-1419). Другою за чисельністю групою монет є гроші карбування Карла I (1346-1378), а третьою – емісії Яна I Люксембурзького (1310-1346). Вибірка знахідок обрізаних празьких грошів за критерієм «місцезнаходження» вказала на їх належність Янові I та Карлові I та походження з Львівської та Хмельницької областей у межах історичних регіонів Галичини й Поділля. Невелику групу складають монети з контрамарками німецьких міст, що фіксуються виключно на монетах короля Вацлава IV (1378-1419). Практичне значення дослідження полягає у введенні до наукового обігу групи цифрових даних новітніх нумізматичних джерел, що дозволяє уточнити географію та хронологію обігу празького гроша в Україні у XIV-XV ст.

Ключові слова: монетний комплекс; скарб; нумізматичний контент; цифровізація; цифрова нумізматики