

УДК 737.1(378.28:477.83.86)

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DIGITIZING THE COIN FINDS OF UKRAINE

ОЦИФРУВАННЯ МОНЕТНИХ ЗНАХІДОК УКРАЇНИ

Abstract

This article introduces the Coin Finds of Ukraine (CFU), an ongoing, collaborative project to digitize and catalogue classical Greek coin finds (500-1 BCE) on the territory of modern Ukraine, which brings together resources and expertise from several participating institutions. An inventory of published coin finds that aims at comprehensiveness is an important contribution to preserving Ukrainian cultural heritage. To date, CFU has completed two major project phases. This paper will acquaint readers with CFU's goals, methodology, and results so far, as well as provide some preliminary discussion of the results. It will also highlight the ways that CFU's data is incomplete and chart future project goals.

Keywords: coin finds, digitalization, digitization, coins, hoards.

Анотація

*Ця стаття представляє «Монетні знахідки України» (МЗУ) – поточний спільний проект з оцифрування та каталогізації класичних грецьких монет (500–1 ст. до Р. Х.), що були знайдені на території сучасної України, який об'єднує ресурси та експертизу кількох інституцій-учасниць. Інвентаризація опублікованих знахідок монет, що має на меті забезпечити їхню повноту, є важливим внеском у збереження української культурної спадщини. Наша **методологія** була розділена на кілька окремих напрямків: збір даних, управління даними та візуалізація даних.*

Завершивши два етапи проекту, які тривали протягом 2022–2023 рр., мандат МЗУ залишається виконаним лише частково. Що стосується знахідок монет, ми ще не ввели до електронних каталогів величезну кількість кримських монет, вирішивши спочатку зосередитися на знахідках з Бузько-Дніпровського лиману, верхньої течії Дніпра та внутрішніх районів українського степу та

лісостепу. Проект спрямований на всеосяжність, і майбутні етапи проекту будуть спрямовані на повне охоплення даних. Ми також прагнемо покращити та розширити доступ до даних. Це означає реалізацію повної сумісності даних зі стандартом *Linked Open Data* від *Notisma*, а також удосконалення інструментів візуалізації МЗУ для користувачів, які хочуть використовувати наші дані для досліджень.

У перспективі ми маємо намір інтегрувати дані IGCH разом з даними МЗУ, щоб надати більш повну історичну картину. Всі ці кроки критично важливі для формування повної картини українських нумізматичних знахідок класичного періоду: надаючи синтетичний огляд цих знахідок, ми сподіваємося поставити їх на належне місце в загальній картині класичного/еллінського нумізматичного обігу Греції і, як наслідок, економіки греко-римського світу між п'ятим і першим століттями до Р. Х.

Ключові слова: монети знахідки, цифровізація, оцифрування, монети, скарби.

Introduction. This article introduces the Coin Finds of Ukraine (CFU), an ongoing, collaborative project to digitize and catalogue classical Greek coin finds (500-1 BCE) on the territory of modern Ukraine, which brings together resources and expertise from several participating institutions.¹ It was started in 2022, largely motivated by Russia's invasion of Ukraine, which has caused significant loss of cultural heritage on Ukrainian territory, including numismatic collections and hoards. An inventory of published coin finds that aims at comprehensiveness is an important contribution to preserving Ukrainian cultural heritage.

To date, CFU has completed two major project phases. This paper will acquaint readers with CFU's goals, methodology, and results so far, as well as provide some preliminary discussion of the results. It will also highlight the ways that CFU's data is incomplete and chart future project goals.

Goals. No one has attempted a comprehensive catalogue of classical coin finds ("classical" gesturing broadly to coins not only of the classical period, but the archaic and hellenistic, as well—or roughly 550-1 BCE) on Ukrainian territory. Previously, there have been no equivalents to the substantial inventories of Kropotkin for Roman and Byzantine coins, which covered coins found on the territories of the former Soviet republics.² In English language scholarship, the closest attempt is the Black Sea section of the Inventory of Greek Coin Finds (IGCH), which records a substantial number of coin

¹ The project is co-Directed by Vasyl Orlyk and Mark Pyzyk. Project staff include Mikhailo Orlyk and Ilia Curto Pelle. CUF has benefitted from the support of the following organizations: the American Numismatic Society, the Canadian Institute for Ukrainian Studies, and Stanford University (in particular, research support came from Josiah Ober and Adrienne Mayor).

² (Kropotkin 1961); (Kropotkin 1962).

hoards found on the territory of the then-Ukrainian SSR.³ While nearly comprehensive, it is now fifty years old.⁴ Our goal was to add finds published subsequently, which are unsurprisingly quite numerous. We also aimed to expand beyond hoards alone, including stray finds and finds discovered in the course of archaeological excavation. Finally, we wished to make these finds available in two ways: first, to encode all CFU finds in a manner that is Nomisma-compliant; second, to provide users with some basic visualization tools to analyze the data.

Methodology. Our methodologies were split along a few separate lines: data collection, data management, and data visualization.

In terms of data collection, we relied on the expertise of project staff to identify finds that had not been covered in the IGCH. These were then manually entered, preserving as much detail as possible, operating at the level of coin find (rather than individual coins). Most such coin find-oriented projects record similar kinds of information.⁵ At the level of find, they track provenance, dates of earliest and latest coins, geographic location, type of find, and so forth—along with any bibliography referencing the find. At the level of find contents, they record individual coin denominations, mints, dates, iconography, etc. Acknowledging that other find-oriented projects focus on this kind of data for a reason, CFU did likewise.⁶

A word is necessary on the distinction between "hoards" and "coin finds," with the latter being an umbrella term that includes the former, as well as the rationale for expanding to single finds and excavation finds (the vast majority of our sample turned out to be single finds). While the IGCH focused on coin hoards, this was the result of a few considerations on their part. Most importantly, such a focus was simply more feasible in 1973. The editors of the IGCH benefitted from approximately a century of archaeological reporting under the imperial-Russian and then Soviet regimes, both of which invested considerable resources into "scientific" publications in archaeology and material culture (while often funneling the most impressive local finds to the imperial center). Thus, while the laws up to 1919 basically guaranteed that ownership of discovered treasures remained in the hands of land-owners, as early as 1859, the Imperial Archaeological Commission incentivized the reporting of finds through monetary

³ (Thompson et al. 1973).

⁴ We have been satisfied with the comprehensive nature of the ICGH, with one exception, which has been included in CFU, as CFU #73 ((Karishkovs'kii 1959)).

⁵ Examples include the IGCH, Coin Finds of the Roman Empire (CHRE), Framing the Late Antique and Medieval Economy (FLAME), or Antike Fundmünzen in Europa (AFE). The basic division between find and find-contents is common among all such projects.

⁶ While our data records information on iconography and epigraphy, this has not yet been meaningfully integrated into our data visualization efforts. While this may happen in future, it is in keeping with the minimal approach to coin data taken by projects like FLAME or CHRE, which record coins as clusters of common characteristics (e.g., two sestertii of Marcus Aurelius, five of Hadrian, etc.), leaving aside more specific details, which can threaten to swamp such synthetic projects, as well as challenging them to account for asymmetrical reporting among various finds (for example, some coin find reports include this information, others do not—when these are collated, they can present a misleading picture of the evidence).

reward.⁷ The most valuable of these finds might make their way to the Hermitage or to local museums—but often they were returned to land-owners, whence they disappear from historical view. The policy of private ownership of treasure did not continue past the revolution, and according to a 1928 Decree of the People’s Commissariat of Education, Internal Affairs, and Finance of the Ukrainian SSR, all such discoveries were considered public property. It is possible that this dampened reporting, because in 1964 a new Civil Code introduced rewards of up to 25% of the value of objects submitted.⁸ Whatever the result, a mixture of carrot and stick likely boosted the reporting of finds up to the time that the IGCH was published (though confirming this would require a longer study).

CFU, on the other hand, faced a problem in following the IGCH’s strategy of recording only hoards, which was that there seemed to be comparatively few to record. We discuss the scale of this problem in Section 3—for now, suffice it to say that CFU’s data contains far more single finds of bronze coins and fewer large hoards of silver and gold. One conclusion might be that all the big hoards had been found. We do not believe this to be the case, and one can find hoards of substantial size in CFU’s data. However, it is reasonable to say that fewer hoards were reported to archaeological authorities between 1973 and today than in the century prior (and the difference is significant enough to be more than a question of time: for example, hoards with 21-50 coins are seven times more numerous in IGCH’s data than in CFU’s).

Two factors are relevant to this discrepancy. One is the strength and relative resources of the state to enforce reporting and preservation, which fell precipitously in the post-Soviet era and remains low today. The other is the growth of a considerable collectors’ market, which has incentivized looting. If anything, this has grown significantly in recent decades, even before Russia’s invasions of Ukraine in 2014 and 2022. Online auction sites like Viology (a site not exclusive to coins, but serving as a hub for the sale and discussion of antiquities) are a manifestation of a much wider black market in heritage objects, which are exported to international buyers. The fact is that we do not know how many medium and large hoards have been found and broken up for sale in this manner.

While our focus on small-denomination single finds is a means of dealing with a drop in hoards, it is also a reaction to new technologies, which prevented such single finds from being catalogued by the authors of the IGCH. Compared to 1973 and prior, far more single-coin finds are reported today, which would have been the result of incidental

⁷ The process and its history are described in (Bogucki and Myzgin 2021).

⁸ This had obvious problems. First, what was the value of such objects, especially in a Socialist state? Second, as Bogucki and Myzgin note, it was far from clear that citizens trusted that objects would make their way to the proper authorities (and therefore questionable whether they would see a reward). See: (Bogucki and Myzgin 2021).

loss in antiquity rather than deliberate hoarding strategies.⁹ This does, of course, mean that we must be careful in comparing the two bodies of data. Two modern technologies conditioned this divergence. The first was the proliferation of cheap metal-detectors. While their use was pioneered in western Europe—perhaps most prominently in the UK, where the law has been amended to incentivize such activities within a heritage preservation framework—their use has become common in central and eastern Europe.¹⁰ The second is the expansion of the same black market mechanisms we described above. If there is more looting than in the past, it occurs under circumstances that are more likely to preserve some (if not all) information about coin finds. In particular, the posting and discussion of such finds on internet auction houses has meant that they may now be subject to at least minimal investigation by numismatists, and in some cases be recorded for analysis and publication.¹¹ This has meant a significant infusion of data that has, by virtue of representing different patterns of use and preservation, illuminated new aspects of ancient monetary circulation (more on this in Section 3).

The phrase "data management" requires a little bit of explanation. Here we refer to the manner and format in which data is encoded, according to what standard, and how it is stored. Our goal was to code CFU's data to be compatible with Nomisma, the now established standard for Linked Open Data (LOD) in numismatics (<https://nomisma.org/>). Nomisma is not a database, but rather an agreed-upon technical language to describe numismatic concepts at the point that they are digitized, in forms like RDF-XML or Turtle. Projects that format their data along these lines, even at a basic level, ensure that their results are viewable and accessible alongside those of other projects that have subscribed to the same encoding philosophy. Properly formatted, then, CFU's coin finds ought to be discoverable alongside the IGCH coin hoards already available through CoinFinds.Org—a project of the American Numismatic Society to digitize the IGCH—along with any other inventories that choose to structure themselves similarly. At this time, CFU's Nomisma-compliance is nominal—that is, we recorded the data in a tabular format that is convertible to RDF-XML: however, full data transformation has yet to be implemented. Nevertheless, we approached the task from the start with this conversion in mind, working directly with staff at Nomisma. It is our hope to implement it in future project stages.

⁹ In general, the FLAME project at Princeton University, which collects information on coin finds from west Afro-Eurasia between 325-750 CE, has done a good job of laying out the differences between base and precious metal coin finds, with the former more likely to be found in single finds and excavation environments, and the latter in hoards. This has to do with the motivations of ancient money users and patterns in monetary use. See: <https://coinage.princeton.edu/biases-in-flames-data/>

¹⁰ (Naismith 2021).

¹¹ This methodology is relatively new. The scholarship that we engaged with are typically from Central and Eastern Europe. See: (Dymowski 2011); (Myzgin 2015); (Dymowski 2016); (Kotsur 2017); (Orlyk and Pyzyk 2023) .



Figure 1: Map visualization layout. Clusters are colored by quantity (red highest, green lowest). Individual finds appear as white dots.

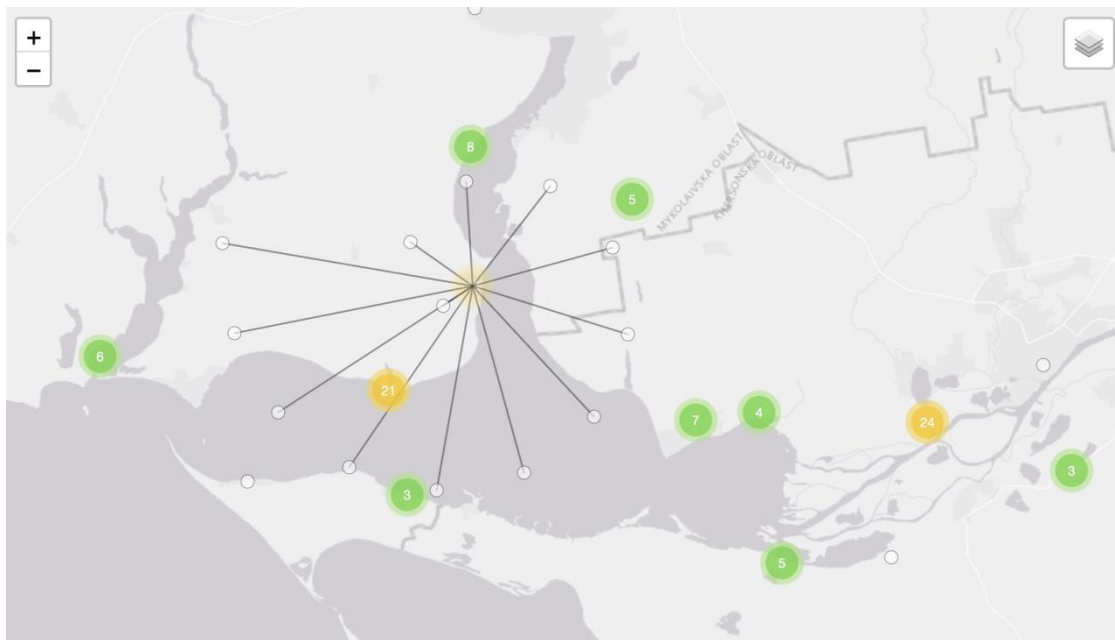


Figure 2: Spider Diagram of coin finds on the site of Parutyne.

The data visualization was implemented using a light-weight, Python-based approach.¹² We needed a simple search system to filter the data, implemented as a set of search fields or numerical sliders (Fig. 1). The main visualization is a map of coin finds, depicted as points on the map. When several finds occur within a minimal proximity to one another, they cluster (being color-coded by quantity). Clicking on a cluster zooms in

¹² Curious readers can look into this further. The dashboard interface is implemented through a Python library called Streamlit (<https://streamlit.io/>). Maps are generated using Leaflet, though again through a Python library called Folium (<https://python-visualization.github.io/folium/latest/>). Project code is currently closed but will eventually be shared through GitHub.

until the clustering equation fails to combine one or more finds, leaving an interactible map point. Clicking on that find generates a pop-up with basic information on the find. Much of this is standard among digital humanities map visualizations. The one unconventional feature of our approach is in handling coin finds that occur on the same geographic coordinates, since this results in stacked map markers that prevent users from accessing the ones at the bottom. In such cases, we have implemented a spider diagram effect, such that when the cluster is clicked, it generates a spiralled series of individual finds (Fig. 2).

Results. In the first phase of the project, efforts centered mainly on data gathering and digitization of existing literature. From August to November of 2022, CFU staff digitized 240 coin finds. By November of 2023, after the project’s second phase, a further 132 finds had been digitized, resulting in 374 finds in total (though as we discuss below, this is not a final count, as certain regions remain incomplete). There remain a number of finds that have disputed hoard counts or geographic coordinates: CFU staff continue to work to establish reasonable values in each of these cases. In the meantime, however, it means that there will be discrepancies between the number of finds in our dataset and the number of finds on the map visualization.

When compared to the 118 finds published in the IGCH in 1973, we find a considerable expansion in numismatic data on the territory of Ukraine, in terms of sheer quantity of finds (374 versus 118, or 492 in total). And indeed, the total number of coins represented by both datasets is comparable (7,879 in CFU, 8,022 in IGCH). So there are slightly more coins in the IGCH, spread across a body of coin finds that is 31.5% the size. This is consistent with our observation that fewer substantial hoards have emerged over the last fifty years than in the century leading up to 1973. But a closer look at the distribution in hoard size reveals a few nuances.

Table 1: Distribution of coin finds by find size

Hoard Count	CFU	IGCH
1	211	0
2-5	8	1
6-10	4	6
11-20	11	17
21-50	3	21
51-100	1	4
101-200	4	3
201-1,000	4	8
1,000+	1	1

The starkest difference, of course, is the enormous number of single finds in the CFU data and concomitantly their total lack in the IGCH (see Tab. 1). Besides this, however, both datasets look surprisingly similar when looking at bigger hoards (say, hoards consisting of 51-1000+ coins). A hypothesis might be that the largest hoards are discovered as the result of deliberate archaeological efforts and are therefore harder to loot. But looking at the single largest hoard in CFU, a hoard of about 4,000 silver coins of the *Medieşul Aurit* type, found near Mala Kopanya (a village SE of Uzhhorod in western Ukraine), this does not seem to be the case. The hoard was not discovered in the course of archeological excavations, and its reporting seems to have been the result of fortuitous circumstances, rather than any well-ordered process.¹³ The narrowing of difference at the upper end of hoard-sizes is more likely to simply be a product of small sample size. However, where we see a real divergence is at the mid-range (e.g., hoards consisting of 11-50 coins), where the IGCH is much better represented than CFU. These are the kinds of hoards that seem to be going unreported, and therefore are absent from our data.

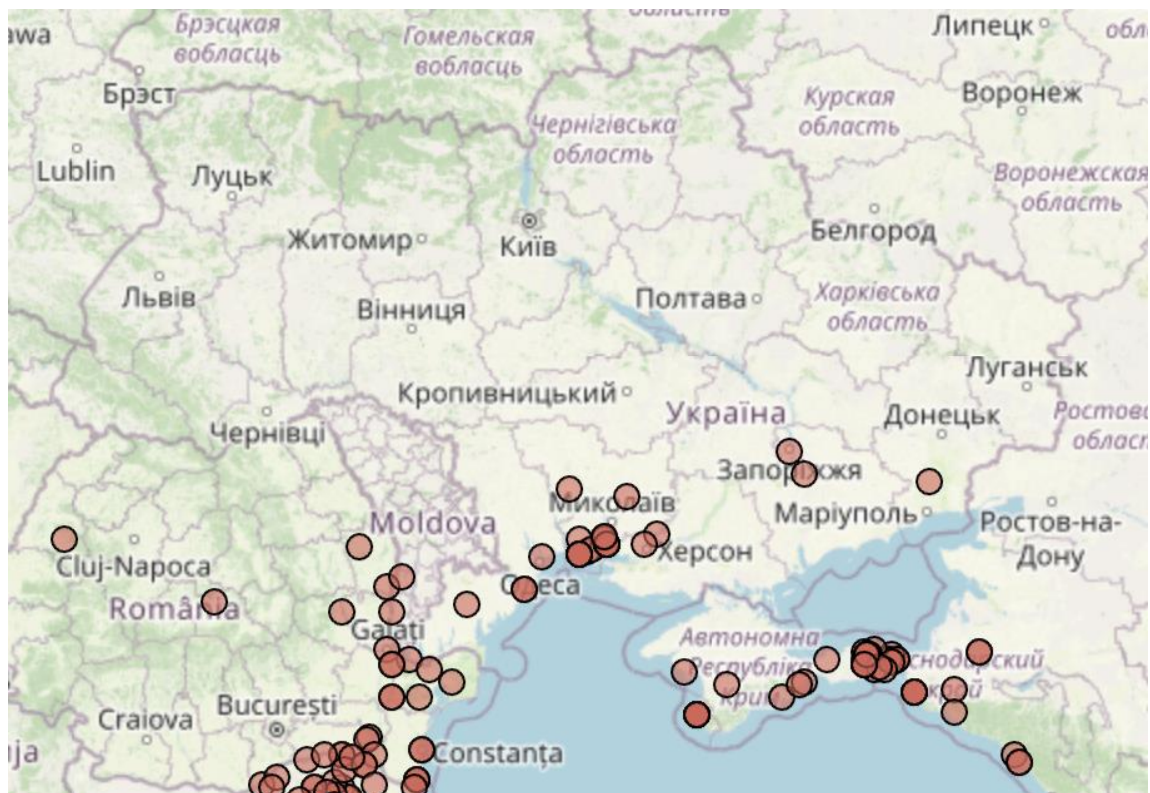


Figure 3: Distribution of coin hoards in the IGCH (source: coinhoards.org)

¹³ (Orlyk 2022).

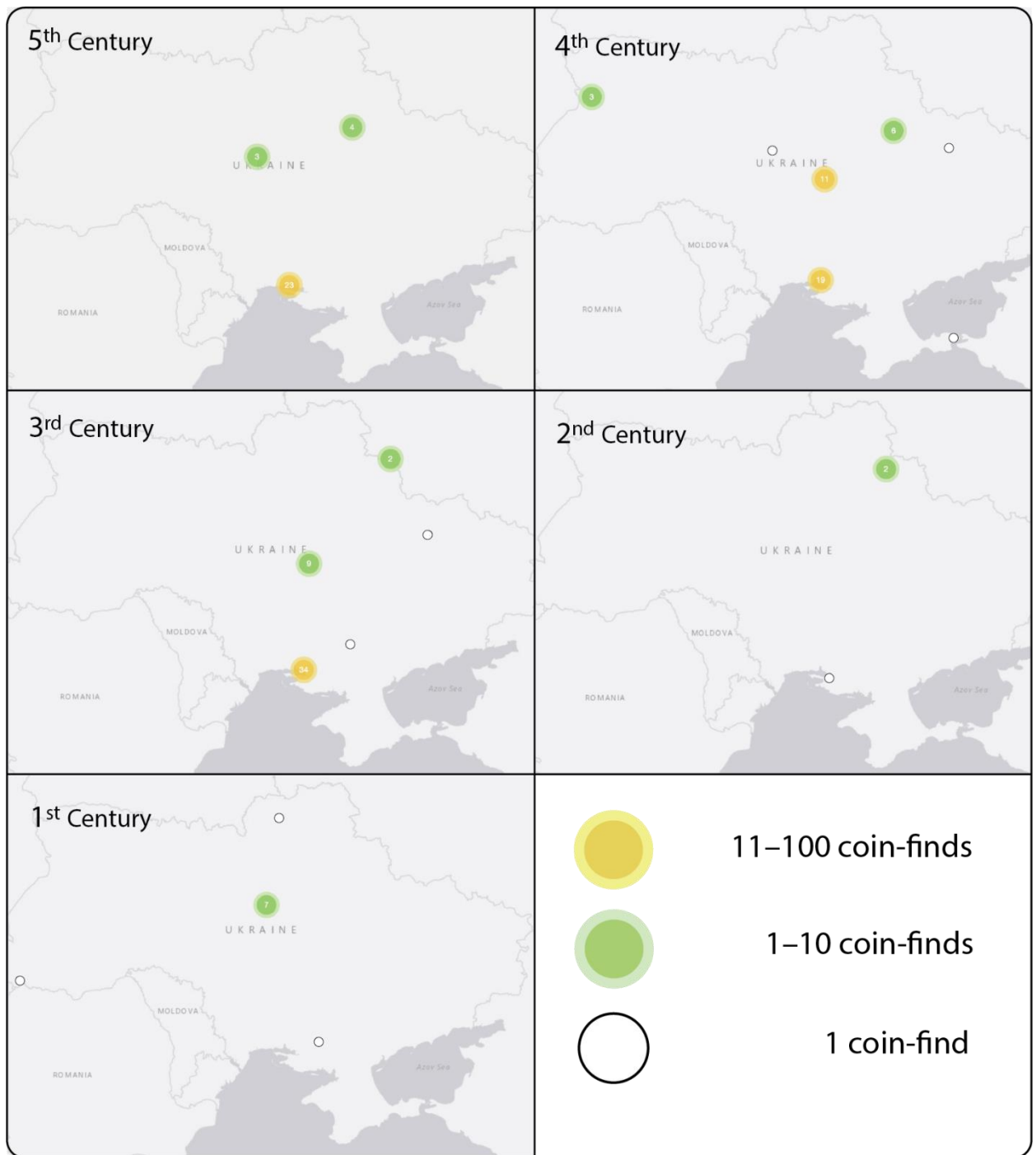


Figure 4: Coin-find distribution by century (5th-1st Centuries BCE)

Besides quantity, there is a considerably different geographical profile between CFU and IGCH finds. While IGCH finds focus almost exclusively on the Black Sea coast (Fig. 3), the finds digitized by CFU penetrate deep into the interior along the Dnieper River (and, to an extent, inland to the NE in the regions of Poltava, Kharkiv, and Sumy: see Fig. 4). While the majority of coin finds from the 5th, 4th, and 3rd centuries are to be found at the Bug-Dnieper estuary, considerable numbers of finds may be found to the north along the course of the Dnieper itself. This is true over time, starting with the early coinage of the 5th century, peaking in the 4th century in terms of inland penetration. The 3rd century saw strong (somewhat diminished) movement of coins into the interior, and

if anything even stronger deposition on the Black Sea coast. Coin finds diminish rapidly when we get to the 2nd and 1st centuries, although we can still observe considerable inland penetration.

One remarkable fact that readers will quickly apprehend is the near total lack of coin finds from Crimea in CFU. This is not at all in accord with the pattern in the IGCH, where the peninsula is well-represented. The answer to this is simply that CFU has not yet inputted a substantial number of finds from this region (save one or two). We have, instead, focused on the Bug-Dnieper estuary and areas inland, as well as throughout the region known as the Ukrainian steppe and forest-steppe. Future stages of this project will digitize Crimean coin finds, and it remains to be seen whether this will affect the relative deficiency in mid-range coin hoards in CFU's data, compared with the IGCH.

This concludes our overview, preliminary as it is, of CFU's data. We stress that it is still incomplete and tentative—not least because it excludes one of the major Ukrainian regions, the peninsula of Crimea, where the majority of ancient Greek Black Sea city-states had been founded. We therefore avoid more detailed analysis, focusing on some aspects of coin find distribution and coin find type (i.e., hoards versus single finds). We anticipate the overall picture becoming clearer as our dataset nears comprehensiveness.

Conclusion. Having completed two project stages from 2022 to 2023, CFU's mandate remains only partially fulfilled. In terms of coin finds, we have yet to input the enormous number of Crimean coin finds, choosing to focus on finds from the Bug-Dnieper estuary, upriver along the Dnieper, and inland from the Ukrainian steppe and forest-steppe. The project aims at comprehensiveness, and future project stages will be undertaken to complete data coverage. We also aim to improve and expand access to the data. This means implementing full data compatibility with Nomisma's Linked Open Data standard, as well as improving CFU visualization tools for users aiming to use our data for research. We intend to integrate IGCH's data alongside CFU's, in order to provide a more complete historical picture. All of these steps are critical to providing a full picture of Ukrainian numismatic finds from the classical period: by providing a synthetic overview of these finds, we hope put them in their proper place in the larger picture of classical/hellenistic Greek numismatic circulation, and by extension the economies of the Greco-Roman world between the fifth and first centuries BCE.

References

- Bogucki, M. & Myzgin, K.** (2021). “The law and practice regarding coin finds: Poland and Ukraine”. *Compte rendu*, 68:17–25.
- Dymowski, A.** (2011). *Znaleziska monet rzymskich z terenu Polski rejestrowane w pierwszych latach XXI wieku. Aspekty źródłoznawcze*. Zielona Góra.
- Dymowski, A.** (2016). *Nummi serrati, bigati et alii. Coins of the Roman Republic in East-Central Europe north of the Sudetes and the Carpathians*. Warsaw.

- Karishkovs'kii, P.** (1959). "Olbian coins found around Odessa". *Undertakings of the Odessan National University*, 149(1):138–143.
- Kotsur, V.** (2017). "Istoriografiiia ukrains'kogo skarboznavstva". *The Ukrainian Numismatic Annual*, 1:15–32.
- Kropotkin, V. V.** (1961). *Klady rymskych monet na territorii SSSR/Hoards of Roman coins on the territory of the USSR*. Number G4-4 in *Arheologiya SSSR Svod Arheologicheskikh Istochnikov*. Izd-vo Akademii nauk SSSR, Moscow.
- Kropotkin, V. V.** (1962). *Klady vizantijskikh monet na territorii SSSR/Hoards of Byzantine coins on the Territory of the USSR*. Number E4-4 in *Arheologiya SSSR Svod Arheologicheskikh Istochnikov*. Izd-vo Akademii nauk SSSR, Moscow.
- Myzgin, K.** (2015). *Do pitannia kritiki numizmatichnikh dzherel (na prikladi vivchennia znakhidok an- tichnikh monet na teritorii Skhidnoievropeis'koho Bar- barikumu)*. Visnik Kharkivs'koho natsional'noho universitetu imeni V.N. Karazina. *Istoria*, 50:179–188.
- Naismith, R.** (2021). *FLAME Regional Bias Series: Britain*. Technical report, FLAME.
- Orlyk, M.** (2022). "The hoard of Celtic coins from the former Vynogradiv district of Transcarpathian Region". *The Ukrainian Numismatic Annual*, 6:110–123.
- Orlyk, V. & Pyzyk, M.** (2023). "A hoard of Pontic coins from the time of Mithridates VI Eupator from the chora of Olbia". *Revista Archaeologica*, XIX(1):87–99.
- Pyzyk, M.** (2021). Regional Bias in Late Antique and Early Medieval Coin Finds and its Effects on Data: Three Case Studies. *The Ukrainian Numismatic Annual*, (5), 197-210. <https://doi.org/10.31470/2616-6275-2021-5-197-210>.
- Thompson, M., Mørkholm, O., Kraay, C. M., & Noe, S. P.** (1973). *An inventory of Greek coin hoards*. The International Numismatic Commission. Published for the International Numismatic Commission by the American Numismatic Society, New York. OCLC: 738363.