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ИЗСЛЕДВАНИЯТА НА ДРЕВНА ТРАКИЯ МЕЖДУ ТРАДИЦИОННОСТ И МОДЕРНОСТ: ТЕОРЕТИЧНИ АСПЕКТИ И НАУЧНА МЕТОДОЛОГИЯ

RESEARCHES OF ANCIENT THRACE BETWEEN TRADITIONALITY AND MODERNITY: THEORETICAL ASPECTS AND SCIENTIFIC METHODOLOGY

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PREFACE

The studies of Antiquity in Bulgarian historical science have a long tradition since the foundation of Sofia University in 1888. Unfortunately, in the last decades these studies have been largely devoid of scientific debate in terms of theoretical and methodological framework. The new millennium has added to the traditional disciplines of history, archaeology, epigraphy and numismatics other key aspects of the interdisciplinary approach, such as archaeometric studies and digital humanities.

The 'Measuring Ancient Thrace' project funded by BNSF (КП-06-Н50/3 from 30.11.2020), has aimed to provoke a methodological debate on the place of the digital technologies and the methods of exact sciences in the research of the history and culture of ancient Thrace at a theoretical and practical level. The created wide network of scholarly contacts and research highlights focused on the lands of ancient Thrace provoked the organization of an international scientific conference entitled 'Researches of Ancient Thrace between Traditionality and Modernity: Theoretical Aspects and Scientific Methodology' (https://digithrace.uni-sofia.bg/digithrace-conference/). It took place on April 11th – 13th 2024 at the Sofia University St. Kliment Ohridski with the financial support of the BNSF (project № КП-06-МНФ/44 from 19.12.2023).

The aim of the conference was to provoke a scientific debate on traditional and new methodological approaches to the study of Antiquity and Ancient Thrace in particular. The discussion was innovative for Bulgaria and for the research of ancient Thracian history and culture, since after the establishment of Thracology as a historical discipline in the early 1970s such deliberate debates have not been held in Bulgarian scholarly community.

The conference focused on the impact of the digital age on the understanding and interpretation of ancient Thrace. The provoked topic concerns the theory and methodology in the four key disciplines of historical knowledge - ancient history, archaeology, epigraphy, numismatics, but also in archaeometric research, and their relationship to digital technologies. The program of the conference is available at https://digithrace.uni-sofia.bg/digithrace-conference/

In the present volume, 19 of the conference presentations are published; they systematize the directions of development and present the new trends in the research of ancient Thrace in the 21st century. If no other indications, summaries and keywords sent solely in English have been translated into Bulgarian by Dilyana Boteva; the editors are hopeful that these translations are all correct.

The editors express their sincere gratitude to the Association Centre for Excellence 'Heritage BG' for the kind offer to publish the proceedings of the conference in its Research Announcements.

Analyzing the Texts of the Ancient (and not only the Ancient) Authors: Some Methodological Aspects

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Faculty of History, Sofia University St. Kliment Ohridski

Abstract: *Along with the archaeological, epigraphical and numismatic material, the texts of the ancient, late-antique and early Byzantine authors provide the needed – though fragmentary – information for reconstructing the Thracian history and culture. These texts have been scrutinized and used by the modern historians of Antiquity for several centuries already and it seems that everything has been said. Still, I dare insist that some methodological aspects of their analyses have never been approached and are in fact badly needed. Following a very short summary of the highlights of the Thracian studies so far, the present paper tries to define two methodological principles to be taken into consideration in future research.*

Keywords: endonym, exonym(s), reliability of Thucydides' reports
Ключови думи: ендоним, екзоним(и), достоверност на Тукидид

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1. INTRODUCTION

When back in 1968 Chr. M. Danov published the Bulgarian version of his book "Ancient Thrace"[1], the knowledge of the scholarly community of the pre-19th century studies on this subject was aware of just Count Luigi Ferdinando Marsili's book of 1734[2] and Felix Cary's one of 1752[3]. The German version of Danov's book published in 1976, despite some updates[4], kept these two oeuvres as starting points of the European interest in ancient Thrace[5]. The same picture is reproduced also in otherwise pioneering book of Alexander Fol "Political history of the Thracians end of the 2nd millennium – end of 5th century BC"[6]. New knowledge of the topic emerged thanks to the unique and amazing private collection of old atlases, maps, engravings and books gathered by Dr Simeon Simov, part of which was presented at an exhibition in Sofia, opened on May 19th 1986[7]. Without referring

[1] *Danov* 1968: 14.
[2] *Marsili* 1734.
[3] *Cary* 1752.
[4] *Schachermeyr* 1976: VI.
[5] *Danov* 1976: 1-2.
[6] *Fol* 1972: 13.
[7] *Vanova et al.* 1986; *Pindikova* 2006: 8.

explicitly to it, but undoubtedly hinting to this event, in 1990 Alexander Fol wrote that in 1986 it had become clear that the start of the thracological studies could be re-dated 20 years earlier than previously known[8]. The new name introduced then in the specialized literature was the one of Sigebert Haverkamp, who published in 1736-1737 two volumes of a general history of the ancient and early Medieval world; the second volume includes a section on the history and numismatics of ancient Thracians, but Thrace also appears throughout the detailed report on ancient Macedonia[9].

Recently a further new name and oeuvre have been highlighted with the statement that the first known so far study on the history of ancient Thrace in fact dates back to the end of the 16th century and belongs to Reinerus Reineccius, who wrote "*Historia Ivlia, Siue Syntagma Heroicvm*" (1595)[10]; there a section of 31 pages is included under the title "Regnum Thracium"[11]. However, the collection of the remarkable Bulgarian Dr Simeon Simov, has provided us with evidence, that the interest for ancient Thrace predates even the book of Reineccius, as already in 1585 Abraham Ortelius created the map of Ancient Thrace (Thraciae Veteris Typus)[12], putting in it a lot of efforts and – obviously – intensive study of the available ancient evidence on the matter.

Thanks to digital technologies it became possible to retrieve many more names of pre-19th century humanitarians who have studied Thracian history and geography, and this is a task which expects its motivated and trained researchers. Especially when we take into consideration that meanwhile some of the codices have been destroyed due to wars in 17th-20th c. Here I am going to mention just two more names in an attempt to start drawing attention to the topic. In chronological order they would be Christophor Heidmann and Georgius Hornius: In 1658 Heidmann published a book, of which chapter XII is devoted to Thrace[13] and chapter XIII – to Moesia and Dacia[14], while in Hornius' oeuvre of 1666 the author introduces with short reports the Thracian history[15].

Several precisions are needed concerning the contributions of Count Luigi Ferdinando Marsili to the geography of ancient Thrace by introducing information about sites and monuments he has managed to autopsy. The first publication of Marsili's oeuvre concerning these lands appeared in fact already in 1726 in Latin[16]; the book of 1734 mentioned by Chr. Danov and Al. Fol, is a French translation. A further reason for the needed precisions is the fact that almost half a century before the book of 1726 (1934) Count Luigi Marsili published in Italian a report on the Thracian Bosporus (1681)[17], in which he discusses the topography and the geographical peculiarities of this strait, referring even to Polybios and his information about the "temple of Mercurius" in ancient Byzantion[18].

Many further precisions concerning the pre-19th century interest in ancient Thrace are possible and are in fact needed; however, this is not the purpose of this paper. Also, I am not going to discuss here the publications on the matter which postdate 1800, as they have been discussed – though also not exhaustively – elsewhere[19]. What is needed in fact here, is to

[8] *Fol* 1990: 10; cf. *Vanova et al.* 1986: 18, no I. 35.
[9] *Haverkamp* 1737: 298-316 and 311-316, the latter being without page numbers.
[10] *Mitrev, Iliev* 2024. Here I would like to thank Prof. DSc Mirena Slavova (Department of Classical Philology at the Sofia University) for introducing to me this publication.
[11] *Reineccius* 1595: 105-136.
[12] *Pindikova* 2006: 32-33. See also *Phillips* 1914: 115, no. 26. See here on p. 13.
[13] *Heidmann* 1658: 323-347.
[14] *Heidmann* 1658: 347-357.
[15] *Hornius* 1666: 122, 144, 147. Special thanks are due to Prof. Dr Alexander Nikolov (Faculty of History at the Sofia University), who drew my attention to the text of this author.
[16] *Marsili* 1726.
[17] *Marsigli* 1681.
[18] *Marsigli* 1681: 26.
[19] *Danov* 1968: 15-42; *Fol* 1972: 14-35; *Danov* 1976: 2-21. See especially *Theodossiev* 2015: 4-5 for some intriguing information on early excavations of Thracian tumuli.

honour the experts, archaeologists and numismatists (**Fig. 1**), classicists and historians (**Fig. 2**), that have devoted their entire academic career to the history and culture of the ancient Thracians and whose achievements formed the basis for the modern studies in the field of Thracology.

periods in general. However, despite the thousands, possibly even hundreds of thousands of publications on such matters, an astonishing fact, firmly documented and clearly traceable, has never been introduced as a situation that should be taken into consideration. This is valid

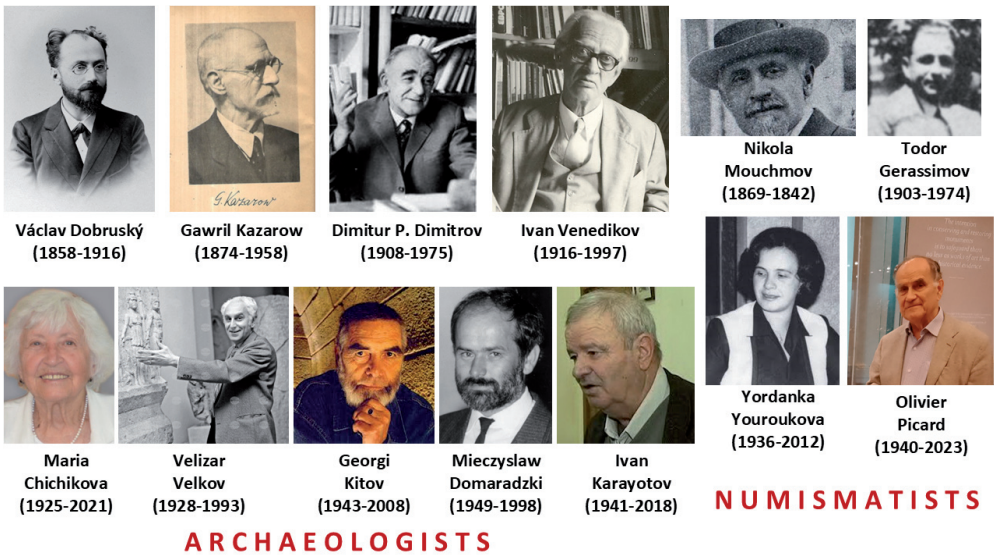

Figure 1. Some numismatists and archaeologists with essential contributions to the study of Ancient Thrace.

Figure 2. Some classicists and historians with essential contributions to the study of Ancient Thrace.

2. THE ISSUE WITH THE ETHNONYMS: ENDONYM, EXONYM(S)

The ethnonyms are among the most often discussed problems in the scholarly community, not only concerning the ancient Thracians but different ethnic groups in different historical

even more for the times, poorly and fragmentarily presented in the sources, as is in fact the situation in the Antiquity (but also the Middle Ages) for almost all ethnic groups mentioned by the ancient (and medieval) authors.

The instructive linguistic situation I am trying to get the attention to, concerns modern-

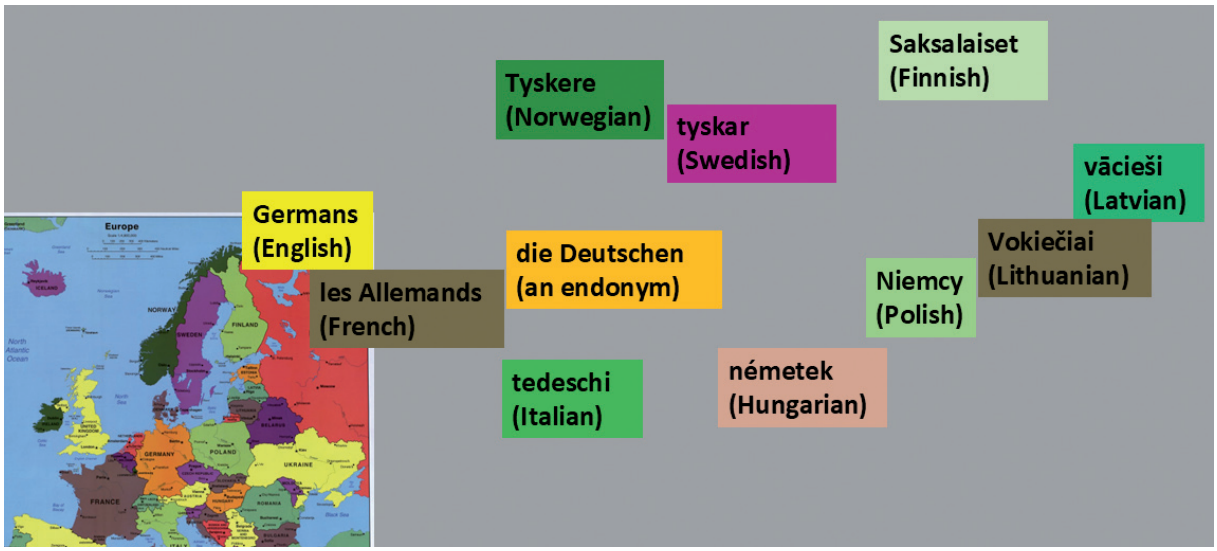

Figure 3. Visualisation of a correlation between endonym and exonyms: the "die Deutschen" case.

day Germans whose endonym is *die Deutschen*, but who has numerous exonyms as shown on **Fig. 3** (in fact they are even more; the examples given in the Figure are just enough to illustrate my point). The appearance of most of these exonyms has a logical explanation, however this does not change the fact of the colourful picture concerning the attested ethnonyms. Nowadays, thanks to the mass media and the printed maps, it is clear all these ethnonyms refer to the same nation; however, we could just image what would have happened without these media of universal information. It is more than sure that the experts would have started to search place and space on the map for at least eleven different ethnic groups. No doubt, the 'die Deutschen / Germans / tedesci / etc.' case should function as a warning sign for everybody when dealing with ancient (and medieval) ethnonyms. All above said is – of course – valid also for the Thracians and the numerous Thracian tribal names that have come down to us. Traditionally it is believed that there are ca. 80 Thracian tribal names, reported by the ancient authors. Having in mind the case with the numerous modern exonyms for the Germans, are we allowed at least to ask, how many of these ca. 80 Thracian ethnonyms referred to just one tribe, or we will continue to view all of them as different Thracian tribes within ancient Thrace?

3. WHAT MATTERS WHEN ASSESSING ANCIENT (AND NOT ONLY ANCIENT) REPORTS? THE CASE OF THUCYDIDES

The above question concentrates the entire basic energy even of our everyday life. However, I am strongly committed to staying solely within the scholarly aspect of the matter.

The author's chronological and territorial coordinates have already long ago been recognized as important when evaluating a report. His / Her social and political position has also been identified as essential at least since mid-19th century[20]. The sources, used by the respective author is a third "must" to evaluate, and it is also universally agreed upon.

And, of course, the condition of the respective codices that have come down to us is a fourth "must" already approached to by many experts. Let me remind, that – on the one hand – some ancient texts are available in just one codex[21], which deprives us from the possibility to check the correctness of the preserved text.

[20] For a recent discussion on the matter see e.g. *Konaris* 2022.
[21] See e.g. *Jackson* 1970: 248, n. 1.

On the other hand – some texts have been preserved in many codices and some of them differ from one another greatly in certain parts[22] and there are emotional debates which of the versions presents more accurately the original author's idea.

The obligatory need to check the codices and not to rely just on the published ancient sources became clear also while working with Eusebius' *Chronicle* entirely preserved solely in an Armenian translation of which only one copy is available and the Latin translation of Eusebius' *Canons* by Jerome, preserved in eleven codices. As already mentioned in another place[23], Dr Nicolay Sharankov drew my attention to the fact that the different codices of Jerome associate the transformation of the Thracian kingdom into a Roman province with different year within the 206th Olympiad – more codices date the change in the fourth year of the 206th Olympiad[24]. Although only in three out of eleven the change is dated in the second year of the 206th Olympiad[25], the latter is the one universally accepted in the published versions of the Jerome's text, despite the fact that it does not synchronize with all available evidence on the matter[26]. The incorrectness of this approach when publishing Jerome's text is evident also by the fact that the Armenian translation of Eusebius' *Chronicle* dates the birth of the Roman province of Thracia in the third year of the 206th Olympiad[27], i.e. in the time of AD July/August 47 – June/July 48, which is in full accord with the information one could extract from the available parts of Tacitus' *Annales* and Cassius Dio's *Roman history*[28]. This would mean that due to incorrect publications of the Jerome's codices for almost century and a half the transformation of the Thracian kingdom into a Roman province has been wrongly dated to either AD 45 or AD 46. This is really a pity, as back in mid-19th century this fateful for the Thracian lands change was dated to AD 47[29], but this relatively correct dating remained without followers in the centuries to come. Nowadays the good news is that thanks to the digital era, the obligatory need to check the codices and not to rely just on the published ancient sources, becomes achievable.

The fourth "must" aside, despite the long-lasting universal agreement on the first three elements of the assessment, there are huge differences in approaching some of the ancient authors. Among them Thucydides has a very special place, being approached and "measured" quite controversially[30]. And this is fully understandable, due to the huge literature published on his personality and his oeuvre[31]; in 2018 even the First International Academic Conference "Thucydides the Athenian" was held in Athens (Greece)[32]. Thus, we have Karl Popper's definition of Thucydides as 'greatest historian, perhaps, who ever lived'[33]. Of course, we must have in mind that this *laudatio* comes from the author of another very influential book, 'The Poverty of Historicism'[34], still there can hardly be a doubt that this definition was really meant as a praise, even though followed by the statement "But however successful he was in making sure of the facts he records, and however sincere his efforts to be impartial, his comments and moral judgements represent an interpreta-

[22] See e.g. *Hdt* V.16.1 which in some codices includes three Thracian ethnonyms (the Doberes, the Agrianes and the Odomanti), while in other codices these three names are missing.
[23] *Boteva-Boyanova* 2021: 15.
[24] *Schoene* 1866: 153.
[25] *Helm* 1956: xlvii.
[26] *Boteva-Boyanova* 2021; *Boteva* 2022.
[27] *Schoene* 1866, 152; *Karst* 1911: 214–215.
[28] *Boteva-Boaynova* 2021: 11–14; *Boteva* 2022: 46.
[29] *Migne* 1866: 449.
[30] See for example the insightful review of J. P. *Euben* on 1984 W.R.Connor's book on Thucydides, strongly influenced by the Vietnam War (*Euben* 1986).
[31] See e.g. *Rengakos*, *Tsakmakis* 2006: 839–882; *Balot, Forsdyke, Foster* 2017; *Nývlt* 2018; *Low* 2023.
[32] *Marinatos, Pitt* 2022.
[33] *Popper* 2013: 169.
[34] *Popper* 2002.

tion, a point of view; and in this we need not agree with him"[35]. Different attitude is championed by the esteemed French historian of Antiquity Nicole Loraux, who wrote back in 1980 'Thucydide n'est pas un collegue'[36]. Harsher critique was published back in 1885, when Herman Müller-Strübung insisted that Thucydides wrote a *"martialisch-didaktische epopöe (…), an die wir durchaus nicht die forderung historischer treue (…) stellen dürfen"*[37].

As is well known and often mentioned, however not properly discussed, Thucydides was personally involved in some of the events he wrote about, having failed in his public tasks and because of this he was exiled by his compatriots. He spent 20 years in exile, and being in exile, started writing his work on the Peloponnesian War. Moreover, he was exiled by the Athenians, because he failed to secure for his polis the control over Amphipolis and accordingly, the control over the gold and silver mines in Pangaion. However, he did not fail to keep the hold of his own mine in the same region (*Thuc.* IV.105.1) – a situation very seldomly discussed in the historiography.

We will remain ignorant of how he obtained these mines[38]; also, the question arises whether the security of his own mines was Thucydides' main priority while in the region of Amphipolis, where he was supposed in fact to protect the Athenian public interests. Sentenced to exile because he failed protecting these interests, Thucydides devoted his time in Thrace while in exile to write his '*History of the Peloponnesian War*' obviously as an active participant in the contemporary events but also – beyond any doubt – as an attempt to regain the respect of his compatriots. With all these circumstances in mind, I personally opt to give support to the popular skepticism concerning the historicity and complete truthfulness of Thucydides[39]. There are a real number of strange sounding pieces in his narration, that should expect caution in trusting it, despite his real achievement of revealing the logic of the historical process and the causality.

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[35] *Popper* 2013: 169.

[36] *Loraux* 1980. Thanks are due to Dr Alienor Rufin Solas, who drew my attention to the English version of this study (see *Loraux* 2011).

[37] *Müller-Strübung* 1885: 289.

[38] *Tzvetkova* 2008: 144; *Plant* 2016: 128-129.

[39] See e.g. *Irwin* 2023.

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Методологически аспекти на анализа на антични (а и не само антични) автори

Диляна Ботева-Боянова

Изследването представя три аспекта на методологическата работа в изследванията за Древна Тракия, които имат и по-широко принципно значение извън конкретните географски измерения. В първата част са представени възможностите за проследяване на развитието на научните знания, станали възможни благодарение на новата дигитална среда. Направени са съответно отделни допълнения и уточнения по отношение на интереса към земите на Древна Тракия преди началото на XIX в. Втората част е съвсем лаконична и акцентира върху необходимостта от висока осторожност при анализа на етноними, като се отчитат особеностите на ендонимите и екзонимите. Третата част визира от една страна необходимостта от задължителна автопсия на кодексите, тъй като често при печатното им издаване са допускани сериозни и необосновани промени, а от друга страна е фокусирана върху оценката на Тукидид като личностна позиция и съдба, и – съответно – тяхното неизбежно отражение върху характеристиките на неговата „*История на Пелопонеската война*“.

The 'Early State' and Its Main Characteristics

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Abstract: *This article presents some of the most essential characteristics of the so-called early state, a concept that has been actively promoted in the last 50-60 years by cultural anthropology and ethnology to describe a form of politico-social structure in the post-**chiefdom** era. In order to avoid the "traps" of the so-called linear perspective in humans' development, the author considers it more acceptable in each particular study one to look for the intersections between history, with its tendency to focus on changes, and anthropology and ethnology, which have a greater affinity for stable structures.*

Keywords: statehood, chiefdom, administration, rulership, anthropology, state apparatus.

Ключови думи: държавност, *чийфдъм*, администрация, власт, антропология, държавен апарат

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Over the past few decades, key concepts in anthropology, such as 'chiefdom' and 'early state', have shown their heuristic potential and gradually established themselves in the social studies and suffice it to point to the names of E. Service, H. J. M. Claessen, P. Skalník, T. Earle, A. Khazanov, N. Kradin, L. Grinin, and A. Korotayev, to mention a few, to illustrate the rise of the above trend. At the same time, there are also authors such as N. Yoffee or D. Sneath, who, on different grounds and to different degrees (of rejecting), question validity of the above-mentioned theoretical constructs. Joffee, for instance, is very keen on contextuality in any attempt to categorize an *early* state, and not just in the relevant political formation one to look for and find some predetermined markers of early statehood.

The above concepts came to replace – especially in both the former USSR and the socialist states in Eastern Europe dominated before 1989 by that same USSR – similar but outdated mental constructs often voluntaristically imposed by the so-called historical materialism which was quite typical (and almost obligatory) for the ex-Soviet Union. Even in the USSR, however, some scholars saw the inconsistency of the established linear and evolutionist scheme used to explain the transition from one formation to another, namely a *slavery→military democracy→feudalism→capitalism*, which subse-

quently passed into *socialism* and, finally, into a classless society called *communism*.

The problem is that anthropology- and ethnology-influenced specialists, trying to impose new concepts such as *chiefdom* and *early state*, along with the well-known *bands* and *tribes*, often pointed to a similar linear evolution, expressing it through the transitional scheme *tribe→chiefdom→early state* to complete the evolution through the *mature* state. Thus, once again, scholarship on man and society and their evolution, as well as that of the socio-political forms in which he/she resides with other people, faced the serious question of how to combine the ideal types (mental constructs) with empirical data, at the same time making these ideal types applicable for analysis within a given area (region, territory) and chronological frameworks, so as not to be only, or mostly, mere abstractions, even if they are created on the basis of specific historical data. It is in this direction that the opponents of the so-called Neo-evolutionism are thinking of.

It has long been the opinion in scholarship that the creation of a *state* is actually a process and not a separate act[1], i.e. the state is as a rule "in motion-and-development". And one more important feature on which to focus our attention: there is no common and compulsory reason for all individual state-*cases* to which the emergence of a state is due.

According to the great connoisseur of early statehood, H. Claessen, the use of the term *early state* was suggested to him already in the 1970s by another expert in the field from the former Czechoslovakia, P. Skalník[2]. The essential thing in this case is that both scholars – Claessen and Skalník – published in 1978 one of the most influential books in the field of *early state* studies[3], thus paving the way for rapid research and clarification of theories, paradigmatic examples, and concepts in the field of early statehood. They would go on to produce another volume on this subject matter in 1981[4]. In his views at the time, Claessen attached great importance to the figure of the "sacred/divine king" when speaking of the early state[5]. He believed that the existence of such an institution was among the typical characteristics of early statehood, since this "king" became an important instrument for the consolidation of society, acting as an intermediary between his subjects and their protecting deities. With the accumulation of empirical data, however, it became clear that the figure of the "sacred king" was not always so decisive for the various early types of states. Within the next few decades, it has become evident that the development of an *early state* is anything but simple, linear, and one-dimensional. On the contrary, in quite a few *cases* the processes were uneven and protracted, with consequences that were not always clear, which is why in some individual cases some of these states could simply disappear from the political scene[6].

After these introductory words, let me outline some of the most general characteristics of the so-called *early state* that are developed in scholarship so that one can still see what is most important for this **ideal** type.

By the beginning of the 21st century, a far more modern version of the definition of the *early state* concept could be found in the works of Claessen. After a long correspondence with Korotayev in September 2006, the two scholars agreed on several important features of the *early state*: that it is, 1) an independent centralized socio-political organization for the regulation of social relations in a given complex and stratified society, divided into at least two main strata, or social classes, that are somewhat clearly defined, i.e. into those who rule and those who are ruled, whose relations are characterized by the political dominance of the former and, accordingly, by the obligation to pay taxes on the part of the latter; and, 2) that this organization is legitimized by a common ideology in which

[1] *Claessen, Skalník* 1978: 637-650.
[2] *Claessen* 2008: 4-18, esp. 6.
[3] *Claessen, Skalník* 1978.
[4] *Claessen, Skalník* 1981.
[5] *Claessen* 1978: 533-596. See also a detailed commentary in *Kradin* 1995: 47.
[6] *Claessen* 2008: 11. On the emergence of alternative forms, cf. *Bondarenko, Grinin, Korotayev* 2002.

reciprocity is a fundamental principle[7].

However, Yoffee presents a counterpoint to the claims given above: the relationships in these kinds of formations, says Yoffee, is not to be represented solely as repressions and exploitation on behalf of those who were in power. According to him, in the earliest states we have variations of both social systems and the style of management, and not some "unilinearity" in development, and hence – uniformity; therefore, there were also a variety of development trajectories at the level of social evolution; consequently, there have been different trajectories for development in the field of social evolution[8]. Here, in my opinion, again we come to the serious and most burning question of how useful in science is a totalizing concept and, accordingly, generalization.

No doubt, one of the essential characteristics of this type of state is not only the ability of a given ruler and his entourage to control certain resources (human, natural, etc., as well as those of a symbolic nature), but also to practice of gift-giving on a large scale. In his book "The Gift", M. Mauss has long explained several specific manifestations of this phenomenon[9], which is why there is no need to go into great detail here. So, I shall point out only the most important aspects of this phenomenon, which have had enormous influence among early human societies. For them, the so-called reciprocity of giving allowed both parties in this regard to feel that they were on the same level, at least by definition. One of the essential functions of whoever held supreme power in a given community was generosity in giving to those below them. Such generosity was perceived as an obligation of the position, not of the specific individual[10]. As a rule, chieftains in Euro-Asia gave weapons, horses, and gold as gifts, and that this phenomenon was related to a constant attribute of theirs – generosity[11]. It was usually displayed in public, at feasts or celebrations of important events, as well as during the observance of annual festivals. Underlying all this are typologically similar notions, and scholars have long established their connection with concepts such as the Iranian *hvarenah/hvarnah/farn*, the Turkic *qut*, or the Slavic *slava*. Behind them were intentions such as "good fate/good luck/happiness" that underlay the aristocratic ethos of pre-modern human beings[12]. Through such ideas, pre-modern men recognize the significance of a semantic chain of divine emanations such as *light*, *brilliance*, *glory, charisma, good fortune, abundance*, etc.

In contrast to the *chiefdom*, the *early state* had coercive institutions, although the separation of rulers and the ruled was still incomplete. The hierarchical principle formed the basis of both authority and governmental organization. At the same time, the gender/age division (of duties, of labor, etc.) continued to dominate at the lower levels of the hierarchy, as in previous periods.

One of the main features of the *early state* in comparison with the *chiefdom* is the emergence of bureaucracy (or, better, administrative apparatus)[13]. According to Grinin, the governmental apparatus of the *early state* is usually of an unsystematic nature. It uses or reconstructs previous forms of government and is formed completely anew only in important directions (or areas). As a result, in its entirety, it is a motley mixture of old and new. In general, however, *early states* have a much more complex and developed system of government[14].

Among the important characteristics of the *early state* should also be mentioned, 1) that the kingship there by definition is not hereditary, but rather has features of duality, i.e. it is both elective and hereditary; 2) that there is a functional dependence between the elective/hereditary character of the kingship and the pres-

[7] *Claessen* 2008: 13.
[8] *Yoffee* 2005: 2, 6.
[9] *Mauss* 1950.
[10] *Kochakova* 1995: 160.
[11] *Cardini* 1987: 142.
[12] Among the numerous titles on this topic see, for instance, *Golden* 1980: 192-196; *Golden* 1992: 147, 169.
[13] *Kochakova* 1995: 158. See the seminal works of Max Weber, as well as *Wittfogel* 1957.
[14] *Grinin* 2012: 54.

ence in the *early state* apparatus of a council of nobles, whose functions included the election of a "king"[15].

In the *early states*, the ruler's clan began to play a new role, that of the highest echelon of power, whose members were often "scattered" in all corners of the state. The supreme authority became capable of effectively influencing both the appointment of the most important posts and the appointment of middle-ranking administrative cadres, if not in all, then at least in some of the key executive bodies and institutions of the state (e.g., those of the army, the courts, etc.). Also, such a state was characterized by greater social mobility among the subjects who performed governmental functions. In addition, *early states* had much greater opportunities to rotate members of the state apparatus if any of them performed their duties inadequately and/or unsuccessfully. Thus began the gradual professionalization of government, although "professional" is a broad enough term[16].

The *early states* also had a considerable number of hereditary and clan professionals from which state officials were selected; they held their position or office independently of the center. But gradually the new type of state officials began to play an increasingly important role. Firstly, the number and role of functionaries among them increased significantly[17]. Since the chieftain possessed authority in all its fullness, the people appointed (approved) by the center often had only limited powers. Secondly, the body of officials became sufficiently diverse, since their rights to a given position were different. Among the new types of officials, a special mention should be made of the appointees, i.e. those who were appointed to certain positions or offices and were dependent on the ruler. This group was also quite mixed. It should be noted that rulers strove to select their people, both in their retinue and in the state apparatus, according to the principle of (personal) loyalty. In this sense, people without kin, slaves and servants, or people from other tribes were particularly convenient to the authorities. In some states of this type, special knowledge was also required of those appointed to govern, and thus, in a purely evolutionary way, prospective groups of specialized managers (including scribes) were created. Foreign advisers could also play an important role in the governance of *early states*[18]. In this way, more and more people entered the political and administrative sphere – people who lived off the remuneration/income from performing their functions and were directly dependent on the "government" of the respective state. Of course, they did not yet constitute a whole, complete system, but the further an *early state* progressed in its development, the more the conflict between professionals "by right" and professionals "by appointment" became apparent[19].

Grinin formulates four specific criteria for distinguishing the *early state*: 1) special properties of the supreme authority; 2) new principles of government; 3) unconventional and new forms of regulation of social life; and 4) redistribution of power. He also offers a number of important preliminary clarifications to this scheme: a) these features form a system; each one of them largely complements the others; b) each feature must be present in each *early state*; but the presence of only some of them is not a 100 % criterion for an *early state*; c) these features are sufficiently broad in their content, which is evident from their very names (new principles, new forms, etc.). In the present case, Grinin argues, such broad generalizations are most productive for the following reasons: they reflect the fact that in each *early state* certain narrower tendencies within the above features prevailed; it was clearly not possible for all of the new principles and forms to suddenly appear in an *early state* – only some of them could[20].

[15] *Kochakova* 1995: 161.
[16] *Grinin* 2012: 54-55.
[17] On their classification, see *Claessen* 1978: 576.
[18] On the examples of the Sogdians in the Turkic early medieval khaganates that are truly paradigmatic, see *Hayashi* 2004: 117-134; *Stepanov* 2010: 20, 28-29, 31.
[19] *Grinin* 2012: 55-57.
[20] *Grinin* 2012: 45 f.

Another important question is what were the main dimensions of power in the earliest states? I will briefly point to the answers of Yoffee and Grinin. The first author emphasizes that they must be present and act together and are as follows: 1) control over the sources and distribution of wealth and resources; 2) maintaining the symbols of social integration and inclusion; 3) have ability to impose power by force, both at the level of central government and on the ground among local groups. These are, in fact, dimensions of the types of power – both political, social and economic, considered in their relationship, which means that they all had to be available at the same time[21].

Of interest as well are Grinin's reflections on the supreme authority's special characteristics[22]. He mentions the long-held thesis that the presence of a single center is a particularly significant feature of a state[23]. Indeed, for the study of the process of state formation, the analysis of its supreme (central) authority is of the utmost importance. It is precisely as a result of the interaction.

In recent years, Kradin has returned yet again to the important problem of the *early state*'s involvement not only in class formation, but also in the existence of writing systems (including written laws), as well as a certain degree of urbanization within it. One of his meaningful conclusions is that there are states, cities and class societies even without writing systems; but where writing appeared, so did the state, classes, and urbanization[24].

To conclude, against the backdrop of all these tensions in historiography, I regard as more consistent the approach which tries to combine both the achievements of ethnology and cultural anthropology and those of the typical historical research, since the latter considers fluctuations, dynamic changes and sometimes even strange trajectories in the development of one or another *early* state.

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[21] *Yoffee* 2005: 34-35.
[22] *Grinin* 2012: 46-49.
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„Ранната държава“ и нейните основни характеристики

Цветелин Степанов

Развитието на социално-политическите системи в предмодерните времена преминава през различни етапи и един от тях културната антропология и етнологията маркират чрез термина *„ранна държава“*. По правило той се явява след т.нар. *чийфдъм* и предшества *зрялата държава*. На основата на различни изследвания са проследени редица съществени характеристики на този тип държавност. В него се откриват и някои от по-старите (характерни за *чийфдъма*) форми на организация и власт, но са откроими и редица от типичните за *ранната държава* специфики: ясно отграничим център на власт; наличие на административен апарат; способност да се налага чрез легитимно насилие определена политика от *центъра* към периферииите; поддържане от *центъра* на баланс между аристократи „по рождение“ и такива „по заслуги“ и т.н. Взети в целостта си, всички те придават по-голяма стабилност и трайност на този тип политическо организиране.

The History of Ancient Thrace, a Field for Methodological Experimentation, Historiographical Deconstruction and Epistemological Reflection

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Abstract: *This paper investigates the possible benefits of challenging the traditional protohistorical approach to Ancient Thrace. The analysis of Greek myths featuring the Thracians, notwithstanding modern prejudice, illustrates the strong integration of the Ancient Thracians in Greek representations and history, underlining the stakes of including the Thracians into the grand historical narrative. The paper also briefly presents the methodologies that make Ancient Thrace a stimulating and potentially groundbreaking subject for historical study.*

Key words: Protohisrory, Mythography, Athens, Alliances, Precious metal objects, Coins

Ключови думи: протоистория, митография, Атина, съюзи, предмети от благородни метали, монети

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As with the Celts, the Dacians, the Illyrians, the Germans and many others ancient peoples, over the long term the Thracians have been relegated to 'protohistory', a field of studies documented by material sources and external texts only. This academic consideration has resulted in their exclusion from a grand historical narrative dominated by literate societies, first Greek and then Roman, with major consequences regarding both the organisation of research and our understanding of these societies. I have tried elsewhere to demonstrate that the Thracian studies may help in undertaking major epistemological and historiographical challenges, especially through wide-scale and comparative analysis of an archaeology of war exchanges[1]. In all the so-called protohistorical studies, the lack of written narratives as well as the specificities of the material sources indeed require a multi-disciplinary approach with efficient methodologies. And yet, ancient Thracians are much better documented than many other societies without written literacy: Thracian studies may therefore appear as a field of choice for strong methodological inves-

[1] *Rufin Solas* 2022.

tigations and a key topic for anthropological as well as comparative archaeological approaches. Protohistorical studies, all over Europe, not to say all over the world, is indeed shaped by a strong national paradigm. There is also a major gap in European protohistory research, as we can observe an east-west organisation for comparative research, inherited from the 20th century. This has contributed to the marginalization and even the exclusion of the so-called protohistorical societies in the classical historical narrative, where many prejudices are pursued. Reopening here these questions, I will firstly focus on the Greek myths, through ancient sources and recent commentaries, as they illustrate the strong integration of the Ancient Thracians in Greek representations and history. Challenging the prejudice developed in modern historiography, the analysis underlines the stakes of including the Thracians into the grand historical narrative. Finally, I will briefly discuss the methodologies that make ancient Thrace a stimulating and potentially groundbreaking subject for historical study.

1. THE THRACIANS, THE GREEK MYTHS AND THE GRAND HISTORICAL NARRATIVE

Ancient Thracians have played an important role in the Greek imagination. Present in the earliest literary works (Homer, Hesiod, Archilochus), they are well represented in tragedy and, more generally, in Greek myths. While mythological narratives provide material for research into literature and cultural anthropology, history is especially relevant when studying mythography, in other words, the process, set in time and space, comprising creation, circulation and modification of the myths, which often served political interests. It is a difficult undertaking, but we sometimes come up with interesting results, especially when it comes to Athens in the fifth century BC.

Regarding tragedy, we may mention the lost play of Aeschylus the title of which is the name of a Thracian people, the Edonians, also mentioned in Sophocles' Antigone. Sophocles also wrote about Lycurgus. This mythical Thracian king was then associated with the Edonians who were settled in the region of Amphipolis. It was at this time, when the Athenians were increasing their ventures in Thrace, and precisely in this rich mining region between the Strymon and the Nestos rivers, that the presence of the Thracians was developing in the myths written down in the city. Another tragedy featuring a mythical Thracian king, Rhesos, the famous Thracian protagonist in the *Iliad*, had been the subject of controversy in terms of both its attribution to Euripides and its dating. The play is now considered to be a product of the fourth century BC. There are, however, decisive arguments in favour of a fifth-century date and consequently for an attribution to Euripides. Some of these objections were raised a long time ago by Goossens, in an article published in 1932[2]. In this tragedy indeed, we find the same pattern of the late Thracian ally, present in Aristophanes' Acharnians; only it is treated differently by Euripides, who transposes into the Trojan cycle the same actuality: the *symmachia* with the Odrysian Sitalkes. These literary references seem to reflect the doubts that Athenians had about their Thracian alliance at this time of war, suggesting that the Rhesos was precisely set in 425 or 424, in any event shortly before the loss of Amphipolis and at a date almost contemporary with Aristophanes' first performance of the Acharnians in 425.

In the same context of the Peloponnesian War, and more specifically of the alliance with the Odrysian Sitalkes from 431 onwards, Thucydides' account provides a mythological evocation that brings the Thracians even closer to the Athenians: the historian takes care to specify that the Thracian Teres, father of the Odrysian king Sitalkes, was not to be confused with the Thracian Tereus (*Thuc.* 2. 29. 3). The latter is not only located in Phocis, the myth settling Thracians close to Athens (and to Delphi, the centre of the Greek world), but he is also presented as an ally of King Pandion of Athens, whose daughter he had married. Thucydides explains the marriage between Pandion and Tereus by the proximity of the two countries, as the two princes were able to help each other.

[2] *Goossens* 1932.

As well as popularising the idea of an ancient geographical proximity between Thracians and Athenians, the myth consequently provided an illustrious precedent for military collaboration between these partners. The adventures of Tereus and Procne, the daughter of Pandion, were already well known to the Athenians at the time, as evidenced by representations of the myth on Attic ceramics before this date and Sophocles' tragedy Tereus. This explains why Thucydides thought it useful to make a clear distinction between Teres and Tereus. However, Thucydides' text shifts the focus from the events of his own time to those of the myth: on the subject of Pandion, the mythical king of Athens, he states that "a journey lasting several days separated him from the Odrysians". While stressing immediately afterwards that the power of the Odrysian kings dated back no further than the time of the father of their ally Sitalkes, Thucydides indeed settles the Odrysians, allies of Athens during the Peloponnesian War, in the world of heroes. We do not know whether the story of the alliance between Pandion and Tereus was produced in Athens in 431, the year of the alliance with Sitalkes, or whether it was created at an earlier date and re-exploited then. In any case, it is close to the official introduction of the Thracian goddess Bendis into the Athenian civic cults in 429.

The image of a distant past in which the Thracians were located in central Greece has long since faded, associated as it was in Greek literature with Phocis (Daulis and Parnassus) and Boeotia (Thebes, which they occupied temporarily, and Helicon). Several stories of migrations also show how myths have reinforced this integration of the Thracians into the Greek imagination, by building up either a geographical proximity or a kinship and, in all cases, a shared history. Herodotus recounts the migrations of the Thracian Minyans, descendants of the Argonauts, who dominated Lemnos, from where they were driven out by the arrival of the Tyrrhenians, before arriving in Laconia, homeland of Castor and Pollux, where they were well received. Things went badly, and these Thracians took refuge first in the Tegetus, then dispersed, some of them founding cities in the Peloponnese (which Herodotus says were later destroyed by the Eleans) while others accompanied the hero Theras in founding Thera (*Hdt* 4.145-148). The Greek myths, whether based on real migrations or not, have finally given the Thracians a prominent place in Mediterranean geography. It is also worthy of note here that all these narratives, set in the time of the heroes, are linked to military operations.

2. A "THRACIAN PRETENCE"?

In a fragment preserved in Strabo, Ephorus recounts a mythical pretence, or trickery, attributed to the Thracians, at the expense of the Boeotians (*Strabo* 9.2.5). This pretence consisted of attacking at "*night*" during a truce agreed for a certain number of "*days*". According to Ephorus, this episode would shed light on an adverbial locution, "true Thracian subtlety!" (Θρᾳκία παρεύρεσις). Although the fact illustrates a deception, it demonstrates not only the Thracians' *metis*, but also the fact that these adversaries were part of a common framework, defined not only by norms but also by dialogue. The Thracians indeed, did not commit perjury.

In fact, this "Thracian trickery", which is valid from a legal point of view, most probably refers to a case that must have been hotly debated in Athens. Before examining this Athenian case, it is worth noting how this myth of a Thracian pretence has been received right up to the present day. In a study published in 2014, Bayliss, referring to a series of historical accounts implementing a similar ruse, considers that the "Thracian pretence" had become in the fourth century "a 'floating anecdote' which could attach itself to anyone"[3]. In the fourth century, Ephorus is our most ancient source. Nevertheless, this mythological account should be read in conjunction with Thucydides' account of the Thracians in central Greece for the first time. We therefore have good reason to believe that the fifth century in Athens was the context in which these stories were created and put into circulation. However, in 437, the date of the second attempt (this time successful) to found Amphipolis, according to Polyaenus,

[3] *Bayliss* 2014 : 261.

it was an Athenian, Hagnon, who tricked the Thracians into trusting him (*Polyaen.* 6. 53). He circumvented the three *days* truce by fortifying the site of Amphipolis by *night*. As Thucydides knows the story, it is safe to assume that the matter was discussed in Athens because of the seriousness of the perjury, which jeopardised the city's relationship with the gods. So, if there is indeed, as Bayliss suggests, a literary topos around this form of shirking a commitment, we should rather recognise it as an Athenian precedent and a quite interesting phenomenon of re-attribution, through myth, to the Thracians, whom the myth located in the heart of Greece. The fact that the Thracians did not respect their oaths cannot indeed be taken as a historical given, as several historians do, such as Torrance, who seeks to explain Zenobios' late commentary, quoting Menander of Ephesus (*FGrH* 783), by some Thracian specific features[4].

Carried away by their own prejudices, modern historians continue to propagate clichés that support the idea of the intrinsic instability of Greco-Thracian alliances, such as the "Thracian pretence". This theme, which can be traced back to Athenian origins, must be assigned to the propaganda register, mythography having succeeded in whitewashing (to the present day) the city for what the Athenians themselves had done to Thracians. This only example shows that relegating the Thracians to protohistory is a dead end. Assuming a linear evolution towards the state and literature and sustaining the myth of civilisations distinct from a barbaric world prevents analysis of the Thracians as rational actors in Ancient history. Indeed, describing the Thracians as 'barbarians' has led commentators to presuppose their systematic hostility toward other societies, especially Greek, and to question the possibility of *philia* (friendship or alliance) between Greeks and Thracians. The same doubts have been expressed about the *xenia*, the traditional hospitality based on gift giving, which refers to all the social practices that made *philia* possible. However, the Greeks themselves were not the most reliable allies. Moreover, these assumptions are contradicted by classical sources, which document numerous agreements between Greeks and Thracians, especially from the fifth to the second century BC. The intensity of these collaborations, which were a two-way street since Greeks also served the Thracians, means that these partners need to be integrated into a more open ancient history, less focused on Greek cities and kingdoms alone. In this perspective, a pragmatic interpretation of the failures of alliances between the Greeks and the Thracians is undoubtedly to be preferred, without systematizing prejudices or misunderstanding.

3. METHODOLOGIES

Material data also enlighten these relations. Among the very large number of precious metal objects dating from the 5th to 2nd centuries BC that have been discovered in Thrace, pieces of gold and silver objects constitute a rich documentary source lending itself to typological, stylistic, iconographic, epigraphic and metrological studies. In a corpus that has grown steadily over the last decades, some discoveries are particularly significant of the uses that Thracian societies may have made of these pieces of silverware, especially in 2004 the two silver vases, bearing inscriptions giving their weight in Alexander's tetradrachms, discovered in the tomb of the tumulus known as Golyama kosmatka. It has also been established that at least some of the gold and silver vases discovered in Thrace were buried long after and far away from their place of manufacture, which bears witness to their circulation. As well as being objects of hoarding, precious metal vases were indeed also used in payment or gift-giving practices : they were therefore "monetary" or "almost monetary" instruments. The map of these precious metal vase hoards, buried in the ground outside any architectural context, does not show the same geographical distribution as the map of silver or gold vases found in funerary contexts: gold and silver vases hoards found outside funerary contexts complement and confirm the information provided by monetary circulation[5].

[4] *Torrance* 2012.
[5] *Rufin Solas* 2013.

Although it is impossible to shed light on all the mechanisms involved, these numerous material sources lend themselves to analyzing hoarding practices. Thrace also offers a good number of inscriptions on precious metal objects, including coins, making it an interesting place to study monetary legends, which in Thrace have a number of original features. Many studies have been conducted both on goldsmith's pieces and coins, demonstrating that an already known documentation may be reviewed again and, with the use of new methodologies, provide new data or information. More generally, Thrace, with its highly interesting monetary material, invites us to question a number of presuppositions about coinage, inherited not only from the Greeks, particularly Aristotle, but also from our our modern view of coinage. From the very first appearance of Thracian coinage, under Persian domination, coins came with surprising characteristic. Not only were the monetary images shared between distinct issuing powers, but these powers did not always seek to identify themselves on the coins[6]. The phenomenon is not restricted to the so-called "Thraco-Macedonian" coins, minted to pay tribute to the Persians, but is also found in coins with silenas and nymphs in the 5th c BC. The attribution of these coins to Thasos, although sometimes disputed, is not in doubt. However, a study of the corners reveals certain oddities that were observed to the same extent by Alexandros Tsamanlis in his study of Thraco-Macedonian coins from the Persian period, especially important or very important difference in weight between coins struck with the same die. This phenomenon, which needs to be confirmed by a more detailed study of coin dies, may challenge the interpretation of coinage as an expression of sovereign power.

Given its exceptional documentation in the form of written documents, coins, gold and silver objects, ceramics and other architectural remains, as well as an abundance of external literature, it is to be hoped that Thrace will establish itself as a leading field of experimentation in the study of ancient societies without written literacy. Comparative archaeology is particularly worthwhile in relation to the Celtic and Illyrian worlds, because these societies, known by the same type of documentation, had the same partners in war and trade as the Thracians. Finally, by challenging the research methods used in Greek and Roman studies, which cannot be applied without adaptation to Thracian epigraphy or numismatics, Thracian studies may not only help the designing of new methodological tools but also shed new light on the ancient societies.

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[6] *Picard* 2000.

Историята на Древна Тракия – поле за методологически експерименти, историографска деконструкция и епистемологична рефлексия

Алиенор Руфин Солас

Статията оспорва традиционния протоисторически подход към Древна Тракия. Анализът на гръцките митове, представящи траките, независимо от съвременните предразсъдъци, илюстрира интеграцията на древните траки в гръцката образност и история. Особено развит е примерът с „тракийската претенция“. Той илюстрира задънената улица на разглеждането на траките като варвари в един грандиозен исторически разказ, доминиран от техните гръцки цивилизовани съседи. Статията обсъжда накратко и някои нови методологии, на кръстопътя на историята, нумизматиката и сравнителната археология, които правят древна Тракия стимулиращ и потенциално новаторски обект за историческо изследване.

Tertullian de Anima 46 and the 'Dreaming Saturn': A Hidden Testimony to the Myth of Zalmoxis in Aristotle's Lost 'Eudemus'

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Abstract: *In this paper, I reconstruct a narrative by Tertullian about a dreaming Saturn attributed to a lost dialogue of Aristotle (on my view, the* ***Eudemus)****. I argue that it is crucial to place this narrative into its proper geographical and cultural context, namely, Macedonia and Macedonian religion. Indeed, I show that Aristotle draws upon a myth in circulation in Macedonia which blended Greek Kronos with Thracian Zalmoxis. This is not surprising given that Aristotle spent not only his childood in Macedonia, but also ten years of his adulthood teaching in Mieza, in close proximity to Thracian tribes in Macedonia.*

Keywords: Fragment, Macedonian Religion, Thracian Religion, Dreams
Ключови думи: фрагмент, македонска религия, тракийска религия, сънища

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The present paper aims to reexamine a passage of Tertullian's *de Anima*, which has long been taken to refer to a narrative contained in a lost dialogue of Aristotle – on my view, the *Eudemus*. We know from a variety of other sources that Aristotle's *Eudemus* discussed the nature of the soul, specifically in the state of dreams or sleep and the life of the soul after death. In his own treatise on the nature of the soul, Tertullian references a story which Aristotle tells about a Saturn, or Kronos, who dreams.

While this story has usually been understood within the context of a more generic Greek theology, I think it is crucial to consider the likelihood that Aristotle composed this dialogue while living in Macedonia, and that Macedonian politics and religion were central to the dramatic frame that Aristotle put around the philosophical positions he developed in the dialogue. More precisely, I will establish that Aristotle was exposed to some blending of Macedonian and Thracian stories, which mixed narratives of a Greek Kronos with the Thracian Zalmoxis, and which gave rise to the narrative about a "sleeping Kronos" which Aristotle would have included in the dialogue. Inasmuch

as these stories were a source for Aristotle, he, in turn, reveals himself to be a source for modern efforts in discerning the religious landscape during this early period of the Hellenic reception of Thracian religious practices.

I.

I begin with a peculiar reference to Aristotle in Tertullian's *de Anima*, which is presented by Ross 1952 as Frag. 20 of the *Protrepticus*, while Gigon 1950 includes it as Frag. 979 in the *Fragmente ohne Buchangabe*.

"How many have commentated on and affirmed this! Artemon, Antiphon, Strato, Philochorus, Epicharmus, Serapion, Cratippus, Dionysius Rhodius, Hermippus, the entirety of the literature of this age! I will only laugh (if I laugh at all), at the person who believed himself able to persuade us that Saturn dreamt before anyone else; for he could only do so, if he were to have lived before everyone else. Aristotle, please forgive the laughing"[1]!

That this line of Tertullian's *de Anima* is indeed a fragment of some lost work by Aristotle was proposed originally by Waszink 1947. While Waszink and other scholars, such as Bos 2003, have quickly jumped to other Greek sources, such as Plutarch (*de Fac. Orb. Lun.* 27), to flesh out this vague reference in Tertullian, I think it wiser to look more closely at the context of Tertullian's report in and of itself[2].

Here, Tertullian is discussing the (wrong) belief that one can have visions in dreams. In the lines preceding (*de An*. 46.9), he simply lists instances of people thinking that they have predicted some event in a dream (e.g. Cicero's eminence is predicted by his nurse). If we look again to 46.10, we can see that reading only those few isolated lines, as they are printed in Ross and Gigon, is very misleading. Crucially, it removes the context for the narrative about Saturn, namely a list of *human beings* who dream. This gives us a first hint as to what Tertullian is referring: it seems plainly inappropriate for Tertullian to insert here a single instance of a deity dreaming.

The second hint which we have is the crux of Tertullian's criticism: Saturn dreams *before* everyone else, which is apparently laughable because he did not *live* before everyone else. However, this does not make sense as a critique of Saturn, the first god, because this Saturn would of course have "lived" before everyone else. The critique really should be: in order to have been the first to dream, Saturn would actually have to have existed, but he did not exist because paganism is nonsense. However, this is not what Tertullian targets.

Could there be some other way to make sense of this reference to Saturn? First of all, Tertullian makes another – indeed helpful – reference to Saturn in his *de Anima*, one which has been overlooked in the literature on *de An*. 46.10. While discussing Pythagoras' beliefs, and his descent into the cave and subsequent "ressurection," Tertullian mentions, almost as a non-sequitur, that Moses is more ancient than Saturn "by some nine hundred years or so" (*de An*. 28.12).

The peculiarity here is that Tertullian thinks Saturn lived some nine hundred years after Moses. Certainly, this places Saturn's life quite late – but, how late? In *Apolog.* 9.3, Tertullian considers Moses to have lived roughly 1000 years before the death of Priam. We have thus made Saturn and Priam contemporaries. Yet, this is nowhere near a normal time frame for Greco-Roman religion. The "birth" of Saturn should be *very* early, if it is to be assigned a date at all.

Thus far we have managed to ascertain a few relatively stable points. (1) Saturn is roughly a contemporary of Priam. (2) Saturn is someone who can be listed in a group of *people* and it not seem obviously wrong. (3) Saturn is *perhaps* associated with the Pythagoras cave myth, and here we should note parenthetically for the moment that Pythagoras' cave story is often attributed not to Pythagoras, but to Pythagoras' slave, Zalmoxis, who uses this event to "convert" the Thracians.

[1] Tert. *de An.* 46.10. Translated by the author.
[2] While Waszink considers this to be a fragment of the *Protrepticus*, for *Düring* 1956 and *Bos* 1989 the theme of dreaming is more appropriate to the *Eudemus*.

II.

Since we are assuming this idea of a dreaming Kronos is something Aristotle discussed in his *Eudemus*, we should give ourselves some context pertaining to the dialogue itself to interpret the myth further. The central theme, on my view, which unites the dramatic frame that Aristotle puts on the dialogue by way of narratives is political: the soul in its proper state is ruled by reason, which acts as a king, while the soul in a disordered state is ruled by the lower parts of the soul, which act as a tyrant. Taking up Gaiser's thesis that King Philip II was indeed an interlocutor in the *Eudemus* (or that the dialogue was dedicated to him)[3] I consider Aristotle to draw upon political practises in Macedonia.

Before I continue, we should mention Aristotle's close ties to the Macedonian royal family. Aristotle probably spent a portion of his youth in the court of the Macedonian royal family, as his father, Nicomachus, was court physician and friend to Amyntas III. Aristotle, then a teenager, was sent to Athens to study with Plato[4]. He leaves Athens in 347 or 348, after about 20 years, precisely because of anti-Macedonian sentiments, as Athens is in a formal war with Macedon after the captures of Amphipolis and Pydna in 357. After spending some time on Lesbos, Aristotle is brought to Macedonia by Philip II, where he stays for a little over ten years as head of the royal Academy of Macedon. Aristotle school is located just outside of modern day Naousa, at the foot of the highest peak of the Vermio mountains, or in ancient Greek, Bermion. This location will be relevant for our discussion later on.

Returning to the content of the dialogue itself, we see the political theme, as well as this geographical locus, referred to quite clearly in the well-known narrative of Eudemus' dream (Cic. *de Div*. 1.53). On the way to Macedonia, Eudemus comes to Pherae, which is ruled by the *tyrant*, Alexander; he becomes ill and sleeps. In a dream, he predicts his own recovery, the death of the tyrant, his return home after five years. However, instead of returning home, he dies in battle in Syracuse under the *tyranny* of either Dionysius or Callippus.

A second central narrative in the dialogue is the myth of Midas and Silenus, which I consider shows not only how Aristotle used Macedonian politics to frame his dialogue, but also to provide us with a methdology for interpreting Tertullian's reference to the dreaming Saturn.

The narrative of Midas and Silenus is preserved in a quotation of the text by Ps-Plutarch. I present below the most relevant lines:

"Such is said to have happened when the well-known Midas, having set a trap by which he captured Silenus, asked him what is best for human beings and what is most to be preferred of all things. Silenus at first would not speak, but remained silent. But finally when using every device, Midas forced him to speak, he said bursting out into laughter: 'Short-lived seed of a suffering spirit and of harsh fortune, why do force me to say what it is better for you not know? A life spent ignorant of one's own ills is the least painful. For human beings, it is impossible for them to have what is best, or to share in the nature of what is best (for the best thing would be for all men and women not to have been born). But after this, the next best thing, and the best thing which humans can attain, is after having been born to die as soon as possible.' It is clear that by this story, he meant to communicate that the existence after we have died is better than our existence in this life"[5].

While there are artistic representations before Aristotle that may be of a meeting of Midas and Silenus[6], the *Eudemus* is the first *written* record of the conversation[7]. Second to Aristotle, or roughly contemporary with him, is Theopompus, who composes his narrative – appropriately – in his *Philipica*. Certainly, some narrative of a capture of Silenus by Midas must

[3] *Gaiser* 1985.
[4] *Chroust* 1972 considers that this was politically motivated.
[5] Plut. *Consolat. ad Apoll*. 115B1-E9. Translated by the author.
[6] For an overview, see *Roller* 1983: 304-6; *Brown* 2002: 53-4.
[7] Aristotle references Midas at *Pol*. 1257b14-17, which only *Roller* 1983 and *Vassileva* 1997 mention.

have been in circulation generally in Greece at this time, yet it is probably no coincidence that both Aristotle and Theopompus are very much connected to Macedonia and that they are the first two to put a bit more meat on the bones of the narrative.

Indeed, the idea that the narrative about Midas and Silenus would have been inspired by Aristotle's sojourn in Macedonia seems even more likely when we consider the fact that there was a version of a story about a meeting and conversation between Midas and Silenus told specifically in Macedonia. We find the earliest reference to (not account of) the conversation between Midas and Silenus in Herodotus' narrative of the begining of the Argead Dynasty: "So the brothers, having come to another region of Macedonia, took up their dwelling near the so-called gardens of Midas the son of Gordias, where roses grow wild which have each one sixty petals and excel all others in perfume. In these gardens too Silenos was captured, as is reported by the Macedonians: and above the gardens is situated a mountain called Bermion…."[8] This point is crucial: not only does this narrative of Midas and Silenus have its origin in Macedonia, but it is also central to the founding of the political institution of Macedonia. And, where does this story occur? In Midas' gardens, at the base of Mount Bermion, where also Aristotle's school is located.

The pantheon of gods worshipped in Macedonia was substantially similar to that of Greece, albeit mixed with local cults as well as having a marked openness to incorporating foreign deities (e.g. Isis, or the Great Mother Goddess, Kybele). Christensen/Murray 2010 note the centrality of the cult of Dionysus in Macedonian religion, which was imported most likely from the east, either Thrace or Phrygia. Moreover, the cult of Dionysus was present in Macedonia well before it was in the rest of Greece – and Silenus is one of the key players in this myth, as he is the caretaker to the infant Dionysus.

However, a particularly notable feature of Macedonian religion is the religious aspect of kingship, as well as the aristocracy in general. Carol J. King connects this to Myceanean culture[9], while Maya Vassileva notes that this "aristocratic" aspect to religious practise is shared between Macedonia, Thrace, and Phyrgia[10]. Indeed, it seems all-important to the Macedonians to preserve this link to the Myceneans, which is evidenced not only in the fact that their religious and cultural practices emulate those of the Myceneans, but insofar as the Mycenean royal family claims a heredity link via Tumenus, King of Argos.

Material evidence as well substantiates the centrality of the aristocracy in Macedonian religion. Macedonians emphatically did not build temples as the southern/central Greeks did. Rather, the Macedonians built *tombs*. This is much more in line with Mycenean and Thracian practises. Even in smaller burial sites, which still would have been reserved for an aristocratic elite, there are striking similarities between Mycenean and Thracian burial practises, in distinction with the rest of Greece where burials were relatively modest[11]. These practises peculiar to the Macedonians all speak to a further peculiarity about Macedonian (and indeed Thracian) religion, which marks it in distinction from Greek religion: a firm commitment to the belief in a (positive) afterlife.

Clearly, Aristotle had access to this Midas and Silenus myth by way of his proximity to the religious practises and beliefs in Macedonia, which (already in the Midas and Silenus story) are a blending of Greek and non-Greek cultures. Given this fact, we may have a different perspective on our original question about the dreaming Saturn. Just as Aristotle knows of a version of the story of Midas different from Plato, so might he know of a Saturn different than his fellow Greeks. Thus, we should ask ourselves: is there some narrative of a non-Greek Kronos who sleeps or dreams? And the

[8] Herodot. *Hist*. 7.138.8-139.1 Transl. Macaulay.
[9] *King* 2010.
[10] *Vassileva* 1997.
[11] *Archibald* 2010: 331-3 compares two burials found at Archondiko in Lower Macedonia and the Mushovitsa Mogila near Plovdiv.

answer is yes – someone whom we already touched upon: Zalmoxis.

III.

Zalmoxis is an elusive figure. However, I will try to say a few things about him that are relatively certain[12]. Firstly, he was some kind of deity of the dead. Secondly, he is a chthonic deity, quite literally living underground and in a cave. Thirdly, there is some narrative about him having lived a life and become a God of the afterlife – and there must have been some similarity between this story and the story about Pythagoras which lent to a later association of the two[13]. Interestingly, we find the following statement about Zalmoxis attributed to Aristotle (via Sotion) by Diogenes Laertius:

"… among the Celts and Gauls there are the people called Druids or Holy Ones, for which they cite as authorities the Magicus of Aristotle and Sotion in the twenty-third book of his Succession of Philosophers. Also they say that Mochus was a Phoenician, Zamolxis a Thracian, and Atlas a Libyan"[14].

It is of particular note that Aristotle supposedly lists Zalmoxis with a number of figures who would rather be *more* ancient than Pythagoras – e.g. Atlas certainly, as well as Mochus whom Strabo dates on the authority of Posidonius as having lived before the Trojan War (Strabo, *Geographica* 16.24).

Aristotle indeed is dating Zalmoxis around the time of the Trojan War. It seems moreover that if Aristotle is aware that Zalmoxis did not live at the same time as Pythagoras[15], he is aware of some *other* narrative about Zalmoxis' life, one which would have caused Aristotle to attribute to Zalmoxis the origin of a wisdom tradition among the Thracians, as well as grouping him with figures who are simultaneously divine and human.

Most pertinent to our own topic here is that Zalmoxis serves a role in Thracian religion which Kronos does in Greek religion, such that many Greek sources *identify* him with Kronos, such Diogenes Laertius, as well as Mneseas of Patrae (Frag. 23 Müller = Suda Z.17) and the later Hesychius (Lex. 118). The parallel is clear: Zalmoxis rules over the "afterlife" just as Kronos rules over the Island of the Blessed.

Carpenter, relying on the etymology of "Zalmoxis" in Porphyry (*Vit. Pyth*. 14.4), as skin or bearskin (τὴν γὰρ δορὰν οἱ Θρᾷκες ζαλμὸν καλοῦσιν), concludes that the myth of Zalmoxis was a common one in folk-religion: a myth of a sleeping bear. The general theme in such stories should be vaguely that we have some kind of deity who lives in a cave and holds wisdom about the afterlife. In Eliade's well-known analysis of Zalmoxis, he associates the god with a number of stories in circulation in the Mediterranean regarding dreaming and the ability to discern the true nature of the soul, i.e. as immortal, in dreams.

At this point, such themes should sound familiar: sleep, descent into a cave, passage into death. Given that we do not have anything more of Tertullian' statement than the mere reference to Kronos' dream, the most prudent course of action is to assume a similarity between this narrative and the narratives which we have already seen about dreams and hibernating. This is all important simply for reconstructing the content of Aristotle's lost dialogue, but I think the implications of my study go beyond this.

Aristotle is not really a source who is mined for reports of religious beliefs, and the consensus is that he is not especially interested in any organized religion. This is a misconception which is due first of all to the fact that all of Aristotle's non-technical treatises (i.e. dialogues where the discussion of religious practices would have been more appropriate) have been lost to us. A second cause of this misconception is that Aristotle had access to a religious tradition quite different from that

[12] For an overview of the litertaure on Zalmoxis see *Popov* 1995; *Popov* 2010.
[13] *Dodds* 1951: 147 considers that Zalmoxis is a kind of reiteration of Orpheus. Plato mentions a Zalmoxis in *Charm.* 156d as a "Thracian King's physician." See *McPherran* 2004; *Brisson* 2000; *Murphy* 2000.
[14] Diog. Laert. *Vit. Phil*. I.I.1-8 = Arist. *Frag*. 35 Rose. Here, we should note that *Magicus* likely refers to a section of *de Philosophia*, not a separate work. See *Chroust* 1965.
[15] *Dana* 2007 concludes that after Herodotus what is transmitted in the literature is rather a botched narrative about Zalmoxis which blurs his narrative with that of Pythagoras.

of his fellow Hellenes. This makes it difficult to interpret the fragments of Aristotle's lost dialogues. However, if we are able to do so, it makes him an invaluable reporter of the religious practices in Northern Greece, and more crucially their interplay with Thracian and other non-Greek cultures. If I am right that the Saturn to whom Tertullian refers represents a blending of Thracian and Greek narratives, i.e. Kronos and Zalmoxis, we gain an all-important insight into how this elusive Zalmoxis or Thracian Kronos was perceived – indeed by one of the greatest minds in the history of western culture, who himself spent significant time living, working, and teaching in Macedonia.

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Тертулиан *de Anima 46* и „сънуващият Сатурн": Скрито свидетелство за мита за Залмоксис в изгубеното произведение на Аристотел „*Евдем*"

Франциска ван Бурен

Авторът анализира пасаж в *de Anima* на Тертулиан, който приписва на диалог на Аристотел (по негово мнение в загубеното произведение *Евдем*) разказ за Сатурн/Кронос, който сънува. Първо поставям тази история в собствения текст на Тертулиан и показвам, че споменаването на Сатурн не идва в разговор за богове, а за човешки същества, които сънуват. Тертулиан също посочва, че този Сатурн е роден приблизително по същото време като Приам. Така става ясно, че Аристотел е разказал някаква история за „Кронос", който е историческа личност, а не типичният Кронос в гръцката митология, и че тази история за Кронос е аналогична на други разкази в *Евдем* за съня, напр. Сънят на Евдем. Въз основа на включването от Аристотел на други разкази за македонската и тракийска/фригийска религия (най-вече Мидас и Силен), считам, че Аристотел е представил македонски разказ, който смесва тракийския Залмоксис с гръцкия Кронос.

The Employment of Digital Tools in the Study of Ancient Thrace

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Abstract: *The employment of digital tools in the study of Ancient Thrace can enhance our understanding of the region. The vast volume of analog data available underscores the need for interconnected datasets via repositories. Digitizing various data types, including archaeological finds, literary works, and inscriptions, promotes scholarly collaboration. Moreover, the study of Thrace, a region rich in history and mythology, also benefits from research with GIS tools that enable quantitative analyses, study of people and object diffusion, trade networks, and landscape exploration. These technological advancements revolutionize archaeological research, potentially driving economic growth and influencing cultural policies.*

Keywords: Athena RC; repositories; Attic pottery; mythology; GIS; networks; landscape

Ключови думи: Изследователски център Athena; репозиториуми; атическа керамика; митология; ГИС; мрежи; ландшафт

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INTRODUCTION: ANCIENT THRACE GOES DIGIT

Archaeological research is a longtime procedure, despite the site or the topic of particular interest. As a discipline also has a long tradition going back a few centuries. In this investigation and study of the past (times, cultures, sites etc.) aiming at its better understanding, Archaeology has employed a great number of approaches and procedures. In reality, Archaeology has adapted and adopted the available tools and methods following the trends of the time. During the last decades digital technologies have significantly revised archaeological research and documentation methods with the study of ancient Thrace being no exception.

The employment of digital tools in the study of Ancient Thrace can significantly enhance our knowledge of the region as well as contribute to its understanding and promotion. Digital archaeology and its widely accessible outcomes not only revolutionize research but also potentially may lead to economic growth and to influence cultural policies. The various research projects and publications regarding Ancient Thrace are increasingly adopting these technologies, utilizing the latest advancements in the related fields.

The aim of this paper is to present some indicative examples of the interdisciplinary work done by the Institute of Language and Speech Processing (ILSP) regarding the study of ancient Thrace. Combining digital with traditional methods, it attempts to contribute to the production of new knowledge for the region as well as to make the outcomes of its research widely known and accessible. Three thematic areas are chosen to be briefly presented here: a) the collection and organization of the sources used (repositories) as the foundation for any study and research, b) the interdisciplinary approach chosen for the examination of a representative category of material (Attic pottery), and c) mythology as connecting link between Greece and Thrace. To those should be added the contribution of Geospatial research in archaeology (GIS).

COLLECTING AND ORGANIZING RESEARCH LITERATURE WITH DIGITAL TOOLS

The extensive scientific literature on ancient Thrace covers multiple languages, themes, and scientific fields. However, there is a significant need for comprehensive digital tools to organize, make accessible, and distribute this wealth. To address this, efforts are made to create centralized repositories of literature categorized by specific sites, periods, and topics. In these repositories, each publication tagged with keywords, facilitates targeted searches and improves accessibility. Moreover, committed to viability, these repositories are regularly updated to reflect ongoing discourse and state-of-the-art in the field.

Thus, for example, the **Archaeological Research in the North Aegean (ARENA)** repository[1] focuses on the extensive archaeological bibliography of Aegean Thrace **(Fig. 1)**, covering a period from the 8th century BC to 31 BC. Up to date, over 5,900 titles have been compiled regarding more than 540 ancient sites, thus creating a valuable bibliographical repository, with advanced search tools that allow users to easily explore the collected information. The repository also includes ancient texts, inscriptions, and educational material related to Aegean Thrace[2].

Likewise, the **Attic POttery in Thrace (AtticPOT)**[3] addressed the need for digital tools to aid the study of Attic painted pottery found in ancient Thrace. A digital repository was developed, encompassing Attic pottery and specialized literature, cataloging approximately 8,700 references about 215 ancient sites. AtticPOT offers researchers resources on the distribution and significance of Attic pottery in the region, providing digital tools that allow users to navigate and extract information, enhancing the

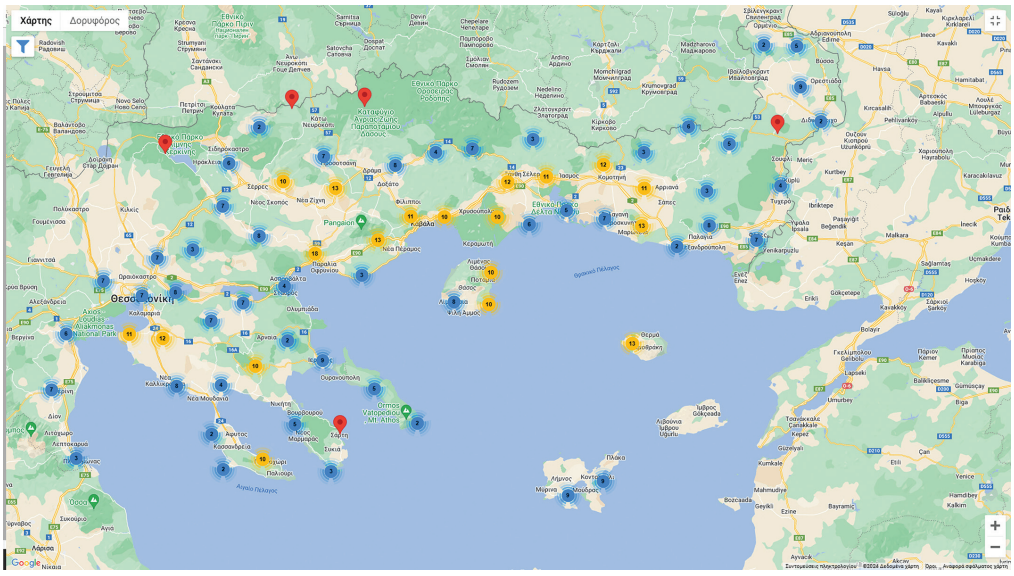

Figure 1. The interactive map of ARENA project.

[1] http://arena.athenarc.gr/
[2] *Tsiafaki and Michailidou* 2019; *Michailidou, Evangelidis and Tsiafaki* 2020; *Tsiafaki et al*. 2020.
[3] https://atticpot.athenarc.gr/index.php/en/; https://atticpot.athenarc.gr/repo/en/

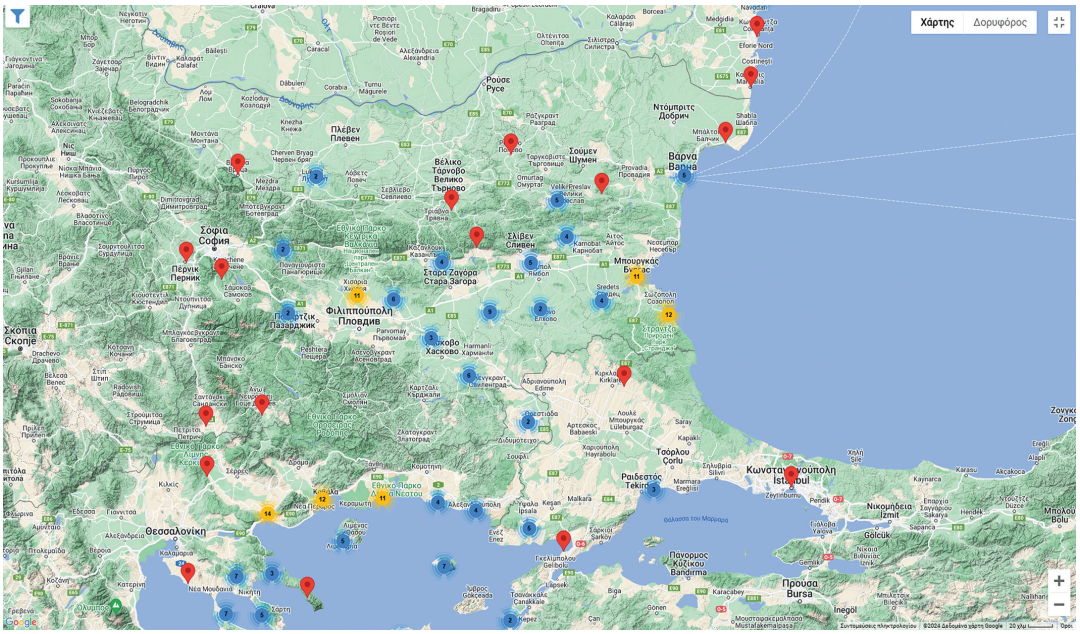

Figure 2. The AtticPOT interactive map.

availability of the material[4].

A third case is **Mythotopia: Mythological Routes in Eastern Macedonia and Thrace project**[5]. Mythotopia highlights the region's cultural and touristic richness through extensive recording, and mapping of ancient myths related to Thrace. It developed a specialized digital repository containing numerous Greek and Latin texts and ancient artworks depicting 36 region-specific myths, thus creating over 200 references, providing diverse ancient literary sources on Thracian mythology.

STUDYING ATTIC POTTERY IN THRACE

After setting up the base of the study, namely building the repository, the next step is to focus on a specific topic, such as for example the Attic pottery. Therefore, aligning with initiatives like BAPD, the AtticPOT employed the developed repository as a base to map and better understand the presence of the Attic vases in ancient Thrace[6]. It focused on various scientific and artistic aspects of Attic pottery, which dominated in the ancient Greek world from the 6th century BC onwards. After collecting the published painted pottery in the examined region, AtticPOT explored the distribution, uses, and preferences for Attic vases across ancient Thrace. Namely it covered sites located in a geographical area shared nowadays between Greece, Bulgaria, Turkey, and Romania. Combining in its methodology traditional with ICT tools, it proceeded to the examination of a large set of vases dated from the 6th to the 4th century BC. Furthermore, studying the presence of Attic pottery in various contexts, AtticPOT aimed to uncover exchange networks, usage patterns, and local preferences[7].

AtticPOT's repository hosts published data coming from a great range of sources (i.e. proceedings, reports, catalogues), covering simultaneously various contexts and collections. To manage the extensive material, researchers may navigate the vase records using browse, search, sort, and export functionalities. An interactive digital map (**Fig. 2**) provides a dynamic visualization of the vase distribution, filtered through comprehensive search criteria, including shapes, iconography, painters, potters, etc.

[4] *Avramidou and Tsiafaki* 2022; *Chioti, Avramidou and Tsiafaki* 2019; *Mourthos and Tsiafaki* 2022:217-218; *Michailidou et al.* forthcoming; *Tsiafaki, Michailidou and Chioti* 2020; *Tsiafaki et al.* forthcoming.
[5] https://mythotopia.eu/
[6] *Tsiafaki* 2022.
[7] *Michailidou* 2022.

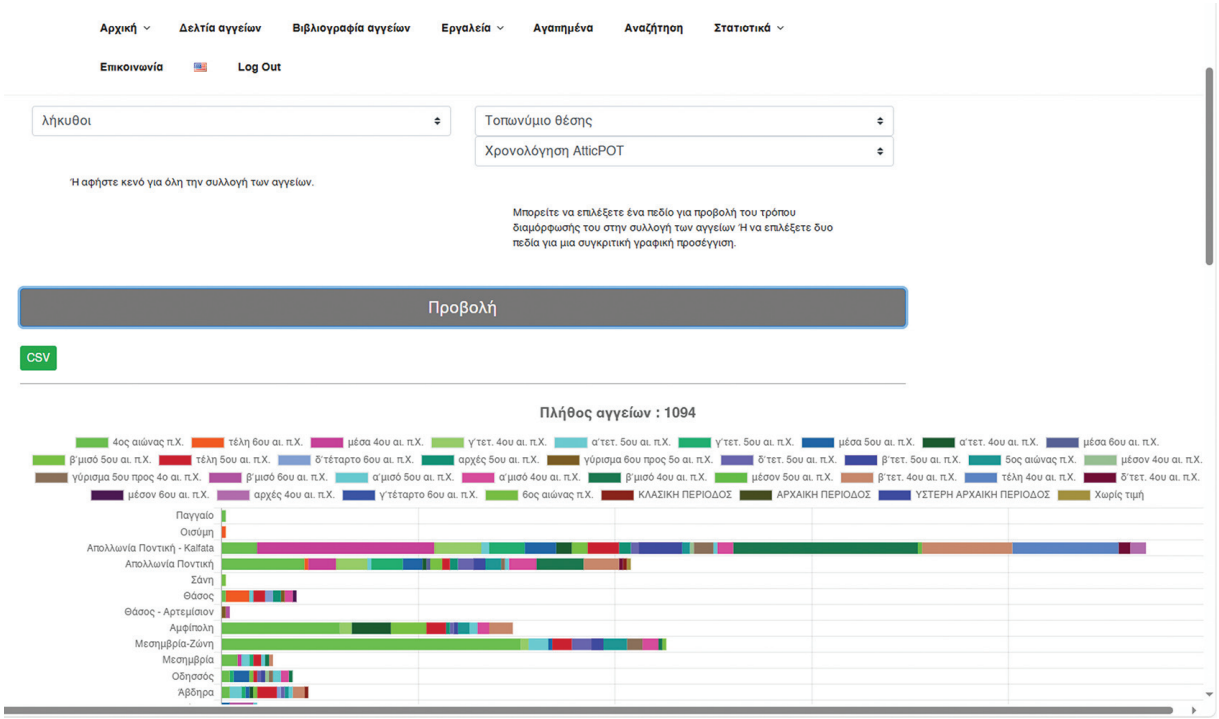

Figure 3. AtticPOT quantitative analysis tool.

Moreover, advanced research tools (**Fig. 3**) allow users to perform detailed analyses, saving favorites, and conducting quantitative analyses to uncover patterns and trends. Despite the project's official end, the ongoing process has amassed a robust collection of over 5,400 vases, approximately 8,700 bibliographical entries, and information from 215 sites across Greece, Turkey, Bulgaria, and Romania, thus enabling a more accessible and detailed study of Attic pottery across the region[8].

Using these tools for the research and study AtticPOT resulted in interesting observations and conclusions. For example, a focus and preference on a select range of vessel types (e.g., kraters, lekythoi) within the Attic pottery repertoire has been observed, which could be related to their function and context[9]. The study of a specific shape provided information on a deeper level. For instance, one of the most popular shapes, kraters, are found throughout the region, but their presence varies significantly in terms of quantity. Moreover, a great number of them have been unearthed in coastal sites. This could be due to the fact that coastal sites are likely more extensively excavated or might be related to historical factors associated, for example, with networks and routes of commerce. A great number of the kraters do not preserve clear finding contexts. Those, however, with known excavation sites mostly come from cemeteries and sanctuaries, predominantly from the 5th and 4th centuries BC. Unless future published data alter this observation, this pattern highlights the fact that they may played a clear role in funerary and religious traditions, at least in specific areas[10].

The other most popular shape of Attic painted pottery in ancient Thrace is lekythos. As regards the 4th century lekythoi, most of them are found in coastal regions, but it is worth mentioning that a significant number of them come from just five sites or has unknown provenance. To the latter may due, as it has been suggested in the case of the kraters, that these sites could be better excavated. Taking again into consideration the kraters, we may assume that coastal Greek colonies could have served as major hubs for Attic pottery trade. Worth of note is that nearly all lekythoi from known

[8] *Tsiafaki, Michailidou and Chioti* 2020; *Michailidou* 2022; *Tsiafaki et al.* forthcoming; *Michailidou* 2022.
[9] *Tsiafaki et al.* forthcoming.
[10] *Avramidou, Tsiafaki* 2022; *Tsiafaki et al.* forthcoming.

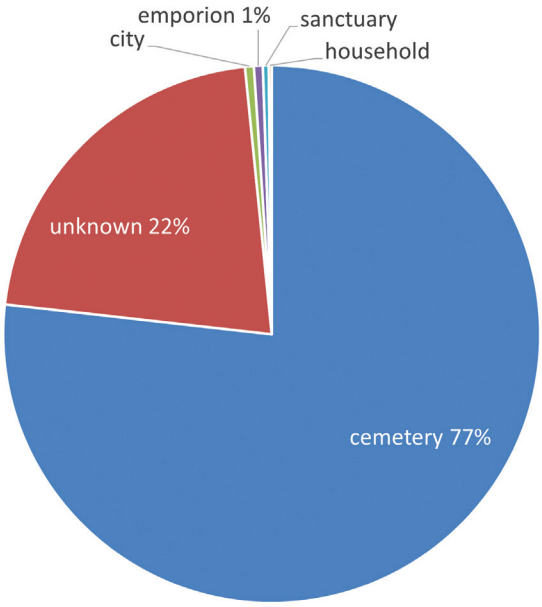

Figure 4. Context of the Attic 4th century lekythoi of Thrace.

contexts are discovered in cemeteries (**Fig. 4**), highlighting their role in funerary practices and rituals. Very few are found in sanctuaries, possibly as offerings, indicating a limited role in religious practices. The same limited presence applies so far to civic and domestic contexts[11].

Apart from shapes, the next important aspect of Attic painted pottery is iconography. The examination of the general distribution of popular iconographic themes (6th-4th century BC) in the AtticPOT repository resulted in several interesting trends. Floral and decorative motifs seem to prevail, while depictions of animal and Dionysiac scenes are also prominent, along with conversations, mythical creatures, domestic scenes, and warriors[12]. Dionysiac scenes stand out, spreading across both coastal and inland Thrace and appearing on various vessel types. Many Dionysiac scenes are found on sherds of unidentified vessels and often come from unknown or unpublished contexts. Those with known contexts are primarily discovered in cemeteries and sanctuaries. Chronologically, Dionysiac scenes are most prevalent in the 5th century BC, followed by the 4th century BC, with limited occurrences in the 6th century BC[13].

Technologies like those employed for the AtticPOT implementation facilitate detailed analysis of specific case studies, whether individually or comparatively. For instance, in exploring the contexts of 4th century lekythoi, distinct archaeological sites emerge as focal points for understanding the distribution and significance of these artifacts. One notable site is Mesembria-Zone, whose necropolis has yielded a substantial quantity of 4th century lekythoi[14]. Excavations in the necropolis of Ainos have also uncovered numerous 4th century lekythoi, highlighting the city's role as a market and distribution hub for Attic pottery during this period[15]. Moving to northern Thrace, near the ancient colony of Apollonia Pontica, Kalfata, cemetery, typical of Greek cities and colonies, has yielded numerous 4th century lekythoi[16].

In summary, the AtticPOT work exemplifies the transformative impact of ICT in classical archaeology, particularly regarding ancient Thrace. The developed digital tools provide the researchers the possibility to analyze extensive datasets, uncover intricate patterns, and gain nuanced insights into archaeological inquiries. ICT tools used in combination with traditional methods may facilitate systematic investigation into pottery typology, chronology, provenance, and cultural context, providing valuable resources. For sharing its research findings and engaging the scholarly community, AtticPOT adopted a hybrid approach of dissemination, both "traditional" and digital, organizing workshops that fostered collaboration among researchers from Greece, Turkey, and Bulgaria. This interstate effort culminated in a printed volume featuring contributions from esteemed scholars, showcasing diverse perspectives on the topic[17], as well as non-predicted in advance outcomes, such as a comprehensive presentation on the history of research into Attic deco-

[11] *Tsiafaki, Mourthos, Michailidou* forthcoming.
[12] *Tsiafaki et al*. forthcoming; *Michailidou* 2022: 48-51.
[13] *Tsiafaki et al.* forthcoming.
[14] E.g. Archaeological Museum of Komotini (МК/АГК 3557); *Iliopoulou* 2015: 61-71; *Iliopoulou and Pardalidou* 2022; *Tsiafaki, Mourthos, Michailidou* forthcoming.
[15] *Şahin* 2016; *Tsiafaki, Mourthos, Michailidou* forthcoming.
[16] *Damyanov* 2022; *Tsiafaki, Mourthos, Michailidou* forthcoming.
[17] *Tsiafaki et al.* 2022.

rated pottery in Bulgaria[18].

The issue of iconography, as a key aspect for extracting further knowledge on the region of ancient Thrace and its inhabitants, is also significant for the next thematic area examined here, that of the Thracian myths.

STUDYING THE ICONOGRAPHY OF THRACIAN MYTHS

Thrace boasts a rich mythological legacy, with numerous Greco-Roman artifacts coming from various eras to depict Thracian myths and to be housed in collections worldwide. Those myths are the topic of **Mythotopia** focused on exploring and promoting Thrace's mythological wealth along with its exploitation for tourism strengthening. In this case there is an integration of the traditional methods of classical studies (philology, archaeology) with ICT, leveraging tools like GIS, repositories, and interactive platforms. From the archaeological perspective -of interest here-, there is a significant number of ancient artifacts to meet contemporary tourism demands by creating immersive and educational experiences centered on Thracian myths. Moreover, by studying the iconography of these myths, researchers gain insights into artistic perceptions, cultural practices, religious beliefs, regional identity, and interactions with the Greco-Roman world.

At the heart of Mythotopia is a repository containing material related to the 36 selected myths related to Thrace. The repository includes over 300 ancient texts and references, along with more than 300 artifacts associated with these myths. Integration of multimedia and POIs enhances engagement, providing contextual information for more immersive experiences and understanding of Thracian myths. These sources encompass a wide array of philological, archaeological, and scientific materials. Central to the repository are Greek and Latin texts, which cover diverse genres such as epic poetry, historiography, tragedy, and other literary forms, from the works of approximately 95 ancient writers. All this information is available to the researchers as well as the visitors, tourists, and general audience.

Moreover, Mythotopia extensively utilizes archaeological artifacts of Greek and Roman origin. Decorated vessels, particularly Attic pottery adorned with mythological imagery, contribute to understanding the appeal Thracian myths had to Greek audiences[19] and the influence of Greek imports on Thracian taste. Sculptural artifacts (**Fig. 5a**) offer visual representa-

a b

Figure 5. a. Orpheus, Euridice and Hermes. Marble relief, 1st century BC-1st c. AD, Louvre museum (Paris) no Ma 854; **b.** Orpheus taming the animals. Mosaic floor from Miletus, 180-200 AD. Antikensammlung der Staatlichen Museen (Berlin), no. 72.

[18] *Banev* forthcoming.
[19] *Tsiafaki* 1998; *Tsiafaki* 2016.

Figure 5. c. Orpheus playing his lyre. Gold stater of Lampsakos, 387-334 BC. Münzkabinett der Staatlichen Museen (Berlin), no. 18215944; **d.** The murder of Orpheus on a gold-plated silver rhyton, 420-410 BC. Vassil Bojkov Collection, Sofia.

tions of mythological themes and characters, providing insights into artistic interpretations of Thracian myths and their significance in ancient iconography. Thracian myths are also depicted on mosaics (**Fig. 5b**) and coins (**Fig. 5c**), as well as on some elaborate and rare items, such as a gold-plated silver rhyton from Sofia (**Fig. 5d**). These artifacts serve as primary evidence as well as visual stimuli, offering material manifestations of mythological themes and characters. Selected photographs of these artifacts, used after permission, enrich the provided resources[20].

The rich material of Mythotopia draws exclusively from scientific publications, repositories, and official websites of institutions. This material fueled the development of a user-friendly platform and mobile application that integrates diverse information related to Thracian myths and cultural landscapes, offers touristic routes, and serves as an educational resource. Voiceover functionality to aid users with visual impairments ensures inclusivity and broadens access. Moreover, Mythotopia extends its impact beyond tourism by providing educational content aimed at secondary school pupils. Finally, Mythotopia also prioritizes "traditional" dissemination, through participation in conferences and the publication of a collective volume[21], pointing again to a combination of digital with analog.

GEOSPATIAL RESEARCH AND THE AEGIS LAB

Established in 2020, the **Archaeological GIS Laboratory (AeGIS Athena)**[22] marks a significant advancement in the study of cultural landscapes and human-environment interactions. Building on previous expertise of GIS technologies[23], AeGIS Athena serves as a hub for high-resolution documentation, mapping analysis, and 3D visualization. It supports diverse research inquiries with flexibility, utilizing both advanced and open-source GIS tools like QGIS to explore various perspectives and approaches in archaeological research. For instance, by integrating **symbology and quantitative analysis** techniques with the extensive dataset from AtticPOT, the distribution and characteristics of Attic pottery in ancient Thrace was further explored. In one case study, the utilization of custom-made symbols to visualize the occurrences of rare pottery shapes across various Thrace sites (**Fig. 6**) facilitated a comparative examination of spatial distribution patterns, providing nuanced insights into the

[20] *Vacalopoulou et al.* 2023.
[21] *Tsiafaki et al.* 2023.
[22] https://aegis.athenarc.gr/
[23] *Tsiafaki, Evangelidis* 2006.

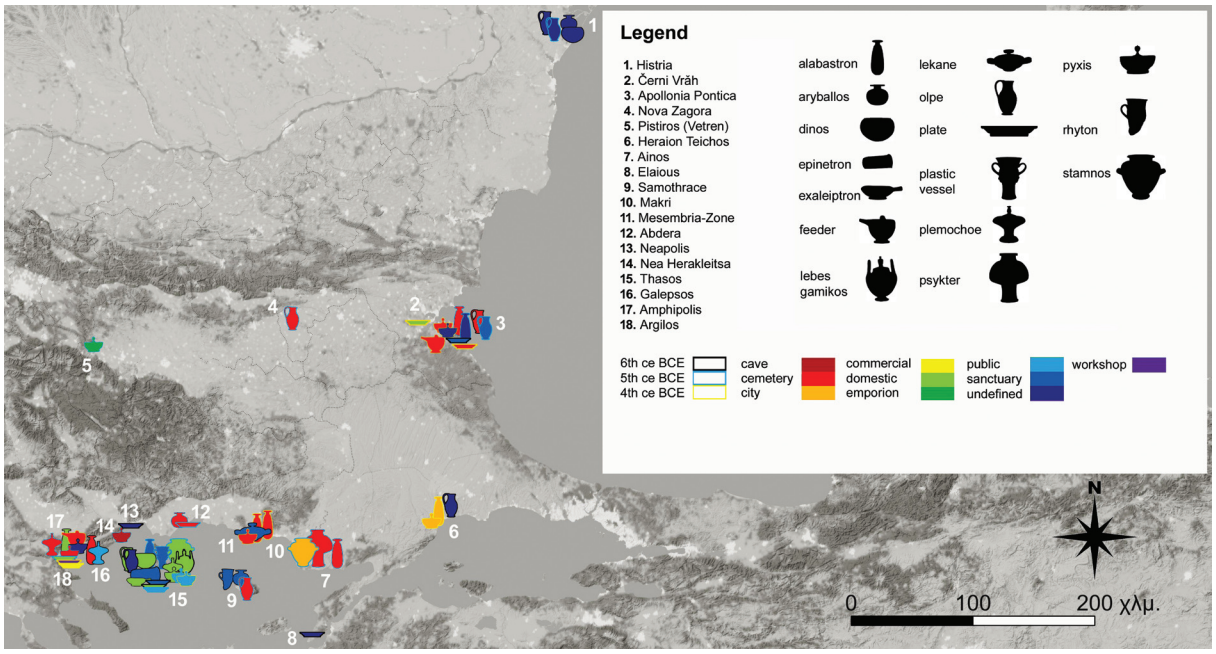

Figure 6. Map showing the distribution of rare shapes of Attic pottery, using custom made symbols showcasing the shape, the context and the date.

geographical and temporal trends of these rare shapes[24].

Moreover, the same integration yielded fruitful results in another case study. This time the focus was on Attic pottery found on sites located in Aegean Thrace, with emphasis on the area of Pistyros-Pontolivado[25]. By employing spatial analysis techniques and customized symbology, the distribution of Attic pottery was systematically mapped out, thus allowing the engagement in discussions regarding trade networks, cultural interactions, and stylistic preferences prevalent in the region during the 6th to 4th centuries BC. Through the visualization and analysis of Attic pottery distribution, valuable insights into the dynamics shaping the exchange and diffusion of material culture in this area were retrieved. To effectively communicate these complex archaeological patterns, the AtticPOT employed symbology techniques including heat maps, which use color

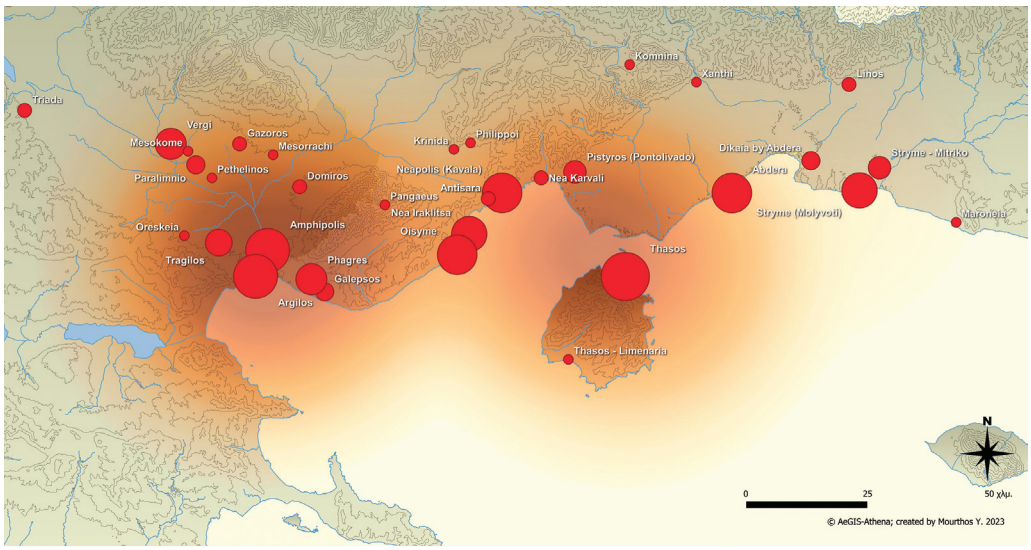

Figure 7. Heat map of the total distribution of Attic pottery (6th-4th century BC) in the area around Pontolivado.

[24] *Mourthos, Tsiafaki* 2022.
[25] For the site see *Papadopoulos* 2022.

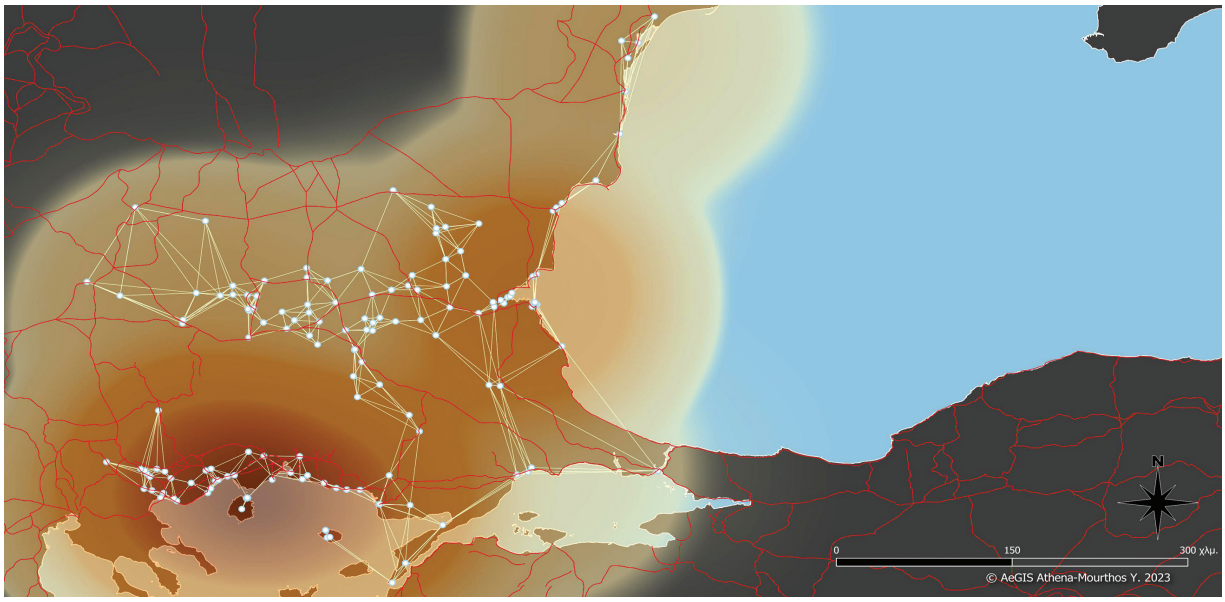

Figure 8. Map combining a heat map, Nearest Neighbor Network analysis of AtticPOT data and the Roman road network in the area of ancient Thrace.

intensity to illustrate the density or frequency of phenomena. The analysis of AtticPOT data with GIS software generated **heat maps with quantitative symbology** examining the distribution and quantities of Attic pottery (**Fig. 7**)[26].

Combining the data from the AtticPOT repository and GIS software, trade routes and networks were explored by analyzing the distribution of rare shapes in ancient Thrace. However, our current focus includes a Five-node Nearest Neighbor Network analysis across the entire AtticPOT dataset to map connectivity between archaeological sites. Interestingly, our findings align significant portions of this network with the Roman road network from the Barrington Atlas in ArcGIS Hub (**Fig. 8**). This correspondence possibly suggests a continuity in trade routes from the Archaic and Classical periods to Roman times, highlighting enduring economic and cultural exchanges over centuries.

Finally comes **landscape archaeology** and the study of natural and anthropogenic landscapes in Aegean Thrace. Using data provided by the Lab of Applied Soil Science of the Aristotle University of Thessaloniki, AeGIS Lab created soil maps to investigate the influence of environmental and cultural factors on ancient economy and settlement patterns. The study focused on the area of Vafeika, Abdera, and Bergepolis (Koutso), early Thracian sites situated in areas affected by the river Kosynthos. By analyzing soil composition within buffer zones around these sites, the research explored how alluvial processes and extensive fluvial landscapes impacted ancient economy and settlement patterns. The findings underscored the pivotal role of fluvial landscapes in shaping the distinct economic activities of the region[27].

CONCLUSIONS

The utilization of digital tools in studying Ancient Thrace offers transformative insights, particularly in managing vast analog data sources. Establishing interconnected repositories and aggregators for archaeological finds, literary texts, inscriptions, and research bibliographies is crucial for preservation and collaboration among scholars. The rich history, mythology, and tourism potential of Thrace make it a compelling super-region. GIS tools enable quantitative analyses, facilitating studies on population movements, trade networks, and landscape dynamics. These technological advancements revolutionize archaeological research, enhancing our understanding of Thracian culture and history while potentially influ-

[26] A couple of them will be published in *Tsiafaki and Amoiridou* forthcoming.
[27] *Tsiafaki, Evangelidis* 2022.

encing economic growth and cultural policies.

To truly unlock the potential of digital tools in studying ancient Thrace, collaboration is necessary. It's crucial for institutions and researchers of the states that share the lands of ancient Thrace to join forces. The rich and complex heritage of Thrace can only be fully appreciated through a cooperative effort in collecting, analyzing, and sharing data, a teamwork that will not only deepen our understanding of the region's history and cultures but will also help preserve and interpret them in a more integrated way.

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Използване на дигитални инструменти в изследванията на Древна Тракия

Деспина Циафаки, Янис Муртос, Мелпомени Карта, Натаса Михайлиду

Отделът за култура и творчески индустрии на Изследователски център Athena в Ксанти (Гърция) се фокусира върху използването на различни дигитални инструменти за археологически изследвания. Чрез различни проекти се използва широк набор от дигитални инструменти за изучаване на историята и археологията на древна Тракия. Въз основа изследването на различни критерии са анализирани разпространението, употребата и културното значение на атическите вази в древна Тракия. Изследването на древните митове и връзката им с тракийския ландшафт показа културния и туристически потенциал на Източна Македония и Тракия. Освен това, използвайки ГИС софтуер, лабораторията AeGIS проучи различни археологически теми чрез използване на символи и инструменти за количествен анализ, както и топлинни карти и инструменти за реконструкция на мрежа.

Unlocking Strategies of Visual Communication in Zones of Cultural Interaction: Opportunities and Challenges in the Digital Age

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Abstract: *Sculptural works conveyed a wide range of meanings, including values, claims, attributions of status and identity, demarcations, and affiliations. The use of iconographic concepts in extensive networks beyond specific regions and political systems characterises sculpture as a medium of transcultural interaction. Consequently, researchers are required to overview a large amount of data. The present paper discusses the advantages and challenges encountered when using digital web-based data management platforms for analysing sculptural works. These platforms organise and structure data both spatially and chronologically, with the aim of contributing to open and fair research by making newly acquired data easily accessible to future research projects.*

Keywords: ancient sculpture, data-management, visualisation, spatial analysis, open and fair research

Ключови думи: антична скулптура, управление на данни, визуализация, пространствен анализ, достъпни и етични изследвания

RESEARCH ON GREEK SCULPTURE BETWEEN TRADITION AND MODERNITY

The study of the origins and development of Greek sculpture has a long research history in Classical archaeology and the history of ancient art. In the established tradition of the field, sculpture has been approached almost exclusively by investigations of either specific material groups, regions, or functional classes. While undoubtedly an important, if not necessary step in research to narrow down the abundance of material and make objects accessible for further studies, this methodology has also contributed to a fragmentation of the material basis. This has, for instance, contributed to the assumption, that marble or bronze statues were more meaningful for the development of motifs than works of limestone or terracotta because of their

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higher material value[1]. Furthermore, it reinforced consolidations of regional perspectives, including a still discernible Hellenocentrism[2]. Archaic sculptures discovered in and around the *apoikiai* at the coastline of the Bosporus and the Black Sea, such as the two torsi of draped *kouroi* from Bisanthe and Apollonia Pontica, were often approached, classified and dated against the background of Greek, specifically Ionian sculpture[3]. However, categorisations like imports or imitations dependent on innovations by Samian or Milesian workshops or 'schools' are problematic: firstly, they presuppose that 'innovative' works discovered in zones of cultural contact were not made in the contexts in which they were found. Secondly, such categorisations assume a certain degree of industrialisation in the production of sculpture in regionally based workshops. But there is still a paucity of information regarding the precise location of these purported eastern Ionian workshops, their organisational structure, the type of marble used, and the specific production stages conducted at each site. A significant number of archaic and classical eastern Greek sculptural works lack clear archaeological context, which would allow for a contextual dating[4]. Another key question concerns the mobility of sculptors and stoneworkers evidenced in inscriptions and its consequences for the organisation of workshops[5]. Consequently, the classification of sculpture continues to rely heavily on established methods, namely analyses of form and style, which, to date, not only presuppose connoisseurship, but also an assumption of stylistic and formal development (e.g. from less naturalistic to naturalistic) and of a divergence between centre and periphery[6]. These issues are known and some have been discussed in greater or lesser detail. The question is how to move on when working with sculpture, especially with finds from regions where sculpture is scarce?

RESEARCH ON SCULPTURE IN THE DIGITAL AGE: MANAGING, MAPPING, AND ANALYSING BEYOND LOCAL DATABASES

For research questions focusing on the distribution and transfers of images, motifs, and styles, it is first and foremost essential to organise the constantly growing material basis in an economical, sustainable, and open way. Given that it was specifically designed for the humanities and that it combines a relational database with tools for spatial and chronological analyses and visualisations, it was decided to test the nodegoat environment to ascertain its suitability for future larger projects on exploring transfers of images, including partial motifs and stylistic elements. Its developers describe nodegoat as "an object-oriented web-based research environment that allows researchers to create datasets based on their own data models and offers relational modes of analysis with spatial and chronological forms of contextualisation". They claim that by combining these elements within one environment, complex datasets can be instantly processed, analysed and visualised relationally, diachronically and spatially[7]. As nodegoat is object-based, data is organised by object types (e.g. ancient place, inscription, name, relief, statue, stele etc.), the specific objects (e.g. draped *kouros* from Atija/Antheia), sub-objects (e.g. findspot, location), and categories (e.g. material, size-type, posture, attributes, etc.), which can be related to each other. Sub-objects not only contextualise objects spatially, but

[1] Since sculptures were usually painted, this may, to a certain degree, be a modern perception.
[2] For few provocative attempts to shift the common perspective see *Morris* 1992 or *Bernal* 2001; *Bernal* 2020. For current efforts towards a broader archaeology of the Mediterranean see e.g. *Hodos* 2020. For Cyprus, see the works of Maria Iacovou, e.g. recently *Iacovou* 2021.
[3] Even in overview works, e.g. *Özgan* 1978: 52-53. 55-59. 66; *Langlotz* 1975: 108-109. 112. 114-115; *Floren* 1987: 379, 404, 408; *Barletta* 1987: 245, nos. 26-27.
[4] This is true, for instance, for most sculptures from the sanctuary of Apollo at Didyma (*Tuchelt* 1970), which were mostly discovered reused in the village.
[5] On this aspect recently *Sossau* 2024, esp. 6-8 with examples and further references.
[6] For a recent discussion (and defense) of traditional classification methods see e.g. *Hoff* 2022.
[7] *Bree, Kessels* 2013. Nodegoat can be set up as a web-application in a single user environment on nodegoat.net (for free) or run on institutional servers with multiple user accounts (with plans).

also chronologically. This allows visualisations of distributions, both in regard to findspots (for an example see **Fig. 1**, showing the distribution of the draped *kouroi* in eastern Ionian garments – chiton, himation draped over the left shoulder, not covering the left arm, sometimes including an ependytes) and the locations where archaeological artefacts are or were kept. Thus, the dimension of object biographies can be incorporated in the analysis, as shown on **Fig. 2:** the statue of a crouching lion was discovered in Olbia Pontica in the 1890-ies; its hind paw and tail were traded to Odessa Museum and were united with the main part of the lion in Kherson in 1924, where they were stored until the Russian occupation in 2022. The opportunity to filter data and immediately visualise search results spatially makes distribution maps an integral part of a dynamic working process rather than a static result of a study.

The sculptures analysed in the first pilot study belong to the group of draped *kouroi*, which are commonly regarded a characteristic element of south-eastern Ionian sculpture. Past studies of this group were primarily based on marble works, while examples made from limestone were only occasionally included when they were discovered in Ionia[8]. Being able to organise a large number of objects made it possible to expand both the regional scope of the analysis and the variety of image carriers. Thus, the data basis now covers sculptures from the Aegean, Cyprus, Ionia, the Levant, the Bosporus and the Black Sea and includes images made in marble, limestone, and terracotta (with the exception of serially produced terracottas). The motifs were described by a number of image categories such as postures, hairstyles, attributes, garments etc., which allowed studying and mapping distribution patterns of specific details in a wider geographical range. Using that methodology allowed visualising the complexity of inner- and intercultural transfers of these motifs and styles which contributed to a better understanding of the interregional relations involved in their production[9].

Figure 1. Distribution of draped *kouroi* in eastern Ionian garments. © Veronika Sossau.

[8] *Özgan* 1978: 42-69, 100-123; The most comprehensive study of the group is still *Barletta* 1987. New finds were added by *Bosnakis* 2012: esp. 183 (with a list of 40 representatives).

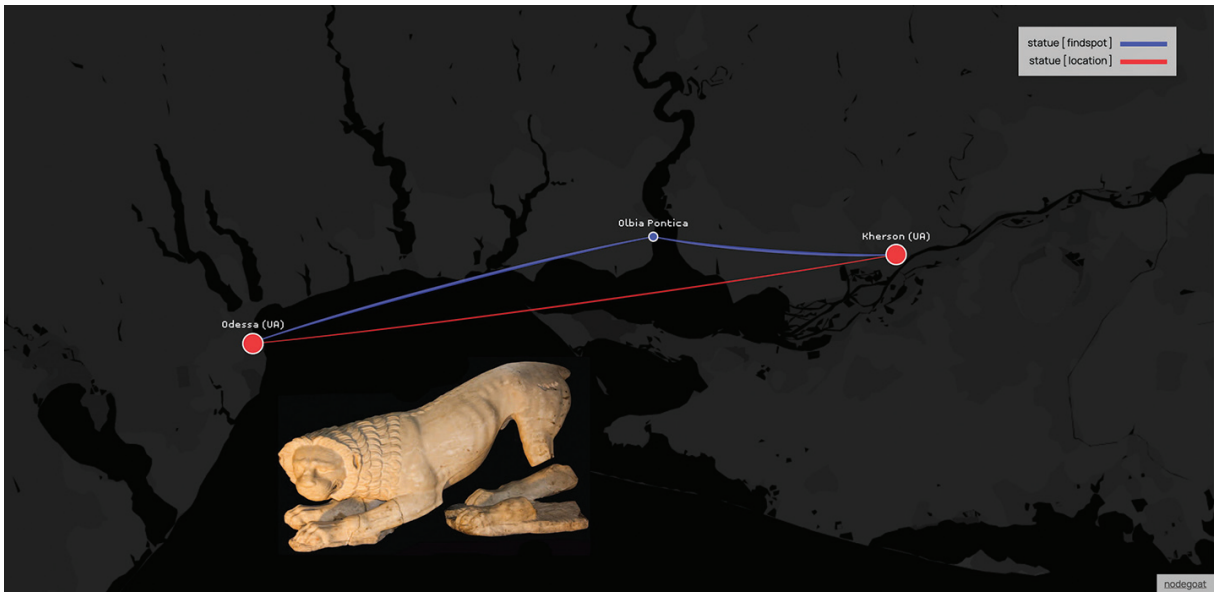

Figure 2. Visualising object biographies: a hind paw and the tail of a crouching lion from Olbia Pontica were first traded to Odessa Museum and later united with the body of the lion in Kherson.
© Veronika Sossau, based on nodegoat.net and https://sanctions.nazk.gov.ua/en/art/stolen/1556/> (25.01.2024).

The analysis can be expanded any time, for instance by systematically including additional object types like serially produced terracottas. Thus, the objective moves away from merely producing a book or a specific study; rather, it is to establish an environment in which data can be continuously expanded and re-examined in novel ways, thereby contributing to the advancement of sustainable and open research.

OPPORTUNITIES AND CHALLENGES IN ENGAGING IN AN OPEN AND FAIR RESEARCH COMMUNITY

A primary objective of sustainable, open and thus fair research is to facilitate the accessibility of data for future research. Therefore, it is crucial to ensure that the utilisation of data is not constrained to a specific software. The nodegoat environment meets this requirement. Conversely, open software often facilitates the integration of existing data. The initial pilot study of draped *kouroi* has drawn upon data from previous own works (tables and sheets), as well as from open research platforms established in the field, including idai.world (in particular, basic object data from iDAI.objects arachne and geographical data from iDAI.gazetteer)[10], pleiades (geographical data and site names)[11], iconographical, especially mythological descriptive categories from digital LIMC (Lexicon Iconographicum Mytholigiae)[12]. Epigraphical data and names are linked to the respective entries in the IG (Inscriptions Graecae)[13], the LGPN (Lexicon of Greek Personal Names)[14], and also to Lexica as the SEG (Supplementum Epigraphicum Graecum[15], and the New Overbeck, a Lexicon of artist's names[16]. To a smaller account, as it focuses on Graeco-Roman Egypt,

[9] For some results of this pilot study see *Sossau* 2022; *Sossau* 2024; *Sossau* forthcoming. The dataset is going to be published on Zenodo: https://zenodo.org/ (accessed 28.06.2024) upon publication of *Sossau* forthcoming.
[10] German Archaeological Institute (ed.), iDAI world portal for digital knowledge: https://idai.world/ (accessed 28.06.2024).
[11] Pleiades (community-built gazetteer and graph of ancient places): https://pleiades.stoa.org/ (accessed 28.06.2024).
[12] WebLIMC: https://weblimc.org/ (accessed 28.06.2024).
[13] Berlin-Brandenburgische Akademie der Wissenschaften (ed.), Digital edition of Inscriptiones Graecae: http://telota.bbaw.de/ig/ (accessed 28.06.2024).
[14] Lexicon of Greek Personal Names: https://www.lgpn.ox.ac.uk/ (accessed 28.06.2024).
[15] Supplementum Epigraphicum Graecum Online: https://scholarlyeditions.brill.com/sego/ (accessed 28.06.2024).
[16] The New Overbeck: Ancient Textual Sources on Greek Visual Arts: https://doi.org/10.1515/overbeck (accessed 28.06.2024). For the printed edition see *Kansteiner et al.* 2014.

Trismegistos (geographical and epigraphical data) was consulted[17]. In turn, newly retrieved data can be made accessible for future research at the end of each project, as nodegoat now also generates web-accessible and downloadable data publications, which can be published in repositories such as zenodo.org[18].

The most challenging aspect in large research portals is organising data, finding the right balance between detail, clarity, and consistency. To make data easily available for future research projects, it is important to use normative data provided by controlled vocabularies and thesauri established in the field as far as possible[19]. Since these thesauri do not always provide sufficient detail and classical archaeology is a discipline with a long multi-lingual tradition, this can be challenging, especially when it comes to hierarchising categories. Within the rather narrow scope of the pilot study, the categorisation of sculptures worked sufficiently. For larger platforms with more different types of objects and therefore greater complexity, however, it proved to be difficult to maintain a consistent and clear organisation of categories and tags[20]. Another problem of normative data is that it can reproduce stereotypes, which is why these categories should not be reproduced without careful reflection[21]. One potential solution to the issues under discussion would be to replace the text tags with graphical tags.

While the dataset of the first pilot study is prepared for publication, more objects, with a continued focus on sculpture from the eastern Mediterranean and the Black Sea, are now integrated into the project environment. At this stage, collaborating researchers are invited to use the platform to test strengths and weaknesses and work out ideas for an improved environment which can handle a larger number of object types and categories in a consistent and clear way, providing a solid basis for future studies.

FURTHER METHODOLOGIES IMPROVING RESEARCH ON SCULPTURE

A precisely structured database of finds is also going to be beneficial for selecting groups for further investigations on the organisation of workshops and the use of materials. There are several methods that have the potential to bring more light into research on sculpture and, above all, to move it to a slightly more objective level, away from its dependency on connoisseurship. More archaeometrical analyses could contribute to a better understanding of the specifics how raw materials were used and where they stem from. This would not only be an interesting information for sites without direct access to marble deposits, but also for the assumed centres of eastern Ionian sculptural production. Did they stick mainly to local marbles, as it, for instance, could be shown in case of a series of Late Classical to Early Hellenistic votives for Meter at Panayýrdap in Ephesos[22], or did they also work with imported marble? Nevertheless, despite the significant advances made in archaeometry over recent years, their application, particularly in marble sculpture, remains limited. Most attributions in publications are personal estimations, but especially calcite marbles can be challenging to distinguish even with scientific methods[23]. High-resolution 3D scan-

[17] Trismegistos. An interdisciplinary portal of the ancient world https://www.trismegistos.org/ (accessed 28.06.2024).
[18] New Data Publication Module, 06.06.2024: https://nodegoat.net/blog.s/74/new-data-publication-module (accessed 28.06.2024).
[19] For classical archaeology see the thesauri and controlled vocabularied by the German Archaeological Institute: https://idai.world/how/thesauri-and-controlled-vocabularies (accessed 28.06.2024). Other classification systems, are offered, e.g. by the Getty Research Portal https://www.getty.edu/research/tools/vocabularies/index.html (accessed 28.06.2024).
[20] For this aspect see *Tolle et al.* 2018.
[21] See, for instance, the dispute over Iconclass: https://iconclass.org/ (accessed 28.06.2024) referring to racial categories: *Kühnl* 2020 and *Sever* 2020.
[22] *Anevlavi, Ladstätter, Prochaska* 2021.
[23] For this reason, results of older marble analyses should not be approached uncritically. For recent efforts in this matter see *Prochaska, Athanasiou* 2021; 2022.

ning may also prove beneficial for future studies on style and craftsmanship, as it allows for the study and comparison of works from different locations under the same conditions (light, angle, surface texture, etc.)[24]. However, at present, they are mainly used for reconstructions[25].

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[24] For a pilot study see *Counts, Averett, Garstki* 2016: 209 f. For an attempt on master-hand attributions e.g. *Patay-Horváth* 2016a.

[25] E.g. *Patay-Horváth* 2016b.

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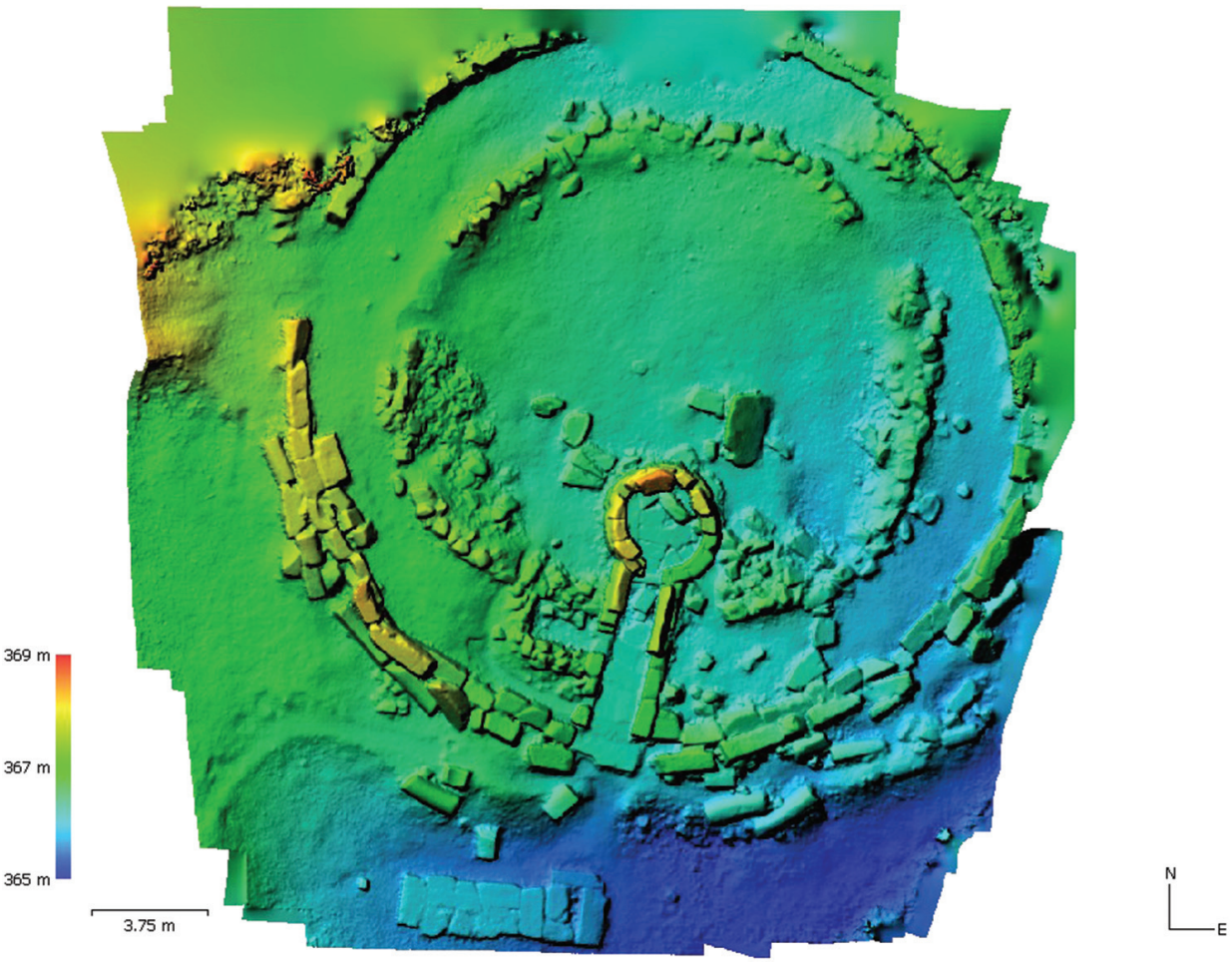
Разкриване на стратегии за визуална комуникация в зони на културно взаимодействие: Възможности и предизвикателства в дигиталната епоха

Вероника Сосау

Скулптурните произведения са сложни единици, състоящи се от множество елементи, които могат да предават широк спектър от значения. Иконографските характеристики, изборът на материали, техники, стилове и комбинации с други комуникативни елементи като надписи и дипинти допринасят за многостранния характер на тези произведения. Тъй като те са циркулирали в обширни мрежи извън определени региони и политически системи, те също така служели като медии на транскултурно взаимодействие. За да се справим с тази висока плътност на информация, е необходимо да се прилагат организационни системи, които могат да организират и анализират голямо количество данни с високо ниво на детайлност. В предварително изследване, което се фокусира върху драпирани куроси, използването на географски визуализации се оказа особено ефективно за изясняване на сложните взаимовръзки между скулптурите, покровителите и потребителите, свързани с тях, както в рамките на, така и извън регионалните граници. Резултатите от такива анализи могат да осигурят стабилна основа за по-нататъшни проучвания, например по отношение организацията на работилниците и използването на материали. Използването на установени нормативни речници и тезауруси, и осигуряването на достъп до данните чрез отворени хранилища гарантира, че те са лесно достъпни за по-нататъшни изследвания. Въпреки че е изключително ценно за анализа на специфични скулптурни групи, справянето с по-голяма сложност и по-голямо разнообразие от типове обекти и категории в обектно-базирани релационни бази данни, като същевременно поддържа последователна и ясна организация, може да създаде трудности. Те ще бъдат оценени на следващия етап от проекта.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Intervisibility among the Thousand Mounds of the Yambol Province

Adela Sobotkova
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Abstract: *Visibility and intervisibility have always been important aspects of spatial analysis in landscape archaeological studies but remain hampered by poor inputs such as small-scale study area, edge effects, and bare-earth models. This paper assesses intervisibility in a dataset of ~1000 burial mounds in the Middle Tundzha River watershed addressing these very issues via a regional analysis of several vegetation-simulating terrain models that include mounds beyond the region to nullify edge effects.*

Keywords: visibility, landscape archaeology, burial mounds in Yambol Province

Ключови думи: видимост, ландшафтна археология, надгробни могили в Ямболска област

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VISIBILITY IN LANDSCAPE STUDIES

In landscape archaeology, two approaches have governed the study of visibility. The first sees visibility as an attribute of the environment while the second interprets visibility as an embodied perceptual act, one that is dependent on a person's knowledge, visual acuity, and scale within the landscape[1]. Each approach requires different operationalization in GIS software. Viewsheds and lines of sight comprise the usual suite of computational tests of visibility calculated on digital elevation models[2]. Yet, many such studies lack inferential rigor, failing to prove whether intervisibility occurred by random chance[3]. Often, they forget to account for weather and other complicating criteria such as edge effects or vegetation permeability[4]. These shortcomings owe to the sheer computational intensity of such tests for randomness[5].

When seen as an embodied perceptual act[6], visibility is impacted by the observer's personal attributes. Her age, vantage point, speed, type of movement, time of the day, and expectations determine what she sees and whether she is seen,

[1] *Tilley* 1994; *Hodder* 1986; *Higuchi* 1988.
[2] *Van Leusen* 1999; *Wheatley* 1995; *Williams* 1999.
[3] *Lake, Woodman* 2003; *Madry* 1996; *Gaffney, Stančič* 1991.
[4] *Skov-Petersen* 2007; *Verhagen* 2018.
[5] *Lake, Ortega* 2013; *Llobera et al*. 2010.
[6] *Shanks, Hodder* 1995; *Tilley* 1994.

and such factors are much harder to model and generalise, requiring a combination of approaches ranging from the line of sight, probabilistic viewsheds, intervisibility networks to prominence and virtual reality simulation[7]. Implementation of these approaches is computationally intensive.

In this paper I try to get beyond some of the pitfalls of visibility studies[8], such as the edge effects, small-scale analysis, and the use of bare earth models. Using custom functions and established spatial libraries in R, I calculate mutual intervisibility in 1000+ burial mounds in the Yambol Province, comparing the results from a bare earth elevation model with two different vegetation-covered simulations. The aim is to explore how well current computational methods accommodate the rigorous testing of inter-visibility and to assess how much intervisibility mattered to mound-builders in Yambol through time.

MOUNDS IN THE YAMBOL PROVINCE

'Will to visibility' has been noted in funerary monuments across a number of cultures[9]. Burial mounds in Bulgaria have been raised over grave sites since the Early Bronze Age until the Middle Ages and represent the most numerous type of immovable cultural heritage in the country.

In the Yambol Province of southeast Bulgaria burial mounds cluster on the ridges and lower rocky outcrops, near and above settlements along Tundzha River tributaries[10]. Excavations and DNA analyses reveal that mound necropolises have been reused over millennia[11], confirming that communities constructed new landscape features with respect to pre-existing sites and monuments as well as natural components of the environment. The combination of prominence, high density and reuse is hardly unique to mounds in southeast Bulgaria. Their thorough digital documentation at regional scale, however, is rare and offers a dataset that can support a rigorous large-scale visibility analysis.

DATA AND METHODS

Mound data

The dataset of burial mounds was produced by the Tundzha Regional Archaeological Project (TRAP) which has operated in the Yambol Province since 2008[12]. The project digitized burial mound symbols from 1:50,000 scale Soviet topographic military maps, visited and documented their status in the field producing a dataset of 1073 burial mounds[13]. Of these 864 represent extant burial mounds, 154 extinct (excavated or looted) burial mounds and 55 small and therefore uncertain mounds. **Fig. 1** shows

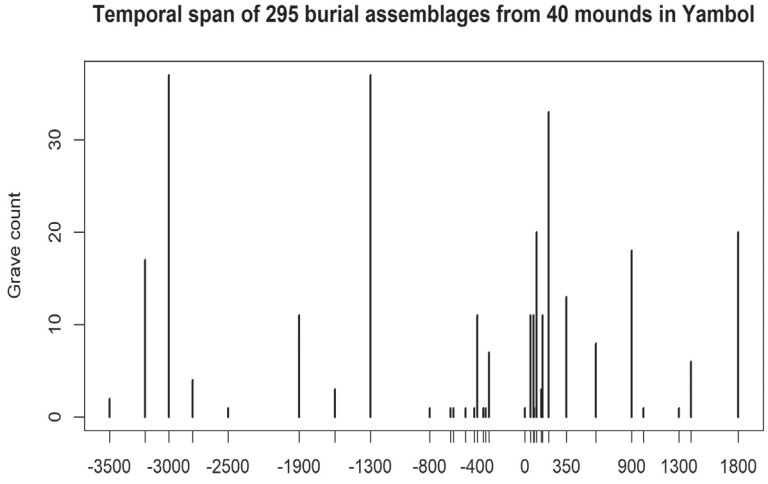

Figure 1. Chronological range of grave goods from mounds in Yambol Province as published in AOR.

[7] *Fraser* 1983; *Llobera* 2003, 2001; *Wheatley, Gillings* 2000; *Čučković* 2023.
[8] *Van Leusen* 1999; *Skov-Petersen* 2007.
[9] *Criado* 2013; *Buikstra, Charles* 1999; *Williams* 1999.
[10] *Sobotkova, Weissova* 2019, 2020.
[11] *Bakardzhiev* 2005; *Privat et al*. 2018; *Penske et al*. 2023.
[12] *Ross et al*. 2018, 2012, 2010.
[13] *Sobotkova, Weissova* 2020.

their chronology spans from the Early Bronze Age to the Mediaeval Era, with the relative frequency peaking in the Early and Late Bronze Age followed by the Roman imperial period[14].

Intervisibility

To assess intervisibility, I calculate line of sight (LoS) from each of the 1073 mounds inside the Yambol Province boundary to all other neighbors within the region. A positive LoS means that the view from point A to point B is unobstructed, meaning there is no higher elevation between the observer and the observed point (see **Fig. 2**). I translate this approach into R as the comparison of elevation at location A to the elevations encountered on a straight line to location B, derived from a raster profile. In order to reduce edge effects in 341 mounds located within a 5 km buffer of the regional border, I also calculate their LoS to additional 1206 mounds within 25 km of the Yambol Province border. The latter 1206 mounds have also been digitized from the Soviet military topographic maps but remain unverified[15].

Digital elevation model and vegetation modeling

I use three JICA ASTER DEM[16] tiles of 30 m resolution as a digital elevation model for the LoS calculation within the Yambol Province and a buffer of 25 km around. The DEM is a bare-earth model (BOM), which maximizes intervisibility. To challenge this model I simulate vegetation following Connor et al.'s palaeoecological study[17] which attests to patchy forested landscape within the Tundzha watershed. I generate two different surfaces: first, trees of 10 m height distributed randomly over 50 % of the landscape, and second, vegetation of variable height from 1 and 20 meters (with a mean at 10m) randomly covering 50 % of the landscape. Both surfaces have the same average height, but the second is more 'permeable'. I overlay the vegetation surfaces over the BOM and re-calculate mound intervisibility. Results allow me to gauge the drop in mounds intervisibility due to vegetation.

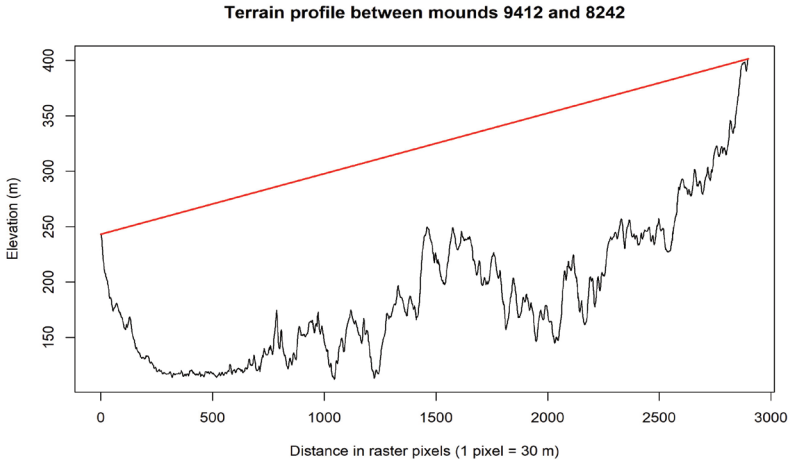

Figure 2. Raster profile from NW to SE edge of the region with positive line of sight between mounds 9412 and 8242.

Intervisibility calculation workflow is coded and parallelized in R and is available for review in Github (https://github.com/adivea/Visibility).

Results

Results for the BOM show most mounds highly intervisible. The group with lowest intervisibility – having only 1-10 visible counterparts – is small at 143 features out of 1073 (13 %).

[14] According to *Arheologicheski otkritia i razkopki*, 40 mounds were excavated in Yambol region in 1987-2014 yielding 295 burials.
[15] *Sobotkova et al.* 2023.
[16] ASTER Global Digital Elevation Model.
[17] *Connor et al.* 2013.

Out of the 1073 mounds 508 (47 %) can see 10 to 100 counterparts, and 422 (40 %) mounds see over 100 other mounds. The most visually dominant 60 mounds can see 250+ other mounds. Their lines of sight extend across the entire region, up to 60 km far. The mound with the highest visual dominance, no. 9412 west of Yambol city has an unobstructed line of sight to 491 mounds, visible in **Fig. 3**. We can reasonably doubt the real possibility of recognizing anything at such a distance, except perhaps fire beacons at night or smoke during daytime. In reality the large-scale of such a distance would reduce even a 7 m high mound to an insignificant and unrecognizable dot.

In addition to considerations of scale and limits of human vision, vegetation changes the situation dramatically (see **Fig. 4**). In the first simulation (static 10m tall vegetation), intervisibility drops by 35-90 %. Over 400 of 1073 (40 %) mounds lose 90 % of their field view due

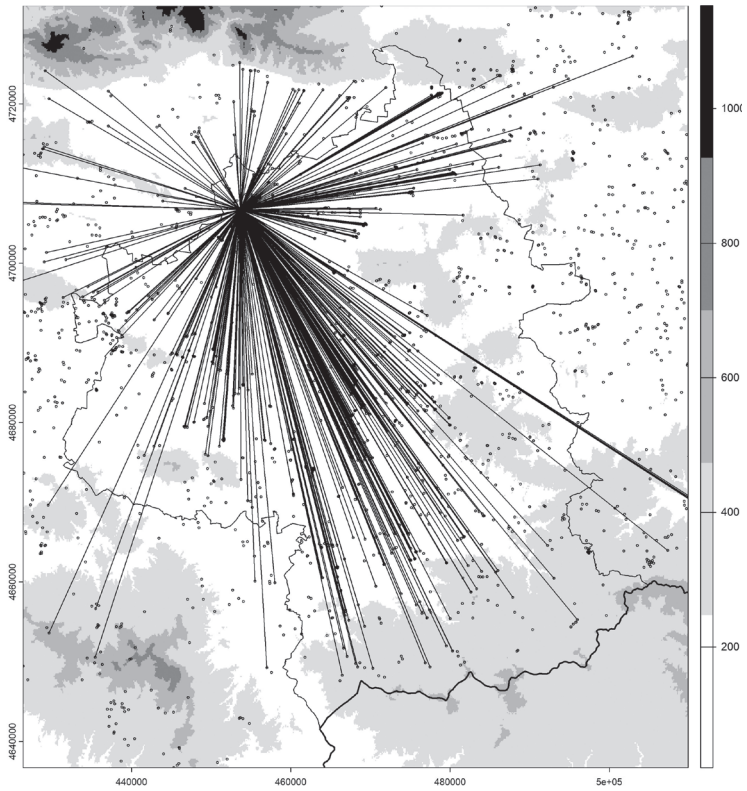

Figure 3. Mounds in the Yambol Province and within 25 km buffer of it visible from mound 9412 (n = 491).

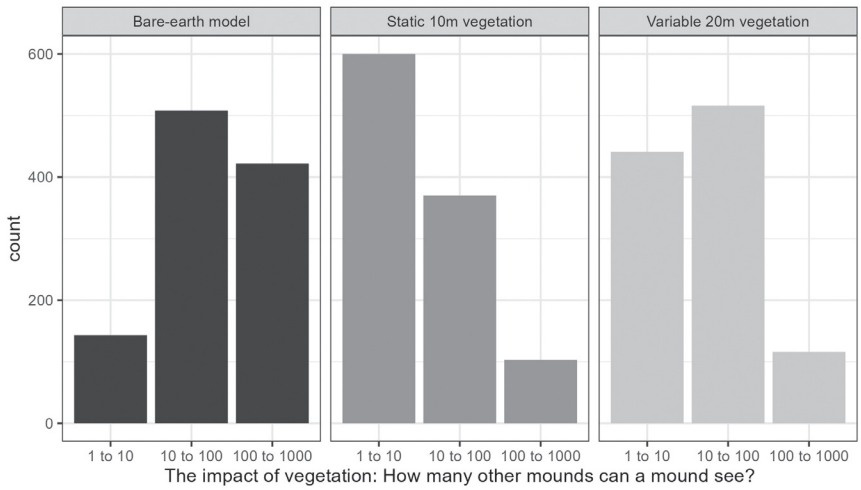

Figure 4. Histograms depict changes in intervisibility class membership under different vegetation scenarios.

to a patch of trees. Most mounds now have intervisibility of 1-10 mounds, their count having risen three-fold over the BOM. The middle rank drops by over 20 % but is still strong at 370 (36 %) mounds with 10 to 100 intervisible counterparts. Only 103 mounds (10 %) remain in the visually dominant rank. This considerable drop in intervisibility is consistent with Skov-Petersen's (2007) results and makes sense in light of the 50 % tree coverage.

In the second scenario (variable 20m vegetation with 10m mean), the drop is less pronounced. Compared to BOM, the lowest rank doubles to 41% with 441 mounds, the middle rank remains almost the same at 516 mounds (48 %) and the highest rank of mounds attenuates to 116 (11 % of total). Even though some trees in scenario 2 are higher in 1, their variability contributes to a less dramatic drop in the middle intervisibility rank, shuffling the class membership gradually. What happens with individual mound ranking, especially the leading ones?

The downward adjustments contribute to some shuffling among the leading individual mounds. The total winner, 9412, moves into second place with 249 mounds (decline of 46 % over BOM) when inside the 20m vegetation model. It is superseded by 9044, a 6m tall mound near Botevo, with 291 visible mounds. Only 4 of the leading mounds retain their position among the 10 leading ones, these being 9412, 9411, 9044 and 8700. Others shuffle up from below these top first places. In the end however, unless the mound location happens to be covered by vegetation, the rule applies that 'once in a commanding position, always highly intervisible'.

Likewise, accounting for the edge effects does not massively alter the order of the leading mounds. While many of the border region mounds grow in visual dominance, the absolute winners' field of view grows too. To illustrate the point, in the bare-earth model 9412 dominates intervisibility with a line of sight to 409 other mounds inside the region in the bare-earth model. When we extend the vision beyond the region to limit edge-effect, 9412 continues its lead with a line of sight to 491 other mounds (an increase of 20 %). In the top ten mounds, eight retain their positions when we extend the view beyond the border of the Yambol Province. While the vertical shape and rugged boundary of the region suggests that edge effects will be considerable, and the final numbers do go up by as much as 20 %, they go up equally for most mounds involved, not perturbing the overall order dramatically.

These results confirm two points: that landscape affordances in the Yambol region drive the results and ancient mound builders were aware of and exploited these attributes (or not) intentionally. Visibility mattered but was not the only criterion. To underscore the point, there are other locations in the region that offer supreme visual dominance, such as the peak of Bakadzhitsite or the Dodoparon hill which offer a prominence of 99 %. Scaling these peaks, however, is clearly beyond the needs for ancestral worship and territorial signaling of the local communities.

Two winners emerge in the study of intervisibility, whose context merits a bit more detailed attention. Mounds 9412 and 8007 and both in locations of high relative prominence, being perched on a ridge or outcrop with an open view across the Middle Tundzha watershed (see **Fig. 3 and 5**). While 9412 sits northwest of the Yambol city, its view opens to the southeast where most of the rest of the region lies. Mound 8007 is near the geographic center of the region, with an unobstructed view of 90 % of the region. Having been investigated in a 2010 rescue campaign, C14 dates place the first use of 8007 in the Early Bronze Age[18]. After the initial construction, over 20 other bodies were interred here over the course of the next 3000 years, attesting to the place's long-term popularity. Mound no. 9412 remains intact as of the writing of this paper. Nearby mounds, however, also contained remarkable stone constructions and pit graves with burial goods dating to the EBA period[19].

[18] *Privat et al.* 2018; *Penske et al.* 2023.
[19] *Bakardzhiev* 2005.

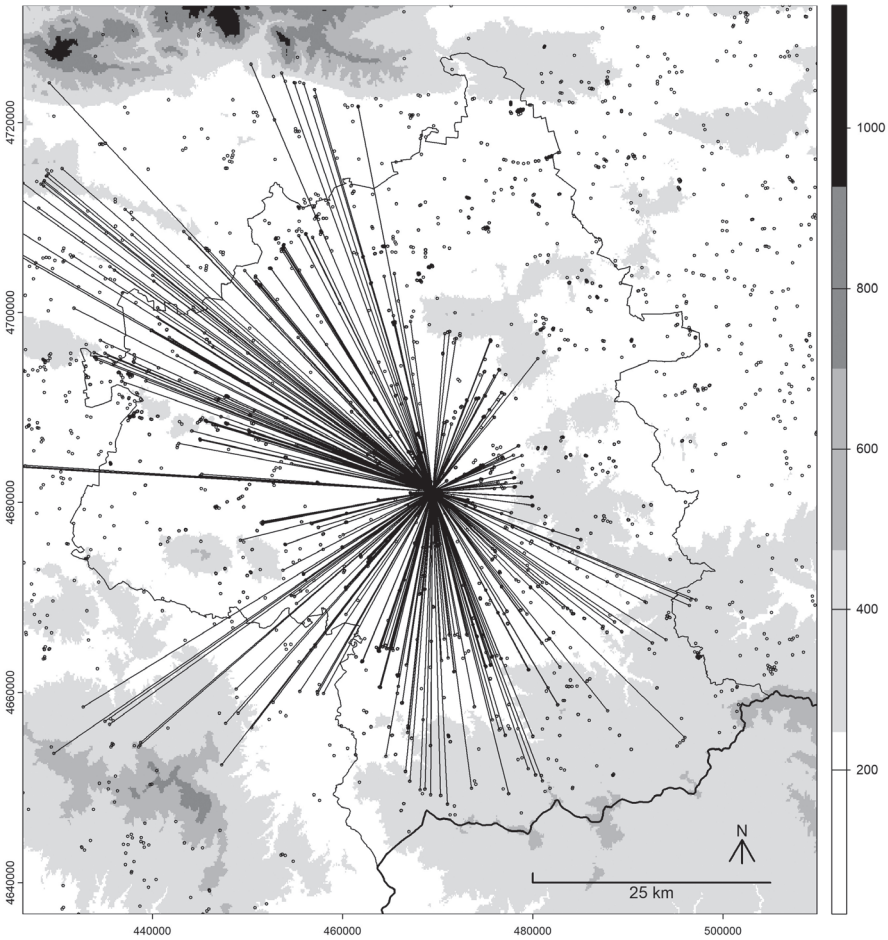

Figure 5. Mounds in the Yambol Province and within 25 km buffer of it visible from mound 8007 (n = 387).

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Видимостта между хилядата могили в Ямболска област[20]

Адела Соботкова

Проучването изследва влиянието на растителността и ефекта на периферията върху степента на видимост помежду над 1000 могили в Ямболска област. Генерирани са два различни варианта на растителна покривка за региона, като видимостта между ямболските могили е сравнена с тази на модел въз основа на терена без растителност. Резултатите от линията на видимост показват, че ямболските могили, разположени върху изолирани възвишения, разполагат с най-добър визуален контрол над заобикалящата ги среда. Калкулирането на растителност с вариращa височина между 1 и 20 m намалява взаимната видимост по-малко, отколкото калкулирането на растителност с еднородна височина от 10 m. Въпреки че калкулирането и на двата модела растителност може да доведе до хаос в класифицирането на могилите по отношение на видимостта, крайните отличаващи се могили остават същите, дори ако в калкулацията се добави и гора. Мерките за коригиране на ефекта на периферията имат сравнително слабо влияние върху резултатите, което показва, че площта от 3355 кв. км е достатъчно голяма за изследване на видимостта на регионален ландшафт.

[20] Translated from English by Julia Tzvetkova.

From Deultum to DigiDeultum

Lyudmil Vagalinski
National Archaeological Institute with Museum,
Bulgarian Academy of Sciences

Abstract: *The Roman colony of Deultum is the oldest Roman city in Bulgaria founded in AD 70. Its archaeological research began in the 1980s. From December 2023, a team of specialists from NAIM-BAS, Sofia University St. Kliment Ohridski and Municipal History Museum-Sredets is implementing a three-year project funded by Bulgarian National Science Fund (КП-06-Н80/7 from 8.12.2023). Its main goal is to explore a possible fundamental change in the historical narrative of Deultum by combining the previous scientific approaches with those of digital humanities and archaeological sciences.*

Keywords: Roman colony, *Deultum*, digital humanities

Ключови думи: римска колония, *Деултум*, дигитална хуманитаристика

Professor Dr Lyudmil Vagalinski is an archaeologist whose scientific interest includes cities in Antiquity, the Roman Danube limes and the Great Migration Period. He conducts the archaeological study of the Greco-Macedonian and Roman city of Heraclea Sintica, as well as the Roman colony of Deultum. Vagalinski publishes the scientific journal Archaeologia Bulgarica and is a co-founder of the e-media platform of the same name for archaeology.
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Founded probably in AD 70[1] by veterans of *legio VIII Augusta*, *Colonia Flavia Pacis Deultensium* is the oldest Roman city in Bulgaria and one of the two Roman colonies (together with *Colonia Claudia Aprensis*) established in the province of Thrace. *Deultum* is the only one to be studied archaeologically. It lies 15 km southwest of Burgas near the village of Debelt, Sredets municipality (**Fig. 1**).

Its archaeological research began in the 1980s. At that time, one of the first geophysical studies of an archaeological site in Bulgaria was carried out there (**Figs 2-4**). In 2004, the coordinate system of the *Deultum* National Archaeological Reserve was linked to the International Terrestrial Reference Frame (ITRF), a first for an archaeological site in the country (**Figs 5a-5c**). Aerial photographs were applied from the very

[1] *Sharankov* 2017: 37.

Figure 1. Location of *Deultum.* (*Hammond* 1981: fig. 24).

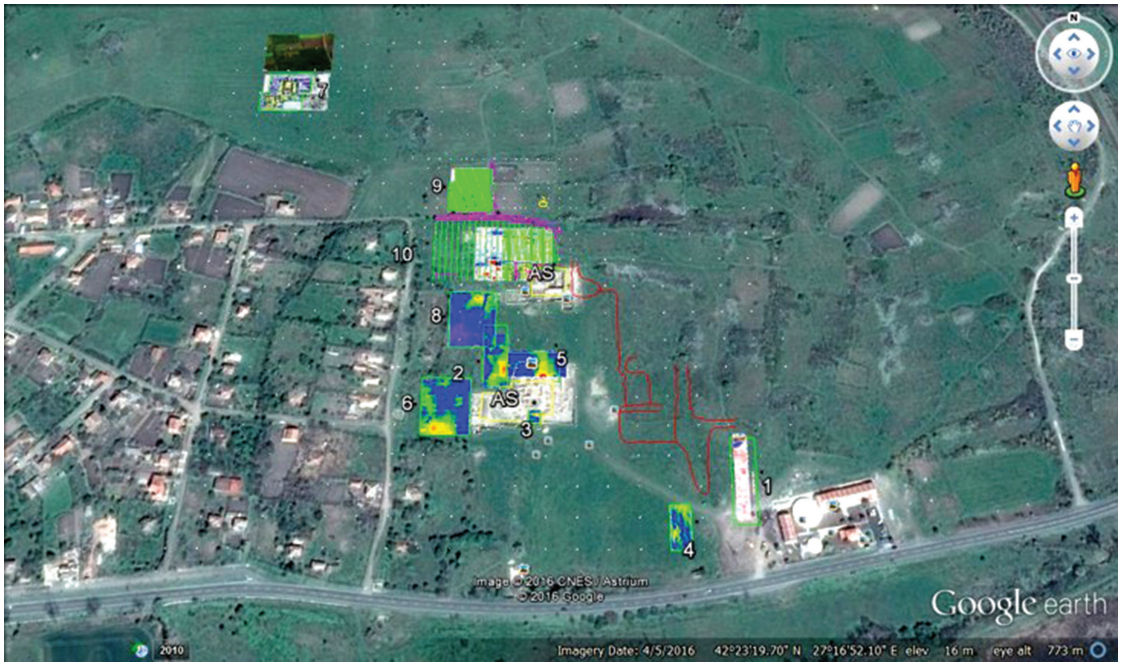


Figure 2. Results of electromagnetic geophysical surveys in *Deultum* in 1980s. (Photo: Kiril Velkovsky).

beginning (**Fig. 6**) along with traditional geodetic measurements and, of course, the usual field and office archaeological methodology. Digital models of the colony's terrain were then created, also facilitating its effective study (**Fig. 7**). The interdisciplinary approach has always featured strongly in the work of the two successive archaeological teams, in the 1980s and since 2003. Currently, three main architec-

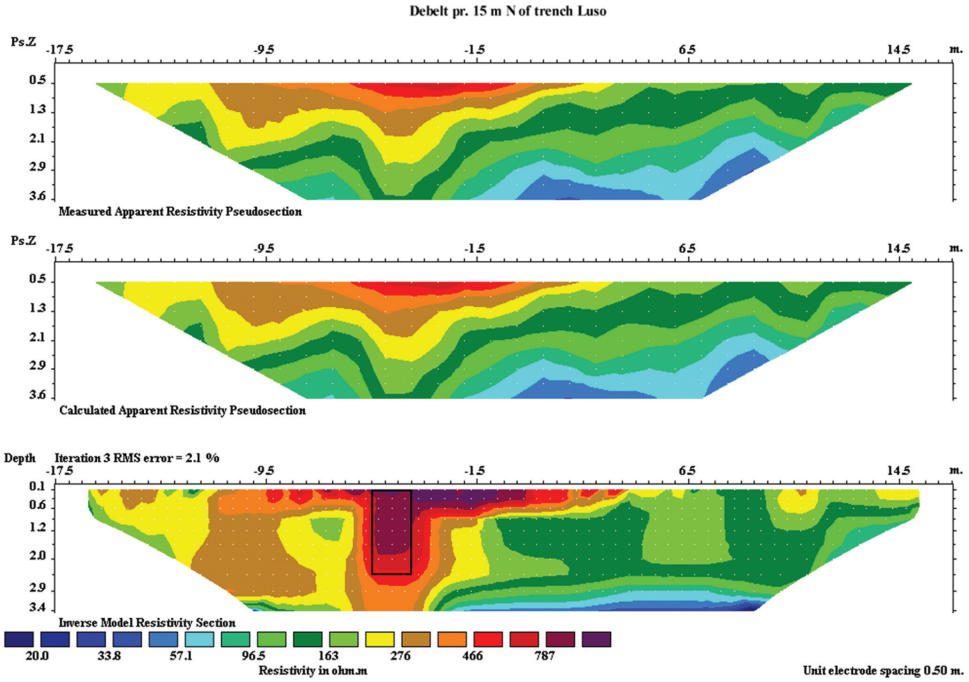


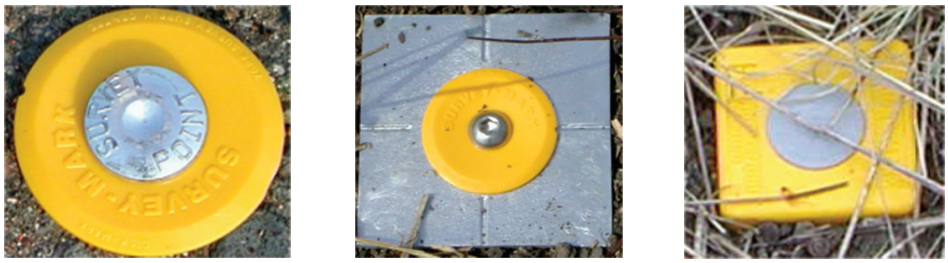
Figure 3. Detecting *Deultum* fortress wall by electromagnetic survey. (Author: Nikola Tonkov).

tural complexes have been excavated: the Roman *thermae*, the so-called "Temple of the Emperor" with adjacent structures and the late antique fortress of the city (**Fig. 8-14**). The excavations of both tumular and flat necropolises of *Deultum* provide rich information about the history of the colony (**Figs 15-17**). In 2023 the oldest archaeological proof in Bulgaria of Christians (ca. AD 200) was found in a grave of the southern necropolis (**Fig. 18**)[2]. Intensive GIS field surveys have been carried out during the last years on the administrative territory of *Deultum*[3].

The scientific results of archaeologists, epigraphists, historians, numismatists, ar-

Figure 4. Geophysical survey in *Deultum* with ground penetrating radar. (Photo: Lyudmil Vagalinski).

[2] https://www.archaeologia-bulgarica.com/открито-е-най-древното-археологическ/
[3] These are conducted by Assoc. Prof. Dr Ivo D. Cholakov.



Figures 5a – 5c. Control point types in *Deultum.* (Photo: Ian Haynes).

chitects, archaeozoologists, archaeobotanists, physical anthropologists, geologists, chemists, geophysicists and restorers have been published in numerous article[4]. These will be updated in an accessible online volume to be published in 2025.

From December 2023, a team of specialists from NAIM-BAS, St. Kliment Ohridski University and Museum-Sredets are implementing a three-year project funded by the Bulgarian National Science Fund. Its main goal is to explore a possi-

Figure 6. Aero photo in 1980s of the medieval fortress near *Deultum.* (Photo: Stefan Damyanov).

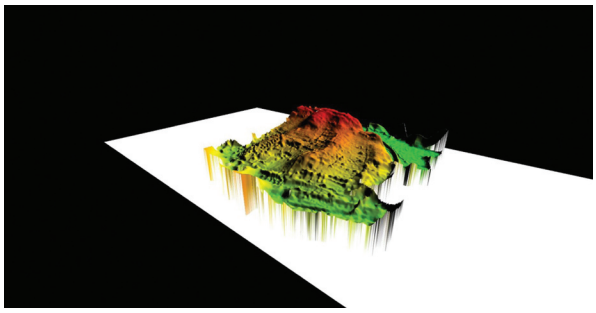


Figure 7. Digital model of the terrain of *Deultum.* (Author: Atanas Kamenarov).

Figure 8. Aerial photo of the current excavations in *Deultum*: Roman *thermae* (in the middle); the so-called "Temple of the Emperor" (right); late antique fortification. (Photos: Lyudmil Vagalinski).

[4] *Balabanov, Nenova-Merdjanova* 2006; *Draganov* 2007; *Vagalinski* 2008; *Preshlenov* 2015; *Sharankov* 2017; *Vagalinski* 2018; *Milčeva* 2020; *Boteva* 2020; *Raycheva* 2022; *Russeva* 2023; *Kostova, Sharankov* 2023; *Russeva* 2023; *Vagalinski* 2024.

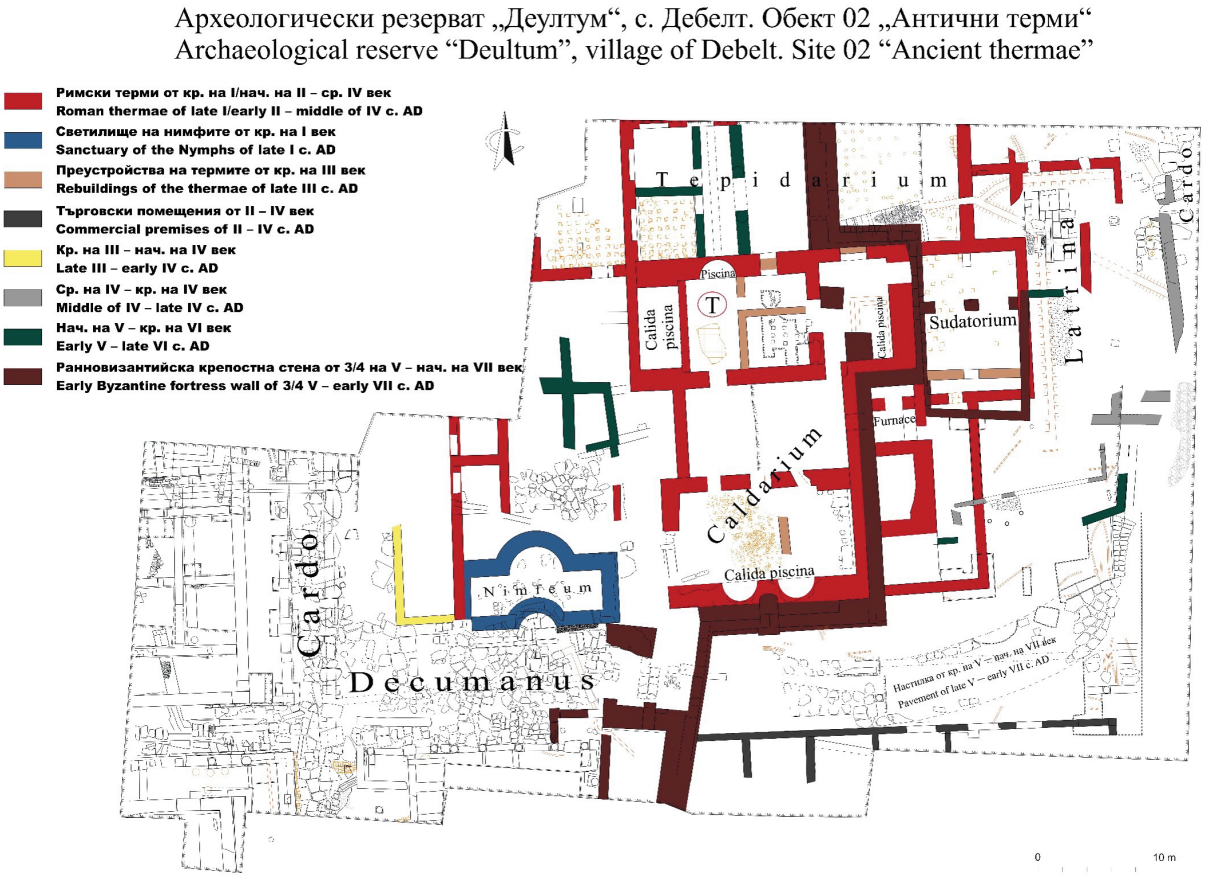


Figure 9. Plan of the Roman thermae in *Deultum.* (Authors: Krasimira Kostova, Emil Dakashev).

ble fundamental change in the historical narrative of *Deultum* by combining the previous scientific approaches with those of digital humanities and archaeological sciences (archaeometry, GIS, archaeoinformatics, etc.). Practically, our previous scientific knowledge about the colony will be reinterpreted in a digital environment (**Fig. 19**). A DigiDeultum concept will be created through the development of digital products. The achieved results will be shared with the partner projects Measuring Ancient Thrace, *Corpus Nummorum* and the scientific journals *Archaeologia Bulgarica* and Bulgarian Numismatic Journal.

Acknowledgement: This research is supported by Project КП-06-Н80/7 from 08.12.2023, "Upgrading the Historical Narrative: From Deultum to DigiDeultum", funded by the Bulgarian National Science Fund.

Figure 10. A hypocaust of the Roman thermae in *Deultum.* (Photo: Krasimira Kostova).

Figure 12. Legs of life-size Roman bronze human statues found in *Deultum.* (Photo: Hristo Preshlenov).

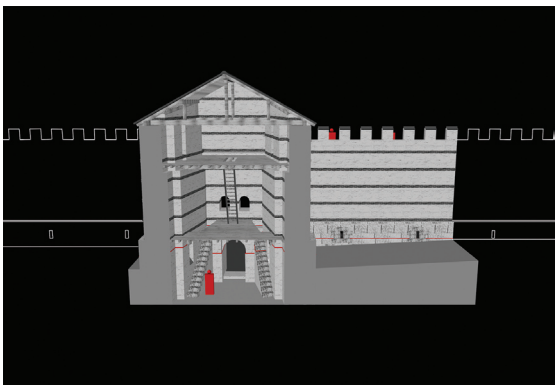


Figure 14. 3D reconstruction of the northern Late Roman tower of *Deultum* (Author: Silva Sabkova).

Figure 11. Bronze head of the Roman Emperor Septimius Severus found in *Deultum.* (Photo: Petya Nikolova).

Figure 13. The interior of the northern late Roman tower of *Deultum.* (Photo: Lyudmil Vagalinski).

Figure 15. A Roman burial in the southern necropolis of *Deultum* (Photo: Ivo D. Cholakov).

Figure 16. A magical gem found in a Roman burial in the western necropolis of *Deultum.* (*Kostova, Sharankov* 2023: fig. 15b).

Figure 17. Plan of the revealed graves in the southern necropolis of *Deultum.* (Author: Ivo D. Cholakov).

Figure 18. A silver foil rolled found in the southern necropolis of *Deultum*.
The inscription is the oldest archaeological proof in Bulgaria of Christians, *ca.* AD 200.
(Author: Silvia Borisova).

Figure 19. Digital coin processing in *Deultum.* (Photo: Lyudmil Vagalinski).

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От Деултум към DigiDeultum

Людмил Вагалински

Основаната най-вероятно през 70 г. сл. Хр. римска колония Деултум е най-старият римски град в днешните български земи. Неговото археологическо проучване започва през 80-те години на XX в. и продължава активно досега. От декември 2023 г. изследователи от НАИМ-БАН, СУ „Св. Климент Охридски" и Общински исторически музей – Средец започнаха работа по тригодишен проект, финансиран от ФНИ-МОН (№ КП-06-Н80/7 от 08.12.2023 г.). Основната проектна цел е да изследва възможна фундаментална промяна в историческия разказ за Деултум чрез комбиниране на традиционните научни методи с тези на дигиталната хуманитаристика и археометрията.

Digital Digging on the Molyvoti, Thrace, Archaeological Project: IDig and a New Web Application

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Abstract: *Twenty years ago, the idea of widespread technology integration in archaeological research was beyond imagination. The excavation in Molyvoti, a walled classical city situated along the coastal region of Aegean Thrace identified as Stryme, the Thasian emporion, exemplifies the transition from traditional to modern technological methodologies in archaeological studies. The excavation endeavors at Molyvoti, which trace their origins to the 1950s, serve as a compelling illustration of the shift towards incorporating advanced technologies for research purposes.*

Key words: Aegean Thrace, Stryme, databases, material registration
Ключови думи: Егейска Тракия, Стриме, бази данни, регистриране на находки

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Situated amidst the prominent Greek city-states of Abdera, Dikaia, and Maroneia[1], along the Aegean coast, lies the classical city of Molyvoti, frequently associated with the polis and *emporion* of Stryme, a Thasian *apoikia* (**Fig. 1**)[2]. The city had two harbors: one to the south of the city, with moles built along the edges, and another harbor in the current Elos Lagoon, southwest of the city. A cemetery consisting mainly of tumuli lays outside the city walls, to the northeast, at the interface with the mainland, while other burials were located to the southwest of the city. It is worth noting that in their majority the tumuli are aligned in the N-S axis, probably along one or more an-

[1] For geospatial data and coins types of the Mints, see Abdera: https://nomisma.org/id/abdera_thrace; Dikaia: https://nomisma.org/id/dicaea_thrace; Maroneia: https://nomisma.org/id/maroneia

[2] *Arrington et al.* 2016. About Dikaia, a city that have been referred to the Athenian Tribute list as being close to Abdera, see *Triantaphyllos, Tasaklaki* 2012; *Triantaphyllos, Tasaklaki* forthcoming; and *May* 1965. For Maroneia, see *IThrAeg* 320-338; *Psoma, Karadima, Terzopoulou* 2008. For the Greek Colonist in Thrace, see *Isaac* 1986; *Tiverios* 2008; *Damyanov* 2015.

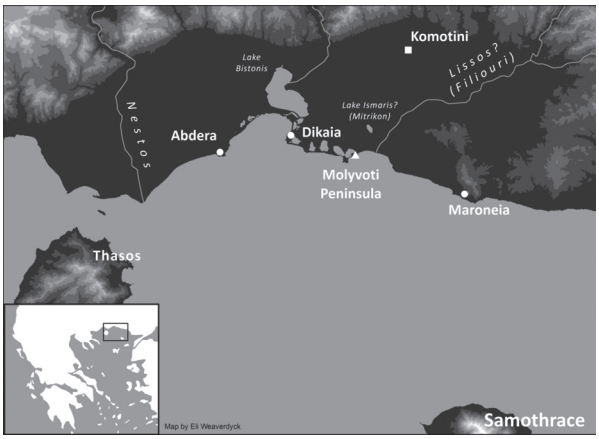

Figure 1. Map of Aegean Thrace. (©Eli Weaverdyck).

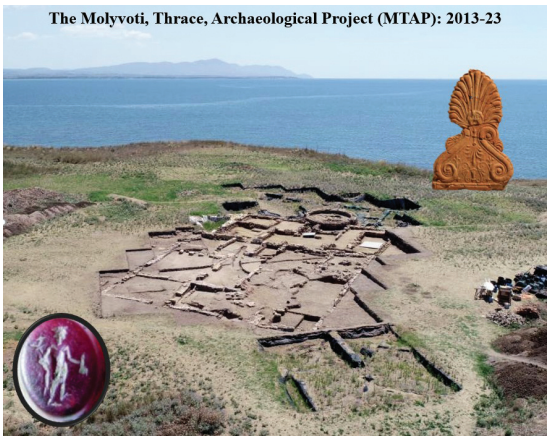

Figure 2. The House of the Gorgon and the house of Hermes in Stryme.

cient roads connecting the city to the Thracian hinterland[3].

A primary feature of the site is its subterranean aqueduct, likely dating back to its initial establishment, visible today from the sea[4]. Comprising interconnected tunnels linked to wells, this aqueduct facilitated water access for the inhabitants, likely pooling ground water. It represents a significant feat of public infrastructure akin to the grand projects such as the Eupaline aqueduct of Samos or Perachora.

The fortified city measures over 63 hectares; some of the eastern section has fallen into the sea and is not included in this calculation[5]. Building *insulae* measure about 70 m x 35 m and there are intersections. The new 4th-century grid plan of *insulae* consists of eight structures, four on the long side, measuring 17.6 m by 17.6 m each, having a common spine wall. Up to now, only two houses have been excavated in their entirety, and many more have been partially revealed (**Fig. 2**). The second house, the House of Hermes, has a different organization and range of finds than the House of the Gorgon, with implications for activity at the site as well as broader issues of domestic archaeology. At the northeast, northwest, and southwest, 4th-cen. city walls have been identified[6].

The fine ware, lamps, loom weights, clay figurines etc. shed light on daily activities and social practices. An eastward orientation (Ionia) was manifest in earlier and later phases of the city's life (archaic period/end of classical), while from the end of the 5th century BC and the first half of the 4th century BC much of the imported fine ware is Attic in origin but there are also regional imitations (**Fig. 3**)[7]. The large number of amphoras, stamped tiles from Thasos and especially coins from the excavation and urban survey is striking (approximately 600 coins come from only two houses), and highlight trade activity and networks[8].

A destruction that took place in the mid-4th century BC is related to Philip II's campaigns in Thrace but life resumed, albeit in a limited manner. What is noteworthy is that there is no final, second destruction horizon, but instead strong indications that the city was slowly abandoned

[3] *Bakalakis* 1967: 3-17; *Triantaphyllos* 2000; *Terzopoulou* 2004; *Terzopoulou, Tasaklaki, Arrington* 2023; *Tasaklaki, Leou* forthcoming. For the *chora* formation in general, see *Baralis* 2008.
[4] *Bakalakis 1967*: 38-45.
[5] For the Landscape, as well as the urban development, see *Arrington, Terzopoulou, Tasaklaki, Weaverdyck* 2022; *Arrington, Terzopoulou, Tasaklaki, Makris, Hudson* 2023.
[6] *Terzopoulou, Tasaklaki, Arrington* 2023. See also, note 11. For houses, both excavation research and publications in this field, were limited, see *Arrington, Terzopoulou, Tasaklaki* forthcoming. Complete houses have been unearthed at Abdera and Zone in Aegean Thrace, for which there are only annual reports in Praktika tes en athenais Archaiologikes Hetaireias (PAE 1973 and so on). For the Hellenistic house found at Maroneia, see *Karadedos* 1990 and *Lavvas, Karadedos* 1990.
[7] For Attic pottery found at the site of Molyvoti, see *Bakalakis* 1967; *Triantaphyllos, Terzopoulou* 2012; *Arrington, Padgett* 2019; For the Ionian orientation, see *Tasaklaki* forthcoming C.
[8] For the coins, see *Tasaklaki* forthcoming A and B. For Networks, see *Karambinis* 2019.

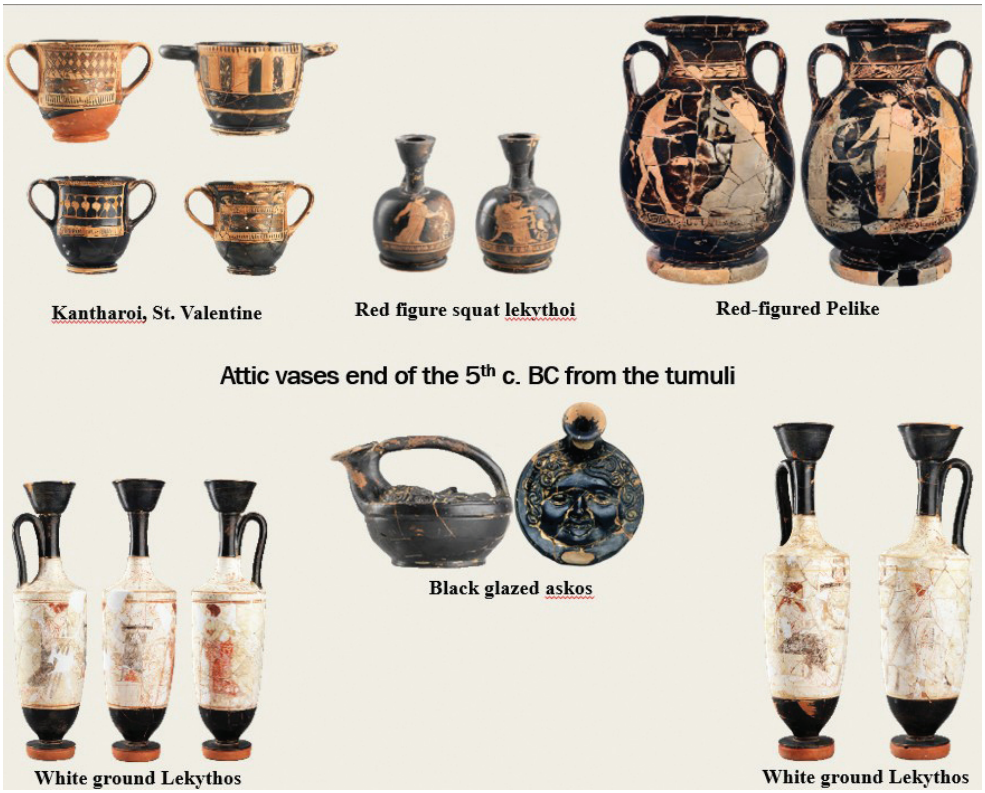

Figure 3. Attic pottery found at the necropolis. (©Ephorate of Antiquities of Rhodope).

at the beginning of the 3rd century BC, during a time of insecurity and instability for the region of Aegean Thrace, as economic networks were disrupted. In contrast, life went on in the *chora.* The survey revealed the edges of the Classical–Hellenistic chora and a significant shift in settlement patterning in the post-Hellenistic periods. An extra-mural sanctuary detected in 2015 and the focus of the 2023 excavation season will be presented in a future preliminary report.

The excavation endeavors at Molyvoti, which first began in the 1950s, are a compelling illustration of the transition towards the incorporation of advanced technologies for research objectives (**Fig. 4**). It exemplifies what was beyond imagination twenty years ago: the idea of widespread technological integration in archaeological research.

The initial excavation, led by Bakalakis in 1957[9], faced challenging and occasionally harsh conditions, lacking transportation vehicles and even basic water supplies. By 1993, when Triantaphyllos initiated a subsequent phase, conditions had improved, and advancements such as geophysical studies were introduced. However, as new theoretical perspectives emerged over time, accompanied by an increasing number of inquiries, novel methods of investigation became available. Furthermore, the wealth of material unearthed necessitated innovative approaches to management.

Thus, the Molyvoti, Thrace, Archaeological Project (MTAP)[10], a *synergasia* spanning two fieldwork phases of 5 years each – the first results already published in 2016-, with a two-year hiatus due to the pandemic, had to encounter new challenges[11]. Employing focused excavation, pedestrian surface survey, geophysical survey, and geomorphological prospection, the project has delved into the urban structure of the

[9] *Bakalakis* 1967.
[10] For MTAP, see https://scholar.princeton.edu/mtap/home. (https://mtap.scholar.princeton.edu/). Preliminary results of the first period of excavation 2013-2015 have been published in *Arrington et al.* 2016. For previous research, see *Bakalakis* 1967; *IThrAeg* 287-288; *Triantaphyllos, Terzopoulou* 2012; For the coins found at the site, see *Psoma, Karadima, Terzopoulou* 2008; *Loukopoulou, Psoma* 2008.
[11] *Arrington, Terzopoulou, Tasaklaki, Tartaron* forthcoming.

Figure 4. Excavation by Bakalakis in 1957. (©Ephorate of Antiquities of Rhodope).

city and its relationship to the *chora* and the hinterland from a diachronic perspective. And of course, to our many specialists we have added a new position: the IT expert. This interdisciplinary approach allows for a comprehensive exploration of the city's history and its interactions with broader social dynamics. For example, we can examine how zones of activity (urban and rural, with economic, sacred, and political functions) functioned as nodes in broader networks of communication and exchange in an evolving Mediterranean world.

But in the process of finalizing the publication of the House of the Gorgon, which was unearthed during the first campaign, we confronted numerous challenges that prompted us to explore new digital approaches during our second campaign[12]. A significant issue, common to many excavations, was the isolation of scholars analyzing the finds after the season, leading to a lack of awareness regarding one another's discoveries and updates.

Another challenge we faced was how to effectively present the project results while addressing the specific requirements of each artifact type and context information. Similar to many archaeological projects, our forthcoming print publication of the House of the Gorgon is structured by artifact type, allowing specialists to offer detailed insights into the finds and connect them to broader discussions in their specialized subfields. While context information is documented in the book, for a reader to recover assemblages and connect the find contexts that are shared across different chapters requires considerable effort. The read must work with indexes and inventories and lists, flipping back and forth from one part of the book due to another. And due to the constraints of print space, some data had to be omitted, so it is impossible for a reader to recover complete contextual information. Not every pottery sherd was inventoried, and not every inventoried object was catalogued.

Figure 5. Taking measurements with a Leica Total Station.

To manipulate such a large and diverse amount of material in the traditional way is an extremely difficult and time-consuming task. To remedy these problems, we turned to digital methods. Our starting point was the configuration of iDig. The *iDig* application, developed for the Athenian Agora by Bruce Hartzler, moves in this direction[13]. Designed as an archaeological tool for gathering data in the field, with some changes it could accommodate specialties like numismatists. It allows field archaeologists to record excavation data easily, accurately, and consistently in real time and then process and share it quickly with specialists and vice ver-

[12] Ibidem.

[13] The application was first developed for the *Agora* excavations in Athens (http://agathe.gr/) and is now being used by many projects. Bruce Hartzler and Georgios Verigakis created this very significant tool for archaeologists and all related disciplines. For further info, see http://idig.tips/ and https://www.youtube.com/watch?v=gyBPYfEFE-k (downloaded 30-06-2024). Dimitris Baloukidis configured the application in MTAP and especially in relation to coins.

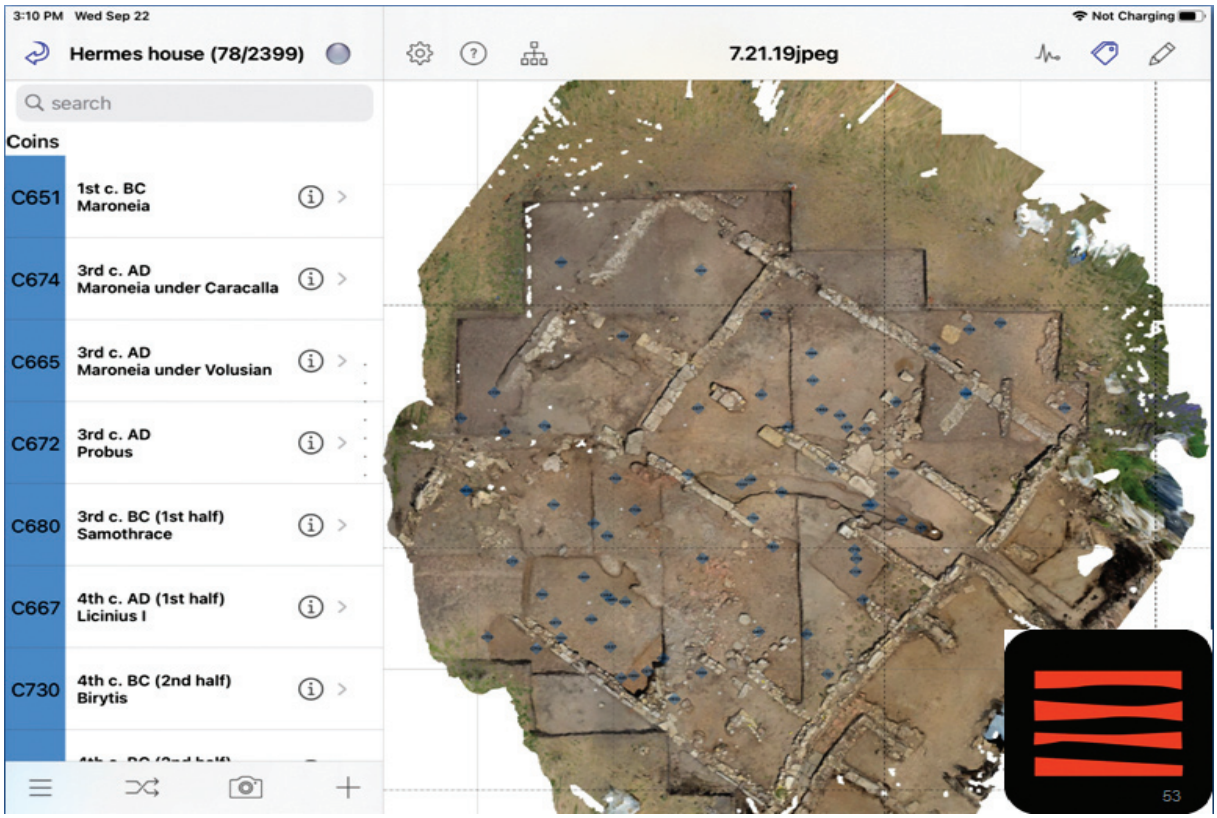

Figure 6. Coins registered with the IDig app.

sa. Each team member instantly records every artifact, architectural element, sketch, photograph, 3-D rendering, soil description. It communicates with aLaser rangefinder (in our case, a Leica Total Stations) in the field (**Fig. 5**). An excavator can see and track data from a number of useful perspectives: top plan, cross section, and spatial and temporal matrix layouts. 3-D Orthomosaics created through photogrammetry are updated at least once a week and form the base plan on which the data is mapped along with the help of the total station. Those project members work at the dig house, such as the registrar or the zooarchaeologist, work on their own iPads[14]. Every afternoon, all devices are synced. Thus, the zooarchaeologist, for example, has the most up-to-date contextual information, and the trench supervisor has the most up-to-date readings of the bones from his or her contexts.

Regarding coins, relevant information was inputted in two stages both by the supervisor of the excavation and the numismatist. In the first stage, the supervisor enters an ID number, fabric, and co-ordinates (**Fig. 6**)[15]. At the same time, if the iconography is legible and furthermore identifiable, the numismatist can add the issuing authority, obverse/reverse description, and date. In the second stage, i.e. after conservation, which takes place either in tandem or just after the end of the excavation season, measurements (weight and diameter), details of description from a default list, references, and professional photographs of the artefact are added.

Careful data entries and continuous updates are necessary prerequisites for having the desired results in the initial stage of the study of the material. Thus, the numismatist and archaeologists have in a very short time the most important information related to each coin,

[14] The application is available for download via *iTunes*.
[15] First presentation of the use of IDig in the field and especially regarding coins was in the 9th Joint Meeting of the ECFN and Nomisma.org, Viminacium, 21-25 September 2021, Costolac, Serbia: 'Numismatic data related to the classical city Molyvoti and the IDig application' (https://fundmuenzen.org/2021/09/21/the-9th-joint-meeting-of-ecfn-and-nomisma-org-2021/ (visited 20.09.2024).

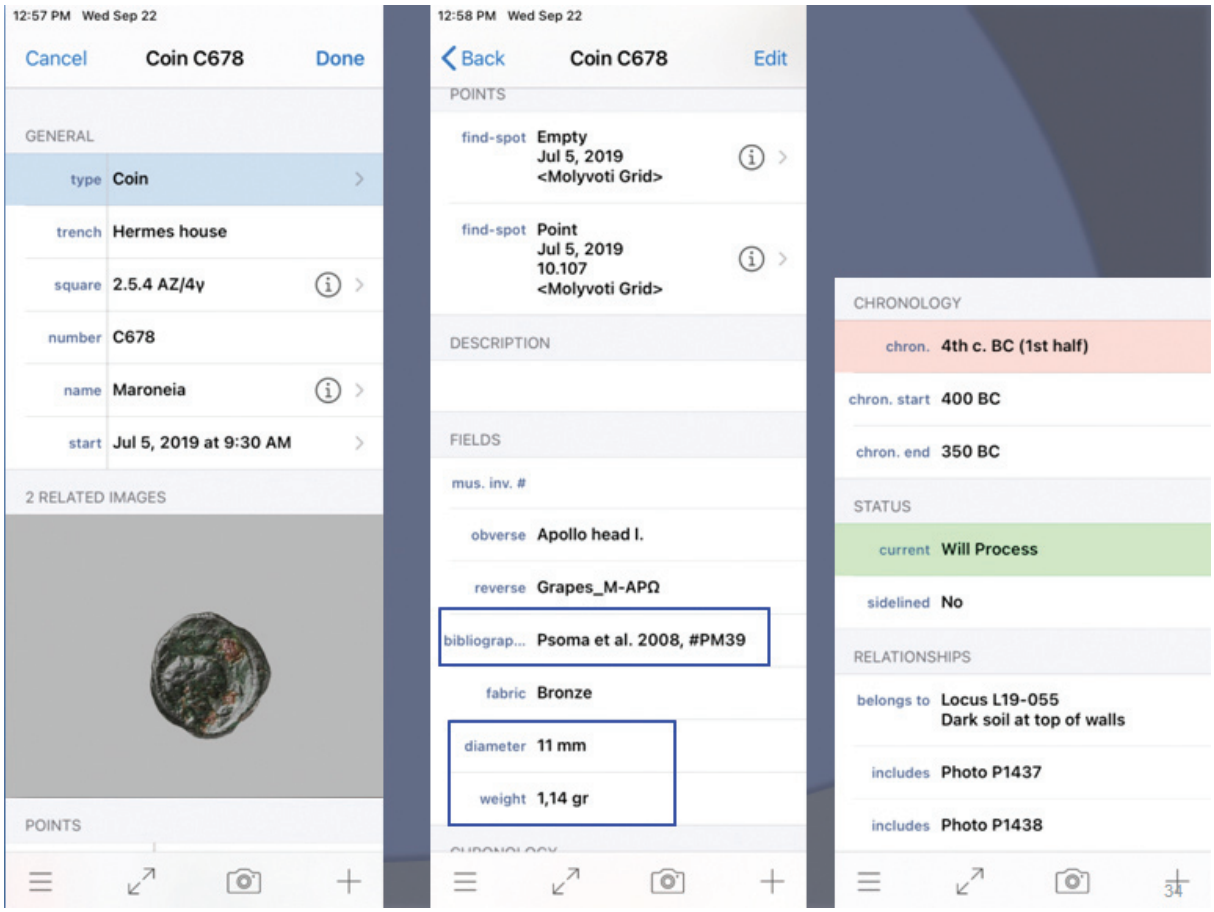

Figure 7. Info regarding coins added to the IDig app.

i.e. issuing authority, obverse / reverse, date and fabric (**Fig. 7**). These data in collaboration mainly with fine pottery and other special finds (like lamps, amphoras, loom weights etc.) provide a clear picture of a locus or of the area selected with a pencil area. For example, in the pastas of the house we have found 37 finds, 13 of which are coins (**Fig. 8 a-b**). In the *andron* we have 4 finds and only 1 coin (**Fig. 8 c-d**). Coins can be sorted by date, issuing authority or both. Specific coins also can be isolated by removing them from the screen. Unfortunately, for now this is the only way to isolate Roman coins for example. But by having an IT specialist on the project, the application is constantly being modified to fit the researchers' needs.

The iDig application facilitates the workflow and collaboration across the entire project during the field season. But it is less successful with the post-season study, as scholars working on the material after excavation has ended and they have returned to their respective institutions are not able to see one another's work and updated results, because they need to have access to the iPads. But those iPads cannot contain the data from an entire excavation (rather than one excavation square) and cannot be constantly syncing while people are no longer together. Consequently, we decided to create a new web application that accommodated the iDig data (**Fig. 9**)[16]. With the assistance of Dimitris Baloukidis, MTAP took the next step with this application, creating a web-based rather than iPad-based platform, which facilitates study outside of the field season. This web application also could complement our print publications, providing a more comprehensive presentation of the finds, and facilitating the exploration of

[16] For a more detailed presentation regarding programming and the language used in the Web Dig site of the site, see *Arrington et al.* forthcoming, which is going to be submitted to Hesperia. Here we only present the environment of site as a tool for material study and our future goals.

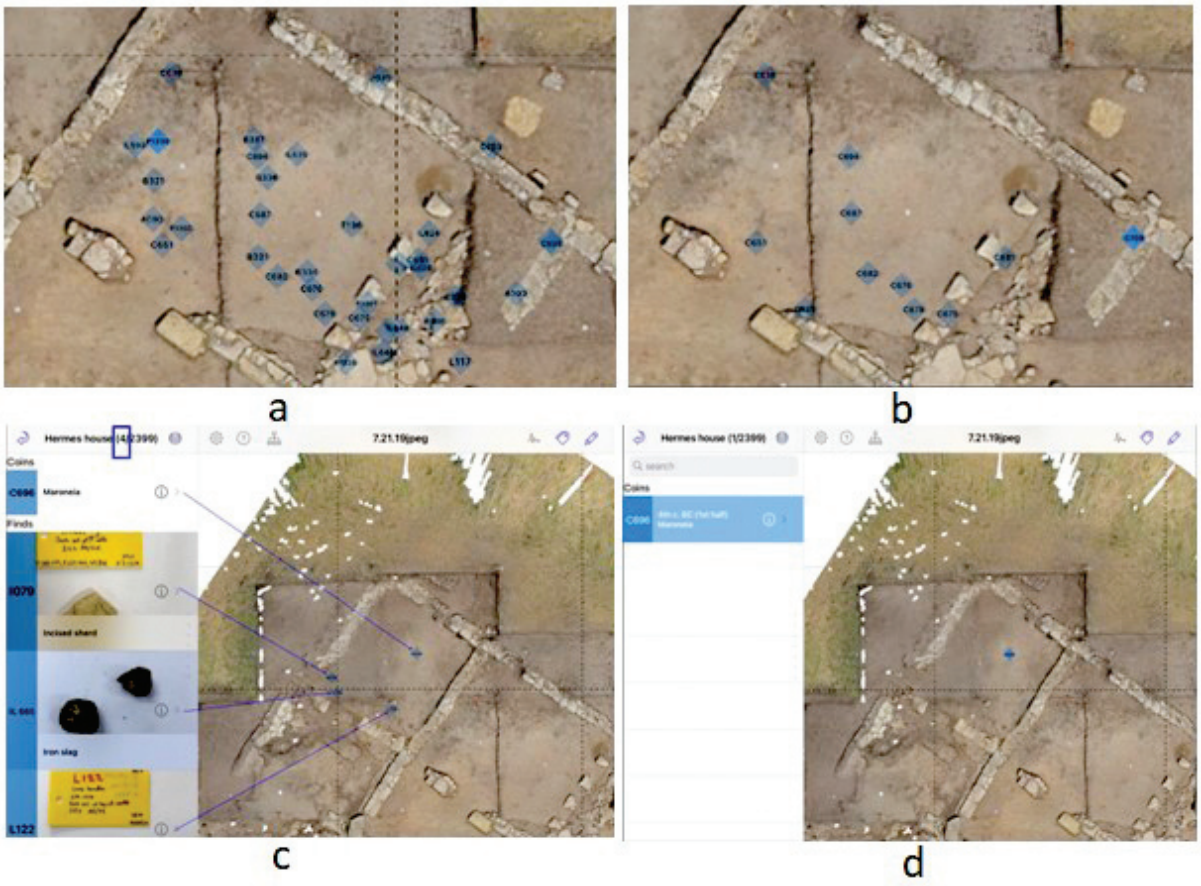

Figure 8a-8d. Findings at the Pastas vs coins, c-d: Findings at the Hadron vs coins.

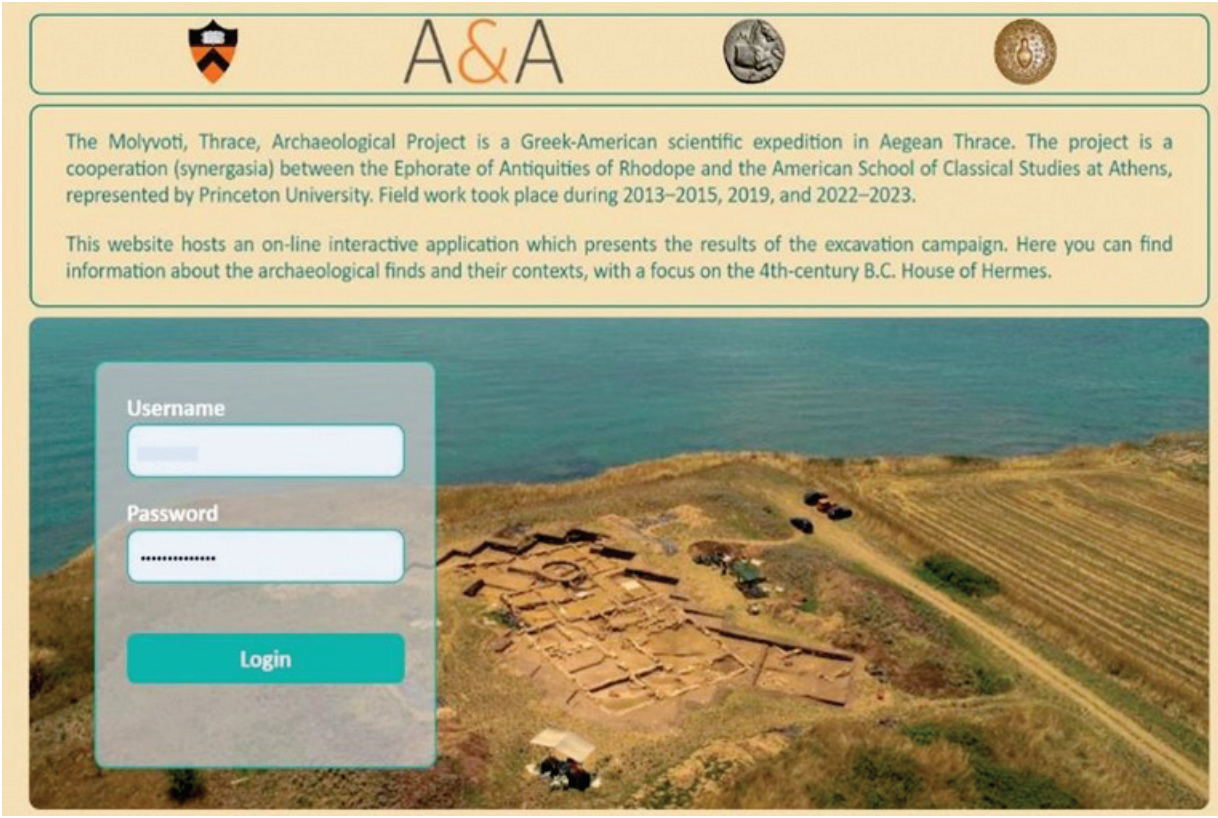

Figure 9. Web-app for the MTAP.

context. A reader of the book would be able to see complete contextual information for an artifact. rapidly on the web application.

The data recorded on iDig in and out of the field for the House of Hermes amounts to more than five thousand records, most of them containing information about artifacts. The database contains all the data acquired on site by the different iPads running the iDig application during the excavation campaign, which can be exported from the iPads and uploaded to the web application. It requires neither compilation nor installation, only copying the source code and data files to a web server. Instructions are provided by various videos, with an aim of making it available widely, to disseminate the findings and the results and encourage public interest in our findings.

The application presents, much like iDig, the archaeological finds, features, and contexts with the relevant descriptions, images, spatial information, and visualization on a site plan generated through photogrammetry. The users can use the application to navigate the site, search for data, focus on certain areas of study, view cross sections and dimensions of the excavation loci, and obtain citation links for each publicized item. It will be made available as open-source software, so that other interested parties are free to use it. Efforts were made to present the large number of photographs and data seamlessly, to ensure data integrity and consistency, to provide several opportunities for item selection and preview, and to keep the Graphical User Interface simple and eloquent.

As for coins (**Fig. 10**), all necessary information regarding Issuing authority, Region, obverse and reverse description and inscription, date, fabric, dimensions and bibliography are present. If someone clicks on the field locus, they can see the description and what other artifacts are related to it.

At this stage, the application is a work in progress and serves primarily to aid in the study. We anticipate modifications and improvements to the platform as we receive feedback from scholars, students, and the public.

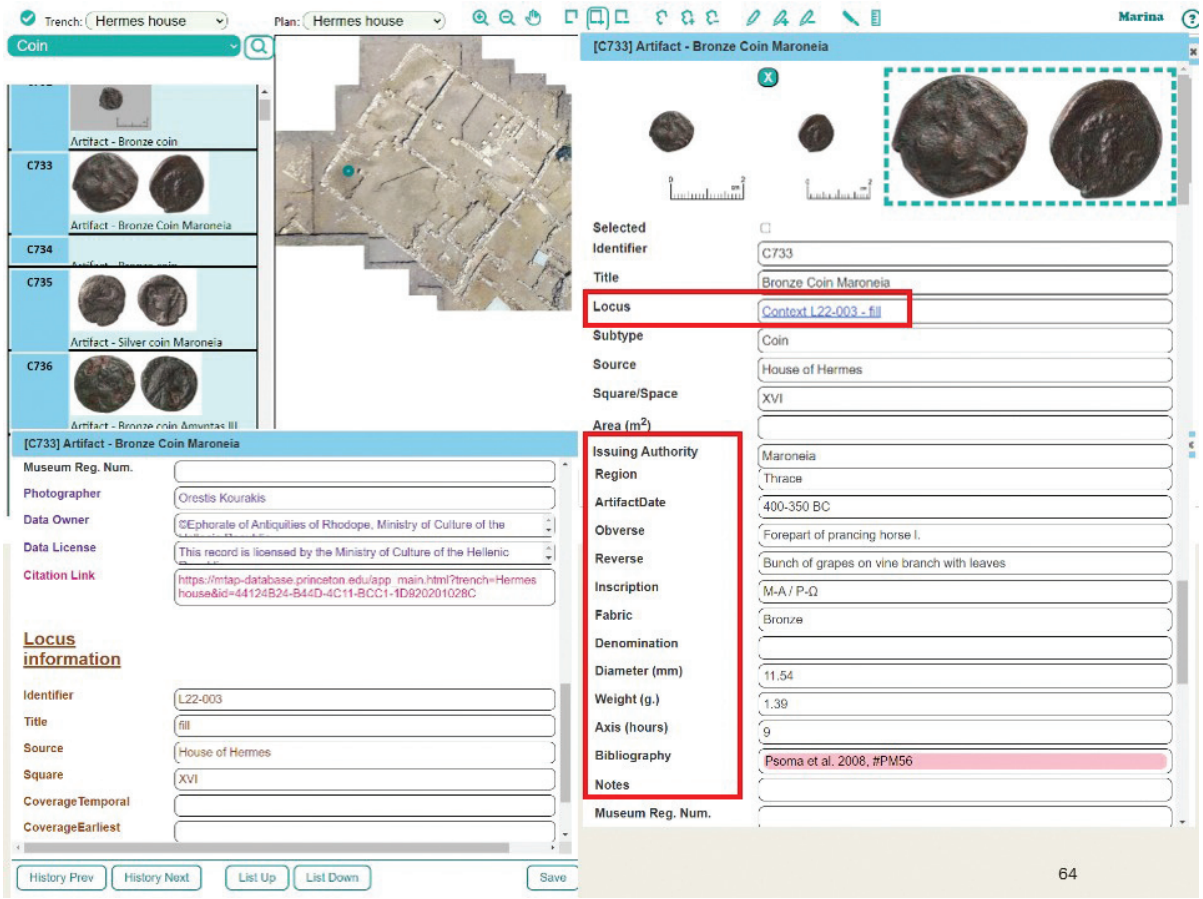

Figure 10. Info for Coins in the Web-app.

For the nearby future, it will work as a hybrid (print and digital) publication and presentation of the House of Hermes and the extra-urban temple site, which are separate "trenches" in the application. In addition, however, it should accompany the forthcoming publication on the House of the Gorgon by allowing readers of the book to obtain the complete list of findings from the house, rather than just the catalogued items. This online platform will enable convenient access to excavation findings and material publications, aiming to engage a wider audience with archaeological research.

Closing this paper, it is necessary to stress that we still dig dirt with trowels and pickaxes. In conclusion, while technology has undoubtedly enhanced the field of archaeology in numerous ways, the traditional practice of digging dirt with trowels remains an indispensable aspect of archaeological research. By combining modern technological tools -above the air, on the earth, under the earth - with traditional excavation methods, archaeologists can achieve a more comprehensive understanding of the past and continue to unravel the mysteries of ancient civilizations.

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Дигитални разкопки на Археологически проект Моливоти, Тракия: IDig и ново уеб приложение

Марина Тасаклаки, Нейтън Арингтън

В рамките на Археологически проект Моливоти, Тракия (MTAP), експерти анализират керамика и нумизматични данни, а също фаунистични и органични останки, открити при теренните проучвания и целенасочени разкопки. Този интердисциплинарен подход позволява цялостно разбиране на историята на града и взаимодействията с по-широката обществена динамика. За систематично записване на всички археологически данни и с цел намаляване на времето за проучване, приложения като iDig са внедрени на място. Освен това са положени усилия за подобряване на публичната достъпност чрез разработването на приложението web-MTAP. Тази онлайн платформа дава възможност за удобен достъп до находки от разкопки и публикации на материали, с цел да ангажира по-широка аудитория с археологическите изследвания.

Measuring the Otherness: Non-Greeks among Greeks in Apollonia Pontica

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Abstract: *The epigraphical material from Apollonia Pontica provides a valuable opportunity to analyze the presence and acculturation of non-Greek individuals in the Milesian colony during the relatively early period of the 5th century BC. How do we measure the extent to which they are others? By scrutinizing and comparing the archaeological, epigraphic, and onomastic evidence about Greeks and non-Greeks in the colony with those of other cities in the Aegean area in the Classical Period, the paper provides a plausible reconstruction of the colonization process and the social structure of the town and also tries to define the methodological principles that should be applied in research of this kind.*

Keywords: Greek colonization, Miletos, Lydians, Carians, Thracians
Ключови думи: гръцка колонизация, Милет, лидийци, карийци, траки

From the 1880s till the recent professional excavations in Apollonia Pontica, a collection of close to five hundred epigraphically documented anthroponyms has been amassed. After excluding any Latin names since the Late Hellenistic Period onward, along with the Late Antique Christian evidence, the Greek names number 424, while the non-Greek anthroponyms are 16, eight from the Classical and eight from the Postclassical Period. (**Fig. 1**)

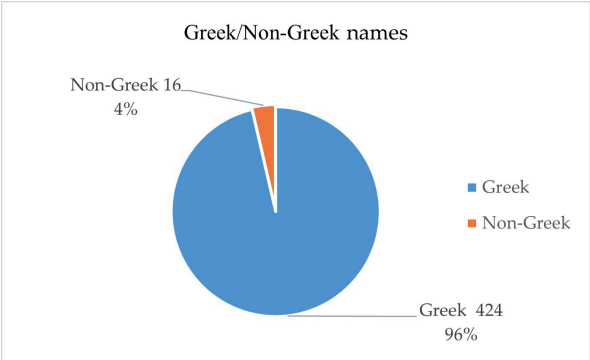

Figure 1. Greek and non-Greek names in Apollonia Pontica.

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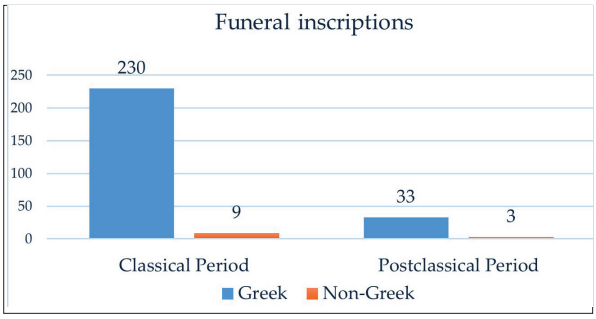

Figure 2. Greek and non-Greek names in Apollonia Pontica in the Classical and Postclassical Periods.

And since the Apollonian epigraphical evidence has been marked by numerous tombstones, particularly from the Archaic and Classical Periods, **Fig. 2** compares the funeral inscriptions with Greek and non-Greek names across two distinct time frames. It reveals that the Classical Period features eight names in nine of the 230 sepulchral monuments from that epoch. In contrast, the Postclassical Period, which spans from the mid-4th century BC to the first centuries AD, only yields 33 funeral inscriptions, with only three non-Greek names.

However, the Postclassical Period provides information about eight more individuals with non-Greek names mentioned in dedications, construction inscriptions, and a thiasus catalogue, which suggests their more active role in the public and religious life of the colony at that time. Most of them were of Thracian origin, as **Tab. 1** shows:

A quick comparison shows that non-Greek names in the 5th century were composed of a heterogeneous mix of ethnic groups. Predominantly, Anatolians were the primary ethnic group during this period. This is in contrast to the Hellenistic and Roman Periods, whereby the Thracian element was more prevalent among non-Greeks. However, it is essential to be cautious and to remember that these statistics are relative, as they depend on the preservation and discovery of finds. Besides, it is well known that only the wealthier ancient population is represented in epigraphic monuments.

After these preliminary notes and considering the nature of the Apollonian inscriptions, the paper will focus on the sepulchral inscriptions dating back to the Classical Period. These inscriptions form a reliable stock of anthroponymy, and my observations will specifically center on the non-Greek names contained within. The significance of these names lies in their early dating, which distinguishes them from the well-known immigration from Asia Minor to the Black Sea colonies in the Hellenistic and Roman Periods, as documented in the inscriptions.

The conventional perception of individuals with non-Greek names in antiquity as being non-Greeks is commonly held. However, a more conservative anthropological approach may challenge the credibility of such assertions. This method advocates for a more nuanced approach that considers a range of factors, including language, religion, cult, material culture,

Table 1. Non-Greeks in Apollonia Pontica in the Postclassical Period.

Name	Origin	Funerary	Construction	Thiasus	Dedication
Αυλουζενης	Thracian				IGBulg 402
Κότυς	Thracian	IGBulg 466	IGBulg 469bis		
Μητοκος	Thracian				IGBulg 400
Ξέρξης	Iranian	IGBulg 458			
Παπας	Micro Asian			IGBulg 401	
Ῥοιμητάλκης	Thracian				AMS 138
Ταρουλας	Thracian		IGBulg 469bis		IGBulg 400

dress, or everyday habits, as markers of otherness and a guarantee for its more intricate understanding.

Without underestimating these theoretical problems, I will nevertheless attempt to shed preliminary light on these eight non-Greek anthroponyms in the colony from the Classical Period by adhering to the notion that *faute de mieux*, it would be good to extract some information from the anthroponymy as well. In considering the interaction between Greeks and non-Greeks, it is important to recognize that such contact was mutual and must be viewed in the context of cultural exchange, which was a significant aspect of their historical relationships[1].

The Corpus has been excerpted from previous publications and the documentation of the forthcoming Corpus of Apollonian inscriptions, which Nikolay Sharankov is preparing in collaboration with Dilyana Boteva and me (**Tab. 2**).

Table 2. Non-Greeks in Apollonia Pontica (5th century BC).

Name	Origin	Number	
1. Ἄδα	Carian	1	*IGBulg* 415
2. Κανδασίς (hapax)	Carian	1	AMS[1]-89
3. Δᾶος	Phrygian	3	AMS-183 (*Giuzelev* 2002, 18), AMS-82, AMS-202 (*Giuzelev* 2002, 25);
4. Γαγις (hapax)	Phrygian	1	AMS-183
5. Λυδός	Lydian	1	*IGBulg* 432
6. Παιβινη (hapax)	Thracian	1	*IGBulg* 430
7. Βαστακιλης	Thracian	1	*IGBulg* 440
8. Κερζεας (hapax)	Thracian	1	Sz[2]-7 (*Giuzelev* 2002, 20)

Eight names under consideration are attested in nine out of 230 tomb inscriptions from the Classical Period. They comprise two Carian, two Phrygian, one Lydian, and three Thracian anthroponyms. In comparison, classical Athens has yielded ten funeral inscriptions for Carians, fourteen for Phrygians, five for Lydians, and twenty-five for Thracians[4]. Considering the difference in the scale of settlements, one can conclude that the number of non-Greeks in Apollonian sepulchral epigraphy was not as small as it appears at first glance[5].

Figure 3. Delineations of the inscriptions with non-Greek names.

[1] Cf. *Brun* 2022: 175-177.
[2] AMS (meaning *Archaeological Museum of Sozopol*) is a preliminary working indexation of the inscriptions in the local museum.
[3] Sz (meaning *Sozopol*) is a preliminary working indexation of the inscriptions localized in the town.
[4] *Bäbler* 1998.
[5] While insightful, the study conducted by Bäbler on the analysis of 146 tombstones in Athens during the 5th – 4th

Let's look at the delineations of the nine inscriptions in question (**Fig. 3**)[6]. We may notice several features of the lettering, which date the monuments to the first half of the 5th century instead of its end and the beginning of the 4th century BC, as is generally accepted[7]. The short hasta of nu, the stretched mu and sigma, and the transferring of the name to the right end of the following line of the patronym Βασστακιλ-εω (**Fig. 4**), all point to this earlier date range.

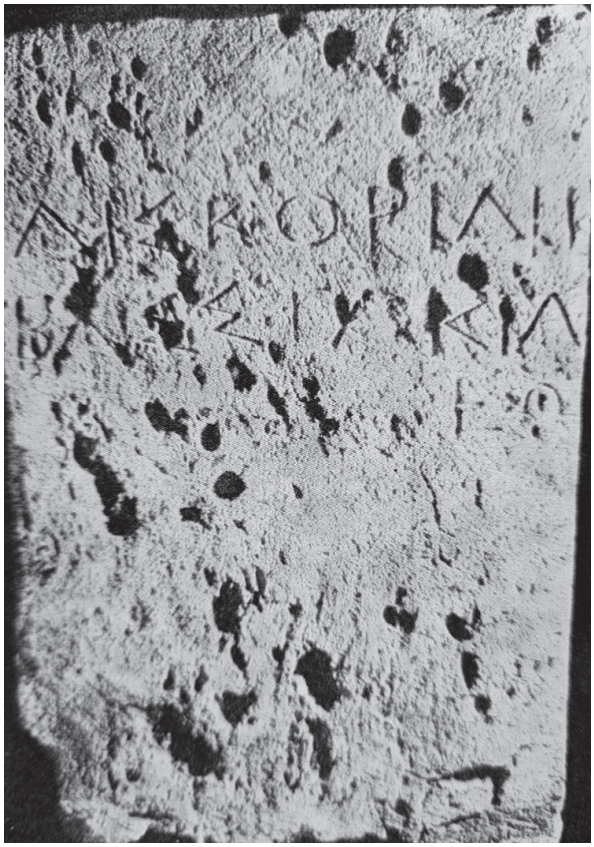

Figure 4. Δισκορίδη | Βαστακιλ|εω (IGBulg 440).

Therefore, it turns out that five Apollonian tombstones contain the earliest lapidary attestations of Ἄδα, Δᾶος, Λυδός, and Βαστακιλης, while the other yield four hapaxes: Κανδασίς, Γαγιης, Παιβινη, and Κερζεας. Given the date of the colony's establishment and the relatively short average lifespan during antiquity, it is reasonable to infer that the deceased individuals in question were fourth or fifth-generation colonists, while their fathers would have belonged to a generation one step younger. This information may be significant in understanding the colony's demographics and history.

All eight names can be classified into two groups based on their origin – Anatolian (Carian, Lydian, and Phrygian) and Thracian, linked to how their bearers infiltrated Apollonia.

In front of the map, and based on the previous research, we should clarify the geographical aspects of Anatolian immigrants' origins. While Miletos was in Caria proper, and it is reasonable to postulate that Carians probably arrived here already with the Miletos colonists because of their early dating and the proximity of their homeland to the metropolis, Phrygia was an inland territory and would have had to rely on Lydia, situated north of the Meander Valley, to access the eastern Ionian cities. Consequently, Lydian and Phrygian bronze, gold, and ceramic artifacts have been discovered in Ephesus and Smyrna rather than Miletos[8]. Although Miletos was a starting point for the streaming migrants' departure, we should consider other potential contact possibilities. The Propontis and the territory of Troas, Mysia, and the Southern Black Sea colonies could have served as intermediaries, enabling numerous 'inland' Anatolians to reach colonies on the western Black Sea coast[9].

Of these Anatolian migrants, only Δᾶος Γαγιω bears two non-Greek names, both personal and paternal, which may suggest non-Greek origin of his both parents. At the same

centuries does not provide a comprehensive inventory of the epigraphic presence of non-Greek foreigners, enslaved or otherwise. Other sources, such as the Attic stelae that contain records of the sale of property confiscated after the scandal with the Herms in 415 BC, the naval lists, the Erechtheum building records, and the inscriptions of the Laurean slaves, are crucial to obtaining a more accurate picture of the epigraphical footprints of non-Greeks in classical Athens. According to David Lewis (*Lewis* 2011), a detailed analysis of these sources is required in order to determine the degree of non-Greek foreign presence in classical Athens.

[6] Five of them were made by Dr Nikolay Sharankov, and I am thankful for his permission to use them.

[7] *LGPN* dates the funerary inscriptions for Lydos to the 5th, Ada to the 5th – 4th century BC, and Daos and Bastakiles to the 4th century BC.

[8] *Kerschner* 2005: 121-141.

[9] The presence of Phrygians in the Hellespont Phrygia in the 6th – 4th centuries BC has been proved by the old Phrygian inscriptions found in Dascyleion (*Ehrhardt* 2005: 96-97). This is the reason for Olivier Masson calling Daos a name 'en Mysie et en Bithynie' but 'peut-être proche de phrygien' (*Masson* 1995: 327).

time, the Carians Ἄδα and Κανδασίς demonstrate a more explicit commitment to the Greek milieu since one was the wife of a man with the Greek name, probably Ἡφαιστίων or Ἥφαίστιος. The other was the daughter of one, Μενέφρων, and was most likely the offspring of a mixed marriage between a Carian woman and a Greek. Other three deceased with Greek given names have Anatolian patronymics from the Phrygian name Δᾶος (Ἀρτεμίδωρος Δάο and Διοσκορίδης Δάο), and from the Lydian name Λυδός (Ἀπατόριος Λυδῦ).

This hybrid nomenclature proves the successive stages of assimilation among the initially ethnically diverse colonizers who hailed from the metropolis's surrounding territories. Moreover, it could also be inferred that the wave of Ionian colonizers comprised mixed families of Greeks and non-Greeks from the beginning of the colony's establishment.

The Thracian names outline the other group of non-Greek migrants in Apollonia. The ideonyms of them were only female if we, contrary to Louis Robert, assume that Δισκορίδη is a feminine name and not the mistaken masculine name Διοσκορίδης. They include Παιβινη, who was mentioned only by her ideonym, and Φανίχη Κερζεατος[10] and Δισκορίδη Βασστακιλεω, who were most likely daughters born of mixed marriages between non-Greek Thracian fathers and Greek women. Κερζεας and Βασστακιλης could not but have been free people, given their ability to enter into marriages with Greek women (I think that it was less likely an entire Thracian family to enter Apollonia during this early period and to give their child a Greek name). It is probable that these Thracian fathers were either craftsmen, small merchants or wage laborers who had the opportunity to contact the colony's population.

However, their lesser familiarity with the Greek language, as compared to the Anatolians, could be suggested, as is evident in the monument to Bastakiles' daughter, Δισκορίδη. Her name recording bears traces of barbarism; I mean the syncope of /o/, the doubled <Σ>, and the uncommon and hapax female counterpart of the masculine Διοσκουρίδης simultaneously with the parallel to the Thracian element Δισκ(ο)-, for instance, in the toponym Diskodouraterae.

I am excluding from this 'Thracian' group the patronymic Ἀψίνθιος, which is present in two inscriptions from the same period[11], although in a recent dissertation presented at the University of California, Riverside, Geff Chu cautiously associates this patronym with the Thracian tribe Apsinthii[12]. Based on the features of the two monuments and their lettering, I am inclined to see here a Greek name that can be traced back to the city of Apsinthus, located on the Aegean coast. Together with Peter Fraser, we can assume that the two attestations of Apsinthios represent an individual relationship at some time, past or present, between the family or family members and this foreign city[13]. Thus, I am inclined to accept that we are confronted here rather with a fictitious non-Greekness.

As for Paibine, her name tops a list of three deceased noted by only ideonyms without a patronym, suggesting they were slaves. However, Jeff Chu has already proposed the hypothesis of a deceased family[14] – a mother and her siblings or a girl and her parents[15]. It is worth noticing that the three names were engraved simultaneously with the same lettering and ductus. As Chu reasonably states, there could be different interpretations and analogies with Attic stelae containing only one name of more than one deceased, which, in contrast, provided more specification through the visual information of the relief.

In Apollonia, there are three more monuments containing only one ideonym of one deceased, such as Κόμων, Καλλίας, and Φαίδων, which could be placed in a peribolos, which *a priori* defined whose family or property they

[10] *Detschew* 1976, s.v. Καρζας, Κερζα.
[11] *IGBulg* 426 and AMS 27.
[12] *Chu* 2022: 70-71.
[13] *Fraser* 2000: 153.
[14] Indeed, Mihailov has already proposed it in the Index of the *IGBulg* I², s.v. Ἑρμαῖος by defining Αὔγη and Παιβινη as his *cognatae*.
[15] *Chu* 2022: 71-73.

were. Paibine's monument differs in the number of deceased persons and the presence of a non-Greek anthroponym. As the monument's character is essential for the social status of the Thracian Paibine in Apollonia, considerations connected with the other two names that do not match the Apollonian anthroponymy could be added. The name of Auge in Apollonia is the earliest attested one. Otherwise known from the Rogozen treasure[16], it does not occur in the Classical Period in Thrace, on the Black Sea coast, or in the Milesian colonies. It is instead associated with Mysia in Asia Minor and the mythological tradition of the local princess Auge, Hercules, and their son Telephus. In later centuries, an Auge in a manumission inscription in Delphi, although from the 1st century AD[17], could support the suggestion that female slaves from Mysia could be named Auge. For instance, another Auge is the third deceased woman with one name in a sepulchral inscription from Athens from the Imperial epoch ([Π]ῶλλα / Ὀκταΐα / Αὔγη)[18]. As for the Hermaios, which, in contrast, has many attestations already from the 7th – 6th centuries BC[19], the neighbor Mesambria Pontica provides a parallel of a dedicator with one name Ἑρμαῖος, obviously a slave, who together with E]ὐέλ[πισ] | [τος], Ἀπολλ[ώνις], [A]θυς, and Λυδό[ς] made a dedication to Sarapis, Isis, Anubis, and Aphrodite in the 3rd – 2nd century BC[20]. Thus, the possibility of several slaves of a family being buried together in its cemetery plot should not be excluded. Apart from Paibine, the other ideonyms in the monument are Greek, which is not uncommon in the naming of slaves of Asia Minor.

Regardless of which hypothesis we adhere to – that of a family with a mixed marriage between a Thracian woman and a Greek or that of a mixed group of slaves with a Thracian member – the process of infiltration of the local Thracians into the colony has been proven since the Classical Period. It can be observed that, in terms of their material composition, the monuments in question consist of limestone blocks arranged with a similar text pattern, rendering them indistinguishable from other Greek tombstones. The sole exception is Discoride's inscription, which is clumsy. This observation suggests that Thracian inhabitants conformed, although to a varying degree compared to the Anatolians, to the customary Greek epigraphic practices for commemorating and paying homage to their deceased in the Greek language.

Of the Anatolians in Apollonia, I will first discuss the Carians. This decision is mainly motivated by the fact that the metropolis of Apollonia, Miletos, which had existed since the Late Bronze Age as Mīllawānda (the Hittite name of the city) and was colonized by the Ionians, was situated in Caria. Entirely subjugated by Lydians in the 7th century, Caria became subject to Persian rule after Croesus' downfall (546 BC) till the beginning of the 4th century BC when it underwent a strong Hellenization thanks to the rule of the Hekatomnid dynasty. Subsequently, Caria ceased to exist as an autonomous state within the framework of Alexander's empire.

In Apollonia, there were two Carian women named Ada and Kandasis, of which the latter is a hapax[21].

Carians were not at all an exotic ethnos to the Ionians in Miletos[22]. Since the Ionian polis was located among settlements of the Carian population in Asia Minor, Ionians and Carians lived in an active symbiosis[23]. On the one hand,

[16] *SEG* 37: 618, 2.
[17] *FD* III 6: 58.
[18] *IG* III 10906.
[19] *LGPN* s.v.
[20] *IGBulg* 322 ter.
[21] Notably, *Kandasis* features the cluster /nd/, for which a special grapheme no. 31 with the corresponding phonetic value has been postulated (*Adiego* 2007a: 760, Fig. 67 and *Adiego* 2007: 246-247).
[22] There has been a huge amount of scholarship on contact between Carians and Greeks, including from conferences specifically devoted to the subject in Berlin in 2005 (*Rumschied* 2009) and in Oxford in 2006 (*van Bremen, Carbon* 2010). Special thematic volumes have also been dedicated to the topic, such as *Brun* 2007; *Lenfant* 2022; *Cohen* 2000; *Biering et al.* 2006.
[23] *Robert* 1973: 441, note 33. An extensive overview of the cultural exchange between Greeks and Carians was made by Alexander Herda in his study *Greek (and our) View on the Karians* (*Herda* 2013).

the Carians were a mobile ethnic group and energetic seafarers. Their ships reached the Black Sea through the Bosphorus and the remote western coast of Africa through the Pillars of Hercules (Καρικὸν τεῖχος Hanno, *Peripl*. 5). In his *Periplus* of the Black Sea, Arrian mentions a port of Carians (Καρῶν λιμήν) and the land around it, named Καρία, which were located 180 stadia southern from Kallatis (approximately 32 km), probably at Shabla (Arr. *Peripl*. 24.1–3). Carians were also prominent as mercenaries in the seventh and sixth centuries in the pay of the Pharaoh Psammetichus I (664–610 BC) and his successors. There was a large contingent of Carian mercenaries in Egypt together with Ionians, as epigraphic evidence testifies, since nearly 200 inscriptions in the Carian language, funeral stelae and graffiti, have been found so far[24]. Herodotus (Hdt. 1.171.4) narrates how many military innovations, adopted by the Greeks, were made by the Carians, including crests on their helmets, devices on their shields, and grips for the shields[25] not to mention how many other things were called Carian[26]. This inventor "tradition" may be not historical, but nor is it myth. Rather it is a rationalization, more or less speculative, of evidence based on historical facts[27].

Moreover, Carians were almost bilingual, and Strabo explains that Homer called them *barbarophonoi* (Νάστης αὖ Καρῶν ἡγήσατο βαρβαροφώνων, Hom. *Il*. 2.867), not because they speak a foreign language, but because they do not pronounce Greek well (Str. 14.2.28).

For the Greek-Carian symbiosis, or ἐπιπλοκή to use Strabo's words, advocate the famous Herodotean lines about mixed marriages in Miletos between Ionian men and Carian women (Hdt. 1.146.2). He himself was a Carian offspring born in Halicarnassus by a Carian father named Λυξης[28] together with the born in Miletos Thales, whose father also has a Carian name, Ἐξαμυης[29].

In the metropolis of Miletos itself[30], six Carians are attested in epigraphic monuments dating back to the 6th – 5th centuries BC. Four of these men, namely Λιατος Βρέμμιος (*Milet* I.3, 122, l. 3, 524–523 BC), Λιατος Ἑκαταίου (*Milet* I.3, 122, l. 106; 421–420 BC), Μασσαραβις (*Milet* I.3, 122, l. 65; 462–461 BC), and Τιαιμος (*Milet* I. 3, 122, l. 84; 440–439 BC), were even eponymous stephanephoroi, the annual magistrates of Miletos, which suggests their high status. Additionally, a Carian named Ἀνδροσσως from Halicarnassus (*Milet* VI.2, 407; 5th century BC) was buried in Miletos, while Υλιαμις Μανδρώνακτος, another Carian, dedicated a bronze omphalos bowl to Ἀφροδίτη Οἰκοῦς at her extramural sanctuary at Zeytintepe in the 6th century[31]. A graffito written in the Carian alphabet was also discovered on a fragment of a bowl in the Heroon III in Miletos in 2003, further attesting to the coexistence of Carians and Ionians in the polis and of the permeable boundaries of their religion and culture (*Herda*, *Sauter* 2009).

Epigraphical evidence of Ada from the

[24] *Adiego* 2007: 30.
[25] Καί σφι τριξὰ ἐξευρήματα ἐγένετο τοῖσι οἱ Ἕλληνες ἐχρήσαντο· καὶ γὰρ ἐπὶ τὰ κράνεα λόφους ἐπιδέεσθαι Κᾶρές εἰσι οἱ καταδέξαντες καὶ ἐπὶ τὰς ἀσπίδας τὰ σημήια ποιέεσθαι, καὶ ὄχανα ἀσπίσι οὗτοί εἰσι οἱ ποιησάμενοι πρῶτοι· τέως δὲ ἄνευ ὀχάνων ἐφόρεον τὰς ἀσπίδας πάντες ὅσοιπερ ἐώθεσαν ἀσπίσι χρᾶσθαι, τελαμῶσι σκυτίνοισι οἰηκίζοντες, περὶ τοῖσι αὐχέσι τε καὶ τοῖσι ἀριστεροῖσι ὤμοισι περικειμένοισι.
[26] Except for the innovations mentioned by Herodotus and widely recognized in the Greek world (cf. Alcaeus'verse λόφον τεσείων Καρικόν (Alc. *Frg*. 388, Lobel-Page) and Anacreon's διὰ δηὖτε Καρικουργέος ὀχάνου χεῖρα †τιθέμενοι† (Anacr. *Frg*. 56, Page), many other things were defined Carian: Κ. ἔλαιον a kind of salve, Καρικὴ μοῦσα funeral song, Καρικόν, τό, Carian quarter in Memphis (LSJ, s.v.); Καρικοὶ τράγοι· ὡς εὐτελῶν ὄντων (Hsch. 820), Καρικόν· εὐτελές, μικρόν. δηλοῖ δὲ καὶ ἀφροδίσιον σχῆμα αἰσχρόν (Hsch. 818); Καρικὸν θῦμα· ἐπὶ τῶν ἄσαρκα μέλη θυόντων. οἱ γὰρ Κᾶρες κύνας ἱερουργοῦσι (Plut. *De proverbiis Alexandrinorum* 73); Καρικαὶ κύνες (Arr. *Cyn*.3.6); θρηνῶδες δὲ Καρικὸν αὔλημα (Poll. 4.75); Καρικὸν γραμματεῖον· τὸ πινακίδιον, οὗ τὸ πτύχιον κεκοίλωται πρὸς χρυσῶν στατήρων ἀπόθεσιν (*Lex. Segu*.); Καρικὸν φάρμακον (Hp. *Ulc.* 16).
[27] *Snodgrass* 1964: 118.
[28] *Blümel* 1992: 25.
[29] *Blümel* 1992: 16.
[30] About the Carians in Miletos generally, see *Ehrhardt* 2006.
[31] *Ehrhardt* 2013: 123; *SEG* 64, 1107. Eleven other Carians from Miletos, including Ada, were also recorded in the following centuries (see *Blümel* 1992 and *Günther* 2017 s.v.).
[32] For epigraphical evidence of Ada in Caria itself, see the updated version of *Blümel* 1992: 9.

5th century outside Asia Minor[32] features only one other Ada in the Milesian colony of Sinope (*IK Sinope* 9) who, not surprisingly, was not a slave as well since her funeral memory reads Ἄδα Ἐπιχάρεος. From the other 31 attestations dating back till the 3rd century AD, which *LGPN* lists, eleven women named Ada were documented in the subsequent 4th century: two free women, namely the wife of the Milesian Lamynthios in Attica[33] and Ada, daughter of Bostas, in Zone[34], and a freedwoman from Mesambria Pontica[35]. Additionally, six slaves are recorded in Attica[36], alongside two dedications from the royal family of Ada and Idrieus in Delphi[37] and in Tegea[38]. The famous queen Ada of this philhellene dynasty was the sister of Mausolus and wife of his other brother Idrieus. She even adopted Alexander the Great in 334 BC, entertained him with sweets, and was restored by him as queen of Caria instead of her brother Pixodarus (Arr. *Anab.* 1.23.7-8; Plut. *Al.* 22.7-10).

From these records, it is apparent that the prejudiced opinion of Ada Carian women as slaves and only slaves should be corrected by a more flexible and unbiased notion that women with the name Ada could be slaves, free inhabitants in a Greek city, and even queens.

On the basis of the above observations, we may postulate an infusion of Carian families or individuals into the stream of colonists heading for the western shores of the Black Sea and the presence of a Carian element that arrived already with the first generation of colonists in Apollonia. The first generation of free Carians seeking better livelihood opportunities in a Greek colony in a foreign land is expected to have lower social status. They could be artisans, wage workers, or those earning a living who could still afford to provide funds for a decent funeral monument, priced from twenty drachms up for the sophisticated stelae in Athens[39], which could be lesser for a colony of the remote ends of the Greek world such as Apollonia Pontica.

It is challenging to give more details about the social status of these two Carian women in Apollonia, Ada and Kandasis, except that they were not slaves. Unfortunately, we only have their anthroponyms. According to Stephanus of Byzantium (St. Byz. 10.54), Kandasis should be a derivative of the name of the city of Kandasa in Caria (Polyb.16.40.5). Ada, from her side, is a trendy Carian *Lallname*[40], which became dynastic due to the female members of the Hekatomnid dynasty later in the 4th century.

As for the Phrygian anthroponym Daos, of which we have three attestations in Apollonia, it was one of the highly beloved slave personages in eight of Menander's comedies: *Dyscolus, Epitrepontes, Aspis, Perikeiromene, Heros, Georgos, Kolax,* and *Perinthia*[41]. Contrary to the erroneous opinion suggested by Strabo that Δᾶοι is the old name of Δακοί (Str. 7.3.12)[42], Δᾶος is the name not of the Dacian but of the Phrygian slaves in the New Comedy. Hesychius, s.v. attests to the meaning of the Phrygian appellative δάος as a wolf (ὑπὸ Φρυγῶν λύκος). A late Greek inscription from Akmonia region in Phrygia dating back to AD 314 and reported by Ramsey in 1883[43] mentions a local syncretic god Μάνης Δᾶος Ἡλιοδρόμος Ζεύς

[33] *IG* II² 9738.
[34] *I. Aeg. Thrace* E411.
[35] *IGBulg* 334 (9).
[36] *IG* II² 8554, 10573, 10574, 10575, 10575a; *SEG* 32:312.
[37] *FD* III 4:176.
[38] *IG* V.2, 89.
[39] *Bäbler* 1998: 59.
[40] *Blümel 1992:* 9; *Zgusta 1964:* 46-47*; Adiego* 2007: 340.
[41] *Lewis* 2011: 101-102.
[42] Γέγονε δὲ καὶ ἄλλος τῆς χώρας μερισμὸς συμμένων ἐκ παλαιοῦ· τοὺς μὲν γὰρ Δακοὺς προσαγορεύουσι τοὺς δὲ Γέτας, Γέτας μὲν τοὺς πρὸς τὸν Πόντον κεκλιμένους καὶ πρὸς τὴν ἕω, Δακοὺς δὲ τοὺς εἰς τἀναντία πρὸς τὴν Γερμανίαν καὶ τὰς τοῦ Ἴστρου πηγάς, οὓς οἶμαι Δάους καλεῖσθαι τὸ παλαιόν· ἀφ' οὗ καὶ παρὰ τοῖς Ἀττικοῖς ἐπεπόλασε τὰ τῶν οἰκετῶν ὀνόματα Γέται καὶ Δᾶοι.
[43] *Ramsey* 1883: 419-420; *MAMA* VI 148,152.
[44] *Masson* 1995: 327.

whom Olivier Masson calls 'une curieuse figure divine'[44]. Without delving into the meaning of the appellative and its relation to a theonym, as Sittig did[45], we should note that the *LGPN* lists 18 occurrences of Δᾶος attested in the 5th – 4th centuries BC. Only three of them date from the 5th century BC, an amphorae maker from Heraclea Pontica[46] and two θεράποντες in the Athenian navy: Δᾶος Φάνο[47] and Δᾶος ἐν Ὦ--- (sc. οἰκῶν)[48]. While the former was a slave of someone, the latter is a metoikos as ὁ δεῖνα οἰκῶν ἔν τινι τόπῳ is the usual administrative formula of registration for metoikoi[49].

According to Xenophon's *On Revenues* (Xen. *Vect*. 2.3), the Phrygians, Lydians, and Syrians constituted a large part of the metoikoi in Athens. Indeed, from a survey of Greek epigraphic monuments of the 5th – 4th centuries it turns out that the ideonym Daos is not only a trademark name for a slave from Phrygia but also for free Phrygian migrants-metoikoi in the Greek world. Particularly revealing are the epigraphic texts representing the financial accounts of the authorities at the sanctuaries of Delphi and Eleusine. From both sanctuaries, several Phrygian wage laborers are known. Two Phrygians left traces in the epigraphic stock of Eleusine as hired construction workers *IG* III 1672, 19 (= *I. Eleusis* 177) and *IG* III 1672, 25-26 (= *I. Eleusis* 177)[50].

The three men with this name (two patronyms and one ideonym) from Apollonia were not slaves and, like their compatriots in Heraclea, Athens, and Eleusine, were most likely small artisans or wage laborers.

Phrygia and Lydia existed as a kind of Hinterland for the Eastern Ionian cities from the 9th century BC till the Persians seized Sardis in the second half of the 6th century BC. The fame of the fabulous wealth of Midas and Croesus and their impressive gifts to Greek sanctuaries reflect the vital place that the elites of these kingdoms had in forming the high aristocratic culture of Hellas in the Archaic Period. Their gold, luxury, scented ointments, purple dresses and shoes were the elements of the elitist culture of Ionia in the 7th–6th centuries BC[51]. In the Greek literature after the Greek-Persian wars, however, the decadence of the East Ionians became proverbial, and both Phrygians and Lydians were depicted unfavorably[52]. The Phrygians were often portrayed as cowardly, while the Lydians were perceived as soft and effeminate[53]. However, as documented in epigraphical records, the Greeks did not renounce their labor and migrant laborers from these lands were in demand as hired workers in ancient Greek city-states. These individuals, irrespective of their occupation, including amphora or brick makers, carriers or construction workers, earned their livelihoods within the Greek polis. Most likely *metoikoi* with no political rights and excluded from the tribal organization of the political community of the *apoikia*, they were often relegated to menial jobs and were subjected to additional taxes. Despite these challenges, some were able, as we know, to accumulate wealth over time. The family of Ἀπατόριος | Λυδδ[54], for instance, to return to Apollonia Pontica, could afford a decent sepulchral monument for their deceased. Named with the typical Ionian ideonym connected with the Ionian-Attic religious feast *Apatouria*, the heir of Lydos was most likely the offspring of a mixed marriage as the name of his father implies Lydian origin. Despite his ethnic name, the father Lydos was not a slave, as such a practice of calling free

[45] *Sittig* 1911: 158-159.
[46] *IK Heraclea Pont*., p. 132.
[47] *IG* I^3 1032, 234.
[48] *IG* I^3 1032, 440.
[49] *Bäbler* 1998: 48, note 221.
[50] *IG* III 1672, 19 (= *I. Eleusis* 177): *To Daos, hired to clean the bondages of the retaining walls, who lives in the deme of Kydantides: 115 drachms*; *IG* III 1672, 25-26 (= *I. Eleusis* 177): *From Daos, who lives in Eleusine, 5000 bricks for the entrance; Price and delivery of 1000 bricks – 38 drachms, in total: 190 drachms.*
[51] *Crielaard* 2009: 60-63. See, for instance, Sapph. *Frg*. 132 (Lobel-Page), Archil. *Frg*. 19 (West); Xenoph. *Frg*. 3 (West).
[52] *Crielaard* 2009: 63.
[53] *DeVries* 2000: 341-342; 357-358. For a more detailed survey of the relationships of Lydians and Phrygians with the Ionians and the Greeks, see *Ehrhardt* 2005 and *Kerschner* 2005.
[54] *IGBulg* 432.

people by ethnic names was attested in antiquity as Xenophon, for instance, testifies[55].

In conclusion: The epigraphic evidence indicates that in the 5th century BC, Apollonia Pontica had an albeit small but motley non-Greek population consisting of residents from Asia Minor, including Carians, Phrygians, and Lydians, as well as Thracians. These individuals, varying in ethnic background, social status, and level of Hellenization, gradually assimilated into the life of the new colony community. They honored the memory of their loved ones with the traditional Apollonian tombstones in Greek. To ensure an unbiased analysis and a meticulous, chronologically aware examination of this phenomenon, the study should consider the different methods of colony penetration during or after its founding and compare the epigraphic evidence from Miletos, its colonies, and other Greek cities. Additionally, ancient sources documenting interactions between Greeks and non-Greeks and the earlier acculturation of non-Greeks compared to the native Thracians should be considered.

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[55] In the fifth book of *Anabasis* (X. *An.* 5.2.29), Xenophon recounts the story of a mercenary soldier named Mysos, who hailed from Mysia and shared his name with the region (ἀνὴρ Μυσὸς καὶ τοὔνομα τοῦτο ἔχων). See also *Fraser* 2000: 153-154.

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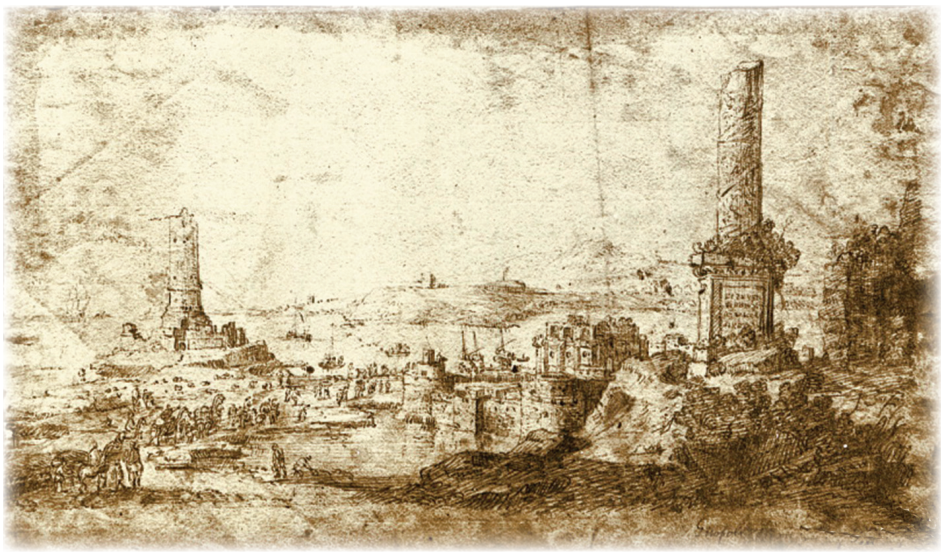
Измерения на другостта: не-гърци сред гърци в Аполония Понтика

Мирена Славова

Епиграфският материал от Аполония Понтика предлага ценна възможност да се анализира присъствието и акултурацията на негръцко население в милетската колония в един сравнително ранен период, V в. пр.Хр. Как да измерим степента, в която те са различни от гърците? Статията дава една вероятна реконструкция на процеса на колонизация и на социалната структура на града, като внимателно разглежда и сравнява археологическите, епиграфските и ономастичните свидетелства за гърци и не-гърци в колонията с тези на други градове през класическата епоха. Въз основа на това са направени изводи за съжителството и социалното положение на малоазийското и тракийското население в един гръцки полис и са очертани методологическите принципи, които могат да се използват при този тип изследвания.



Ethnē Thrakōn in Ancient Greek and Latin Authors – What's in a Name?

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Abstract: *Writing l'histoire des noms, et même l'histoire par les noms is, in the case of Thracian ethnonyms, a particularly complex procedure. After briefly commenting on some of the difficulties, the present communication focuses on two specific cases attested in both literary and epigraphic sources (Sapaioi, Coelaletae) and, by analyzing variations in the attested forms of these ethnonyms, tries to differentiate between variations that can be considered pertinent to the history of the tribes from variations that can be attributed solely to the literary tradition.*

Key words: Thracian ethnonyms, Sapaioi, Coelaletae
Ключови думи: тракийски етноними, сапеи, койлалети

At the end of an article devoted to the study of the relatively rare Greek personal name Εὔλαιος, published more than sixty years ago, Louis Robert formulated a sentence that was to acquire universal renown in the field of Onomastics: "we must not make catalogues of names, but the history of names, and even history through names"[1]. In 2000, in an article summing up his many years of research on the personal names of Macedonia, Miltiades Hatzopoulos suggested a reformulation of Louis Robert's phrase, aiming to redress the importance of catalogues and highlight the advantages of both approaches: "we must not only make catalogues of names, but the history of names, and even history through names"[2]. The

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[1] *Robert* 1962-1963: 529 [987]: "Nous devons faire non point des catalogues de noms, mais l'*histoire* des noms, et même l'*histoire par les noms*".

[2] *Hatzopoulos* 2000: 99: "Brilliant as it is, this programmatic declaration needs, in my opinion, slight emendation if it is to be realistic: "Nous ne devons point faire que des catalogues de noms, mais aussi l'histoire des noms, et même l'histoire par les noms". In fact, before writing the history of names and even more before writing history through names, we must go through the less exciting – some would say the more tedious – work of collecting them". Groundbreaking projects – like the *Lexicon of Greek Personal Names (LGPN)*, with its online

comments of both Louis Robert and Miltiades Hatzopoulos were, of course, formulated with Greek personal names in mind. In a culture characterized by a rich literary tradition and the extensive dissemination of the so-called "epigraphic habit", a name can occur in literary texts, in inscriptions of all kinds –whether of public or of private character, on stone or on any other medium–, on coins and also in papyri. More often than not, a name can occur more than once, sometimes even tens or hundreds of times. In the database of the *LGPN*, for example, the name Διονύσιος is catalogued 5.019 times; the name Ἀπολλώνιος 4.724[3]. Such a proliferation offers scope for a more systematic analysis of a name's original form(-s), its evolution into time, its geographical or chronological distribution. To transfer Louis Robert's approach from the world of Greek personal names to that of Thracian ethnonyms may seem, and probably is, overly optimistic. It is certainly beset by a series of complex, sometimes absolutely determining, methodological difficulties; only some of these will be mentioned here, in a very selective way.

Systematic efforts to collect and analyze ancient testimonies on Thracian ethnonyms date back to at least the 19th century AD. Counting their number, however, has yielded a range of different results, varying from approximately sixty to one hundred tribes, with eighty often being considered an acceptable average[4]. These numbers sharply deviate from the only surviving ancient testimony, that of Strabo, who, referring to the *ethnē* of the whole of Thrace, gives the very specific number 22[5]. His source remains unnamed. Some scholars suggest Theopompus, thus dating his testimony to the time of Philip II; others suggest Artemidorus of Ephesus or some other near contemporary author, thus dating it to the very beginning of the 1st century BC.

But difficulties do not end in counting. Since the overwhelming majority of Thracian ethnonyms have come down to us through the writings of ancient Greek and Latin authors primarily, two filters, at least, are to be taken into account.

The first concerns the author himself and/or his sources. Any foreign name – whether an ethnonym or any other name – will be adapted to the language of the text; and this adaptation may vary from author to author and from one period of time to another, leading to a number of different forms[6]. More importantly, an author might extent – whether intentionally or not, and for a variety of reasons– an ethnonym (=identity) to a less familiar or more distant group, the ethnonym more often used in this case being that of the Odrysians. Even a historian like Polybius – who had an impeccable education and was well-versed to the events of the Early Hellenistic Period– could label Dromichaetes King of the Odrysians (βασιλεὺς

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database and its nine, up to this day, published volumes– had, in the meantime, amply demonstrated the importance of catalogues and the mutually complementary character of both approaches.

[3] For Διονύσιος, see https://search.lgpn.ox.ac.uk/browse.html?field=names&sort=nymRef&query=Διονύσιος; for Ἀπολλώνιος, see https://search.lgpn.ox.ac.uk/browse.html?field=names&sort=nymRef&query=Απολλώνιος (accessed on 07.07.2024).

[4] In a study published in 1893 and covering a large area stretching from the Carpathians to northwestern Asia Minor, Wilhelm Tomaschek analyzed 63 *ethnē*, divided into three large groups, labelled "Paeonian-Dardanian", "Phrygian-Mysian" and "Thracian", with this last one further divided into two sub-groups, "Southern Thracian" and "Northern Thracian or Getic", see *Tomaschek* 1893; Brunhilde Lenk, in her still valuable entry on ancient Thrace for the *Realencyclopädie*, catalogued 53 *ethnē*, see *Lenk* 1936; Dimitar Detschew, whose book on the remains of the Thracian language was first published in 1957, assigned the terms "Stamm/Stammvolk", but also "Sonderstamm" or "Bruchteile von einem Stamm" to 123 entries, see *Detschew* 1976. Other scholars have opted for a chronological or geographical approach. Thus, in a book devoted to tribes attested during the Archaic and Classical periods only, Alexander Fol and Tosho Spirodonov counted 48 cases, see *Fol*, *Spiridonov*, 1983; in his book on the history of the tribes of south-western Thrace, Peter Delev analyzed 54 cases, see *Delev* 2014.

[5] Strab. 7, fr. 48: Ἔστι δ' ἡ Θρᾴκη σύμπασα ἐκ δυεῖν καὶ εἴκοσιν ἐθνῶν συνεστῶσα· δύναται δὲ στέλλειν, καίπερ οὖσα περισσῶς ἐκπεπονημένη, μυρίους καὶ πεντακισχιλίους ἱππέας, πεζῶν δὲ καὶ εἴκοσι μυριάδας.

[6] Sometimes an author may even invent a name, but this particular category will not be taken into consideration here.

τῶν Ὀδρυσῶν; an extension) or King of the Thracians (βασιλεὺς τῶν Θρᾳκῶν; a generalization), instead of the expected βασιλεὺς τῶν Γετῶν, used by other authors[7]. Anachronisms –sometimes introduced very consciously by ancient authors, in order to enhance comprehension for contemporary readers– can be particularly difficult to grasp. The classical example here is the term Haemimontani, a term pointing to Diocletian administrative reforms but used by the 4th century AD historian Ammianus Marcellinus to describe events related to the campaign of M. Terentius Varro Lucullus in the 1st century BC[8].

The second filter pertains to manuscript tradition. Though profoundly indebted to generations of copyists for their meticulous and time-consuming work, the quality of the manuscript at their disposal, their own diligence and care, their knowledge and understanding of the manuscript's language, are all factors that may have affected the quality of the text reproduced. A copyist may distort an unknown to him ethnonym, to the point of making it unrecognizable. A copyist may choose to replace what he considers to be an incorrect form of a given ethnonym with what he considers to be the correct one, or, at least, the more common one. Thus, the Maidoi – a Thracian tribe dwelling along the middle course of the Strymon river – can become the Medes. Sometimes, a copyist may even translate. Thus, in a map of Claudius Ptolemy's *Geography*, dated to AD 1478, the Ἀστικὴ στρατηγία of Thrace – so named after the tribe of the Astai – occurs as *Praefectura Urbana*. Philologists have, of course, made the necessary emendations; in some cases, though, restitution of the original form – and by that, I mean the form as used by the Greek or Latin author in the original text– remains beyond our reach[9].

This very brief, very selective overview is just to underline the obvious: gathering, counting, analyzing, writing the history of names and, even more so, writing history through names can be a very complex procedure when dealing with Thracian ethnonyms. This certainly explains – at least, in part– the many hypotheses that have been formulated by modern scholars in their almost desperate effort to reconstruct the history of these tribes. But that writing history through names can be applied, after all, to the study of Thracian ethnonyms –albeit with certain limitations– is what I will try to demonstrate by analyzing two specific cases.

In two passages of Strabo's *Geography*, in Books 10 and 12 respectively, Strabo associates the Σαπαῖοι – a tribe dwelling in south-western Thrace, just to the east of Macedonia and to the north of both Abdera and Maroneia– to the Σάϊοι, Σιντοί or Σίντιες of the poet, the poet being Homer[10]. Though both passages repeat more or less the same information, they do deviate in some, apparently minor, details; (a) instead of the conjunctive adverb εἴτε (whether) of the first passage, the adverb of time εἶτα (later) is used in the second, thus introducing a chronological sequence to the occurrence of the different ethnonyms; and, (b) instead of the reading Σαπαῖοι of Book 10, the manuscript tradition of Book 12 preserved the reading Σάπαι. This second form was emended by the German philologist Christoph Gottlieb Groskurd in his four-volume edition of Strabo published in Berlin between 1831 and 1834, since unattested to his

[7] See Polyb. fr. 104: *Δρομιχαίτην τὸν βασιλέα τῶν Ὀδρυσῶν* and the relevant comment of *Delev* 2018: 24. For the predominance of Odrysians in modern literature, see *Rufin Solas* 2020: 35, who refers to "the exaggerated place that modern historiography has given to the Odrysians in the history of ancient Thrace".

[8] See Amm. Marc. 27.4.11: *eodemquem impetus Haemimontanos acriter resistentes oppressit*.

[9] For a distortion beyond recognition, see indicatively Livy 42.19.6 and the relevant comment of *Briscoe* 2012: 218-219: "I would now be inclined to print Serdis † Cepnatis † que et Astis"; for the Maidoi as Medes, see Plutarch, *Alexander* 9.1; for the map, see *Tacheva* 2004: 121. The same phenomena, of course, apply to the study of Personal Names of Thracian origin. A ruler named Dizazelmis on his coinage (ΒΑΣΙΛΕΩΣ ΔΙΖΑΖΕΛΜΕΩΣ) is to be identified to Ζιβέλμιος of Diodorus (34.12: *Διηγύλιος νίὸς Ζιβέλμιος*) and to Zisemis of Valerius Maximus (9.2, ext. 4: *Zisemis, Diogyridis filii*); on this ruler, see now *Paun*ov 2021; the same remark applies to his patronymic.

[10] Strab. 10.2.17: *Τινὲς δὲ Σάμον καλεῖσθαί φασιν ἀπὸ Σαΐων, τῶν οἰκούντων Θρᾳκων πρότερον, οἳ καὶ τὴν ἤπειρον ἔσχον τὴν προσεχῆ, εἴτε οἱ αὐτοὶ τοῖς Σαπαίοις ὄντες ἢ τοῖς Σιντοῖς – οὓς Σίντιας καλεῖ ὁ ποιητής – εἴθ' ἕτεροι (μέμνηται δὲ τῶν Σαΐων Ἀρχίλοχος…)*; and 12.3.20: *Σίντιες γὰρ ἐκαλοῦντό τινες τῶν Θρᾳκῶν, εἶτα Σιντοί, εἶτα Σάϊοι – παρ' οἷς φησιν Ἀρχίλοχος τὴν ἀσπίδα ῥῖψαι... οἱ δ'αὐτοὶ οὗτοι Σαπαῖοι νῦν ὀνομάζονται*. For the ancient testimonies on the tribe of the Sapaioi and for their localization, see now *Parissaki* 2024.

time. His emendation was universally accepted and introduced into all later editions of Strabo's *Geography*, including the most recent ones[11].

At the very end of the 19th century AD, though, an inscription was spotted at the churchyard of Παναγία Εκατονταπυλιανή at the island of Paros in the Cyclades and was published by French and German epigraphists[12]. Often referred to as the *Monumentum Archilochi*, it remains to this day one of Paros' most important epigraphic texts. The inscription dates to the 1st century BC; but as explicitly stated at the beginning of the text (ll. 1-9), it reproduces a life of Archilochus, the island's most famous poet of the Archaic period, as compiled by Demeas, a chronicler of the second half of the 3rd century BC. It is, then, particularly important to stress that the text presents multiple chronological layers. In theory, it refers to events of the Archaic period; but in context, it reproduces information of the 3rd century BC, while dating to the 1st century BC. I will skip details – which have been analyzed elsewhere[13] – only to mention that in l. 51 the text gives the reading εἰς τὰς Σάπας, that is the accusative plural of a feminine noun, most probably a place name. Then came a second epigraphic find. In 1921, André Plassart published a catalogue found at the sanctuary of Delphi, the so-called "grande liste" of the *theorodokoi* of Delphi. The text consists of a series of place names arranged in a more or less geographical order, each one accompanied by one, two or three personal names of those responsible for the reception of the *theoroi*, the *theoroi* being those announcing the celebration of the sanctuary's Panhellenic Games. At col. III, l. 83 Plassart read the names of Ἀντιφάνης and Ἀντιγένης Κλέωνος – that is two brothers of probably Greek origin – as *theorodokoi* ἐν [Σ]άπαις. Reactions to Plassart's reading varied; but Jacques Ouhlen's extensive re-examination of the text in the early '90s seems to have confirmed the reading[14].

Taken together, these testimonies –that is, an inscription from Paros, an inscription from Delphi, and a literary reference by an ancient author, who explicitly mentions his presence in the Cyclades during his many journeys around the Mediterranean and who may have visited the Archilocheion just a few years after the *Monumentum Archilochi* was placed there – allow us to suggest the following: (a) the form Σάπαι may have existed after all, even if for a more or less short period of time during the last quarter or the very end of the 3rd century BC; (b) that this form may have designated some kind of place name, maybe even an administrative center, if only to Greek eyes; and (c) that the passage of Book 12 of Strabo's *Geography* –that is the one preserving the reading Σάπαι and using the adverb of time εἶτα– may have been closer to the author's original text.

But there is more, I think. Surprising as this may seem, towards the end of the 3rd century BC, Delphi –that is the Aetolians, who at the time still controlled the sanctuary and the assembly of the Delphic Amphictyony–, Paros – which, like other islands of the Cyclades still remained within the sphere of influence of the Ptolemies – and the Thracian tribe of the Sapaioi – who, during the second half of the 3rd century BC, were the northern neighbors of the so-called Ptolemaic strategy "of the Hellespont and of the places in Thrace"[15] – shared one common trait; and that was their profound Anti-Macedonian feelings. Sapaean resentment to Macedonian pressure and control will be clearly manifested a few decades later, with the attack of Abruporis against Amphipolis in the summer of 179 BC and Perseus' counterattack soon afterwards. Both Polybius and Livy, as well as the text of an *epistula* sent by a Roman magistrate to the members of the Delphic Amphictyony in ca. 171 BC, mention the hostilities between Macedonians and Sapaeans as one of

[11] See e.g. the edition *Radt* 2002-2011 and more specifically the *apparatus criticus* at Band 3 (2004) p. 446: Σαπαῖοι Groskurd: σάπαι codd.
[12] See *IG* XII 5, 445 and Suppl. pp. 212-214 (cf. *SEG* 15, 518); *Parissaki* 2024: 20, n. 53 for further bibliography.
[13] See above, n. 10.
[14] See *Plassart* 1921: l. III 83: *ἐν [Σ]άπαις Ἀντιφάνης Ἀντιγένης [K]λέωνος*; for reactions, see *Papazoglou* 1988: 19, n. 25; for Ouhlen's re-examination, see *Ouhlen* 1992: p. 55 (as l. III 87): *Ἐν Σάπαις Ἀντιφάνης Ἀντιγένης Κλέωνος*.
[15] *IG* XII.8, 156 (= *Syll*3 502), ll. 3-4: στρατ[ηγὸς | ἐφ' Ἑλ]λησπόντου καὶ τῶν ἐπὶ Θράικης τόπων. For Ptolemaic rule in Aegean Thrace, see *Chryssanthaki-Nagle* 2007: 281-282, with earlier bibliography.

the main causes that led to the outbreak of the Third Macedonian War[16]. The variant Σάπαι, therefore, may reflect a specific development within specific circumstances.

In other cases, though, a variation in the form of a name may indicate a development unrelated to the history of the tribe itself. The *Coelaletae* emerge in AD 21, when, as Tacitus reports, they rebelled against the King and ally of Rome Rhoemetalces II, along with the Odrysae and the Dii. A votive inscription from Bizye, the capital of the client kingdom of Thrace at the time, refers to this rebellion with the designation Κοιλαλητικός πόλεμος "Coelaletic War". Valerius Flaccus in his *Argonautica* of the 1st century AD, also mentions the *Coelaletae* in a poetic context. Pliny the Elder mentions the *Celaletae maiores* and *minores*, the first in association with the Haemus, the second with the Rhodopes. And a military diploma of AD 86, found in Romania gives the reading *Cololeticus*[17]. With these references in mind, we could perhaps suggest that the form Κοιλητική, to be found in Claudius Ptolemy's catalogue of the strategies of Thrace, instead of the expected Κοιλαλητική, represents a "simplified" / Hellenized version of the name, whether introduced by the author himself or his sources. If this is so, the etymological association of the form Κοιλητική with the Greek word κοῖλον, as suggested by some scholars, should not be used as an argument in defining their tribal territory[18].

When dealing with external testimonies, as in the case of Thracian ethnonyms, a range of serious methodological difficulties must be taken into account. Only some have been analyzed here; others – like those pertaining to the perception of identities, e.g.– can prove equally challenging and determining. The world of the Thracian *ethnē*, as transmitted by ancient Greek and Roman authors, is a complex but also a very interesting one.

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[16] See, respectively, Polyb. 22.18.2-3, Livy 42.13.5 and *RDGE* 40, ll. 15-17. The causes of the Third Macedonian War have been analyzed by *Burton* 2017: 78-123, esp. pp. 81-83.

[17] See, respectively, Tac. *Ann*. 3.38; *OGIS* 378; Val. Fl. *Argonautica* 6.81; Plin. *HN* 4.40-41; *CIL* 16, 33.

[18] For the catalogue of strategies, see Ptol. *Γεωγραφικὴ Ὑφήγησις* 3.11.8-10 (ed. Stückelberger and Graßhoff); for this interpretation, see *Delev* 2014, 311, who revives an earlier suggestion by *Venedikov* 1982, 64.

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Ethnē Thrakōn в сведенията на античните гръцки и латински автори – Какво стои зад името?

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Настоящото съобщение разглежда накратко методическите трудности, срещани при изследването на тракийските етноними и техните засвидетелствани форми. За да илюстрира по-добре тези трудности, авторът анализира два конкретни казуса: Sapaioi и Coelaletae. Твърди се, че формата Sapai – открита във всички ръкописи на книга 12 от *Geographica* на Страбон, но изменена на Sapaioi от редакторите през XIX век, може да е представлявала съществуваща вариация, употребявана през късния III в. пр. Хр., тъй като е засвидетелствана в два надписа: известният каталог на theorodokoi (длъжностни лица, които отговарят за посрещането на пратеници) от Делфи и надписът на Состен от Парос. Обратно, формата Κοιλητική – откривана в *Geographica* на Клавдий Птолемей, вместо епиграфски засвидетелстваната Κοιλαλητική – може да представлява „елинизирана“ версия, приписвана на Птолемей или неговите източници; като такава, тази форма трябва да се счита за неотносима към историята на племето или неговата локализация.

Structured Metadata for the Digital Corpora of Ancient Epigraphic Monuments from Bulgaria

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Abstract: *The paper presents the main features of the EpiDoc-compliant XML template according to which ancient inscriptions in Greek and Latin from the lands of today's Bulgaria are encoded and then indexed and displayed in the browsable and searchable databases TELAMON and TITVLI*

Keywords: Digital Epigraphy, EpiDoc, metadata, schema, encoding
Ключови думи: дигитална епиграфика, EpiDoc, метаданни, схема, кодиране

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1. INTRODUCTION: DIGITAL EPIGRAPHY AND EPIDOC

The "digital turn" in the Humanities in the last several decades, with all its achievements and peculiar challenges[1] could not exclude the study of the past, together with its rich and multifaceted documentary heritage. This heritage encompasses different physical objects which often also bear symbolic content in the form of images and/or text: coins, seals, inscriptions, papyri, ostraca, manuscripts, stamps, etc. Such items, known by the common term of "text-bearing objects", provide valuable information by the means of their materiality as well as of their textual content, and both these aspects of them need to be equally described and studied, together with the archaeological context in which they were discovered and their fate after the discovery[2]. Among the prominent text-bearing objects whose research has always been a significant part of *Altertumswissenschaft* are the epigraphic monuments. The past two centuries have seen the development of epigraphy as a scholarly discipline, the publication of thousands of Greek and Latin inscriptions and

[1] See *Viola* 2023: 1-37.
[2] *Tsouparopoulou* 2016.

the appearance of large corpora such as *CIL* and *IG*, new volumes of which continue to appear to this day. With the dawn of the new millennium, the methodology of the digital description and publication of epigraphic monuments was developed. It is based on the principles and standards of application of mark-up languages (SMGL at first and later XML) established by the Text Encoding Initiative, or TEI[3]. On the basis of TEI XML, with its vast variety of elements, attributes and values, a subset was elaborated which was specifically designed for the purposes of the electronic publication of inscriptional corpora previously published in the traditional analogue way[4]. It was later applied to born-digital collections of other historical documents such as wooden tablets[5] and papyri[6]. The EpiDoc guidelines[7], together with additional documentation and tools (e.g. transformation stylesheets and a regularly updated RNG schema)[8], not only allow the detailed edition of a monument's text and the description of its metadata in a simple, yet powerful and interoperable way. They also enable the exportation of the encoded data into various publication formats, online or offline, electronic or printed, aimed at different audiences[9].

In the 2010's, many digital collections of Greek and Latin inscriptions applying the EpiDoc schema went online: the *Inscriptions of the Northern Black Sea*[10], the *Inscriptions of Roman Cyrenaica*[11], the *Dodona Online* collection of oracle lamellae[12], etc. Some of these corpora are still regularly updated with new content. Gradually, EpiDoc came to be applied to epigraphic material written in other languages and belonging to cultures other than the ancient Graeco-Roman world[13]. Being a TEI subset, EpiDoc is also undergoing its own customizations for the digital description and publication of other historical text-bearing objects. An international team of Byzantine scholars created SigiDoc[14] for Byzantine lead seals[15]. Currently, the data from the various EpiDoc projects related to Classical antiquity need to be mapped against each other so that meta-queries can be made through as many of them as possible. Similar issues are addressed by projects such as FAIR Epigraphy[16].

2. BULGARIA'S EPIGRAPHIC HERITAGE

The land of today's Bulgaria has a rich and diverse epigraphic heritage. The ancient Greek inscriptions date from a time span of approximately 12 centuries, from 6th c. BCE to 6th c. CE. More than 5,000 in number, the largest part of them is published in two big corpora, edited by Georgi Mihailov[17] and by Veselin Beševliev[18]. Many monuments, however, are either left outside the big collections, often scattered in inaccessible publications, or in need of serious revisions even when they are known and quoted. The current state of the study of Latin inscriptions from Bulgaria is even more complicated:

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[3] See *The TEI Consortiu* 2024.
[4] Such as *Reynolds, Roueché, Bodard* 2007.
[5] *The Vindolanda Tablets Online* at http://vindolanda.csad.ox.ac.uk/ (accessed 23.07.2024).
[6] See the largest and the most exhaustive meta-collection of documentary and literary papyri currently available online at https://papyri.info/ (accessed 23.07.2024).
[7] *Eliott, Bodard, Mylonas, Stoyanova, Tupman, Vanderbilt* 2007-2022.
[8] See https://epidoc.stoa.org/.
[9] *Flanders, Roueché* 2006.
[10] https://iospe.kcl.ac.uk/index.html.
[11] https://ircyr2020.inslib.kcl.ac.uk/en/.
[12] https://dodonaonline.com/.
[13] See, e.g., *Forschungsplattform für jüdische Grabsteinepigraphik* (http://www.steinheim-institut.de/cgi-bin/epidat), *Die Inschriften des deutschen Sprachraumes in Mittelalter und Früher Neuzeit* (https://www.inschriften.net/), the *Corpus of Pyu Inscriptions* (http://hisoma.huma-num.fr/exist/apps/pyu/index2.html) and many others.
[14] *Sopracasa, Filosa*, 2020.
[15] The SigDoc v.1.1. Guidelines are published here: http://sigidoc.huma-num.fr/ . A sample corpus can be seen here: https://sigidoc.raketadesign.com/en/ .
[16] More about the project and its demo meta-platform can be seen here: https://inscriptiones.org/. See also *Heřmánková, Horster, Prag* 2024.
[17] *Mihailov* 1956-1995.
[18] *Beševliev* 1964.

there is no comprehensive publication meeting modern scholarly standards. The number of the Latin inscriptions is comparable to that of the Greek inscriptions, although they belong to a much shorter period, from the beginning of the 1st to the end of the 6th c. CE. Only a small fraction of them was edited by Boris Gerov and published posthumously[19] as an intended first part of a large corpus which never materialized. Some inscriptions are included only in rather old editions with multiple errors and incomplete data, while many others still remain dispersed, obscure, or unknown to the scholarly public.

3. THE BULGARIAN EPIDOC COLLECTIONS

The *Telamon* project[20] initiated by the Department of Classics to St. Kliment Ohridski University of Sofia aims at creating a digital library of the ancient Greek inscriptions found in Bulgaria using an EpiDoc-compliant template according to which inscriptions from the rich ancient Greek epigraphic heritage in Bulgaria would be encoded. The .xml documents of the separate monuments contain the text of the inscription itself (diplomatic as well as editorial), together with additional commentaries, bibliography, and metadata concerning both the content of the text and the features of its physical carrier. Most of the inscriptions included in the collection are also contained in one of the two large corpora mentioned above, or are presented in other publications which are not part of *IGBulg* or *ILBulg*. One of the aims of the project is to revise the previous editions of the inscriptions, check once again the monuments *ex autopsia*, be it in the museum repositories or elsewhere, and to examine and present them in the light of the newest discoveries and publications. Sometimes, the inaccessibility of either some of the publications[21] or the monuments themselves could be a challenge. For the first time, these monuments are now being collected into a bilingual digital corpus with translations added. Their revisions, corrections, the publications of new inscriptions and also the commentaries are mainly the result of the research activities of Dr. Nicolay Sharankov. Some of his research on the topic has already seen the light of the day as articles and monographs[22], some of it is born-digital and appears, for the first time, in his notes and comments on the inscriptions published as a part of the *Telamon* collection.

Apart from the up-to-date and accessible content, another contribution of the *Telamon* initiative for the development of Digital Epigraphy in Bulgaria and beyond is the indexing and visualization tool for the .xml files developed especially for the aims of the project. AIAX[23] is a CMS and a front-end tool used to produce the output of the separate inscriptions as well as the indices based on the internal XML authority files of the collection[24]. Initially designed to work with the custom EpiDoc-compliant template used for the purposes of *Telamon*, the tool can be adjusted for other purposes. Recently, it was applied to Latin monuments in the framework of a pilot collection of Latin inscriptions from Bulgaria created by the National Archaeological Institute with Museum to the Bulgarian Academy of Sciences under the name of *Tituli*[25]. Both *Telamon* and *Tituli* use the same basic template which applies the same description structure for the metadata, the text of the monument, its translations in Bulgarian and English, the apparatus and the commentaries to it. We

[19] *Gerov* 1989.
[20] https://telamon.uni-sofia.bg/.
[21] Examples of such works are *Dimitrov* 1931, used as a secondary source for the electronic publication of *IGBulg* 727 (https://telamon.uni-sofia.bg/en/epi/view_ins/IGBulg_0727) and *Botusharova* 1959, used as a secondary source for the electronic publication of *IGBulg* 1460 (https://telamon.uni-sofia.bg/en/epi/view_ins/IGBulg_1460). Not only are such works not very accessible in terms of availability, but some of them require knowledge of Bulgarian which makes them virtually unknown to the international scholarly public. The bilingual output of the *Telamon* platform (Bulgarian-English) allows for the dissemination of Bulgarian research hitherto unknown to international scholars.
[22] See e.g. *Sharankov* 2016; *Sharankov* 2024.
[23] Available for download and installation as a desktop and server package at: https://telamon.uni-sofia.bg/en/page/project.
[24] See more details about AIAX and how it stores and processes data in *Iliev, Boeva* 2023.
[25] The demo version of the web platform can be seen at: https://tituli.epistone.net/.

shall now proceed to examine the basic structure of the EpiDoc .xml file used across these digital projects and, in particular, the part of it containing the metadata.

4. THE MAIN PARTS OF THE DOCUMENT

XML is a mark-up language derived from SGML and similar to HTML[26]. It basically consists of strings of metatext enclosed in triangular brackets giving additional information about the strings of text they encompass in the following way:

<tag> *text* ***</tag>***

The opening and the closing tags should be identical except for the / symbol at the beginning of the latter. The unity of an opening and a closing tag together with the content enclosed between them forms an XML element[27]:

<title>*Two stories by Edgar Allen Poe: electronic version****</title>***[28]

Most of the elements can have daughter elements, or sub-elements, wholly nested within them and forming with them a hierarchical tree-like structure:

<persName>
<forename>*Franklin****</forename>***
<forename>*Delano****</forename>***
<surname>*Roosevelt****</surname>***
</persName>[29]

Within the opening tag of an element, different attributes with their values can be added for supplementary information:

<name *type="city"****>****Glasgow****</name>***[30]

Thus, TEI XML (and its subsets such as EpiDoc) provides a detailed and flexible mechanism to formally describe all the peculiarities of a text or an object for the purposes of scholarly research and publication. This description can be stored in the lightweight .xml format and then exported for user-end visualization as a web page, a PDF file, etc.

Like all the TEI-based documents, the EpiDoc-compliant .xml template used for the Bulgarian epigraphic collections uses the *<TEI>* root element within which three sibling sub-elements are nested for the three main parts of the document:

<TEI>
<teiHeader>*…****</teiHeader>***
…
<facsimile>*…****</facsimile>***
…
<text>*…****</text>***
</TEI>

Of these, the *<teiHeader>* element contains all the metadata describing the text and the text-bearing object. The *<facsimile>* element has the shortest content of the three and serves to link to the image of the monument which is usually stored locally on the web site's server:

<facsimile>
<graphic *url="1069.jpg"****/>***[31]
</facsimile>

The *<text>* element contains not only the text of the inscription itself, but also paratexts such as translation(s), commentary, critical apparatus, bibliography:

<text>
<div *type="edition"****>****…**** ***
<div *type="apparatus"****>****…**** ***
<div *type="commentary"****>****…**** ***
<div *type="bibliography"****>****…**** ***
</text>

It is the first of these main components, the *<teiHeader>*, which will be the object of detailed presentation in the next pages.

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[26] Concerning the history and the basic features of XML, see *Yott* 2015.
[27] With the exception of the so-called "empty elements" which we will not discuss in detail.
[28] Example taken from *TEI P5 Guidelines* "2.2.1. The Title Statement" [Last modified 2024-07-08] https://www.tei-c.org/release/doc/tei-p5-doc/en/html/HD.html (accessed 20.07.2024).
[29] Example taken from *TEI P5 Guidelines* "14.1.2. Personal Names" [Last modified 2024-07-08] https://www.tei-c.org/release/doc/tei-p5-doc/en/html/HD.html (accessed 20.07.2024).
[30] Example taken from *TEI P5 Guidelines* "14.2.2. Organizational Names" [Last modified 2024-07-08] https://www.tei-c.org/release/doc/tei-p5-doc/en/html/HD.html (accessed 20.07.2024).
[31] This is an example of an "empty" element which has no textual content and thus lacks a closing tag.

5. THE STRUCTURE OF THE METADATA IN THE BULGARIAN EPIDOC-COMPLIANT TEMPLATE

The <*teiHeader*> element containing all the metadata about the digital publication and its analogue source consists of three main sibling sub-elements:

<*fileDesc*>…**</*fileDesc*>**
<*encodingDesc*>…**</*encodingDesc*>**
<*revisionDesc*>…**</*revisionDesc*>**

Of these, <*fileDesc*> is where almost all of the principal metadata of the encoded file (and its source) are stored. The <*encodingDesc*> element may contain additional information about the methodological particularities of the encoding, if such information is relevant and needed. Its content may not be displayed in the user-end view of the encoded monument. But, if the raw .xml file is made available somewhere (which is a good practice generally recommended in Digital Humanities[32]), users, researchers, encoders, etc. may draw valuable workflow examples from such data. The same goes for the <*revisionDesc*> which contains information about the team members having worked on the file. It may look as follows:

<*revisionDesc*>
  <*change* *when="2022-07-20" who="E.B."*>
  encoded, added links to authority
  </*change*>
  <*change* *when="2022-07-23" who="N.Sh."*>
  corrected, added description
  and Bulgarian translation
  </*change*>
</*revisionDesc*>[33]

This is an information that the project team might or might not choose to display as a part of the front-end publication of the inscription. However, if contained at least in the raw .xml file, it gives its creators (usually the work on one .xml publication is collaborative) authority and responsibility akin to those of the traditional editors of ancient inscriptions in the printed publications. And such contributions to the digital publishing of epigraphic monuments should receive acknowledgement equal to the authorship of paper editions: a step which is still a *desideratum* in the framework of national and international research assessment policies[34].

Of these first-level sub-elements, <*fileDesc*> is the only one that contains daughter elements in an at least two-level-deep further hierarchy. The first level consists of the following sub-elements:

<*titleStmt*>…**</*titleStmt*>**
<*publicationStmt*>…**</*publicatiionStmt*>**
<*sourceDesc*>…**</*sourceDesc*>**

The title statement contains the title of the online publication displayed at the head of the web page of the inscription. It also contains the names of the main scholarly editor of the online publication, as well as those of all the previous scholars whose editorial decisions and observations have been taken into account in the digital publication (also notice the bilingual rendition via the duplicated elements with the *@xml:lang* attribute):

<*titleStmt*>
  <*title* *xml:lang="bg"*>Почетен декрет
  <*title* *xml:lang="en"*>Honorary decree for Akornion**</*title*>**
  <*editor*>
    <*persName* *xml: lang="bg"*>Василий Латышев**</*persName*>**
    <*persName* *xml:lang="en"*>Vasiliy Latyshev**</*persName*>**
    <*persName* *xml:lang="bg"*>Ернст Калинка**</*persName*>**
    <*persName* *xml:lang="en"*>Ernst Kalinka**</*persName*>**
    <*persName* *xml:lang="bg"*>Георги Михаилов**</*persName*>**
    <*persName* *xml:lang="en"*>Georgi Mihailov**</*persName*>**
    <*persName* *xml:lang="bg"*>Николай Шаранков**</*persName*>**

[32] The *Telamon* collection provides the downloadable .xml files with the respective raw data within the display page where each inscription is published. Otherwise, whole project datasets may be published in Github repositories, see e.g. the repository of the EpiDoc initiative here: https://github.com/epidoc.
[33] Source code taken from *Tlmn3_0001.xml*, front-end publication at: https://telamon.uni-sofia.bg/en/epi/view_ins/Tlmn3_0001.
[34] On the subject of digital research and its assessment see *Tasovac, Romary, Tyth-Czifra, Ackermann, Alves, et al.* 2023, particularly p. 5-6.

```
        <persName xml:lang="en">Nicolay
        Sharankov</persName>
    </editor>
</titleStmt>
```
[35]

The <*publicationStmt*> element is also related to the electronic publication of the inscription rather than to the printed publication(s) thereof which are described in the bibliography to the text (*TEI/text/div type="bibliography"*). In it, the project responsible for the digital edition of the inscription is indicated, as well as the ID number of the inscription in the digital collection.

<*sourceDesc*> contains the description of the physical source of the inscriptional text, its material medium. As such, it has all the further levels of hierarchy embedded within it. Its main daughter element is <*msDesc*> which stands for "manuscript description". Although the physical bearer of an epigraphic text is different than a parchment codex or another type of manuscript, the name of the element is inherited in EpiDoc from the superset of TEI which was initially designed mainly with the digital edition of Mediaeval codices in mind. <*msDesc*>, in turn, contains the following daughter elements:

```
<msIdentifier>…<msIdentifier>
<msContents>…</msContents>
<physDesc>…</physDesc>
<history>…</history>
```

<*msIdentifier*> contains the inventory number of monument in a museum repository, if the inscription is listed or stored in such. In case a museum is indicated, a link is also given to its official website in order to give it credit as a collaborating institution (since usually providing an up-to-date inventory number of an item requires the cooperation of the museum's employees):

```
<repository>
    <ref target="http://naim.bg/">
    Национален археологически
    институт с музей към БАН
    </ref>
</repository>
```
[36]

<*msContents*> classifies the inscription by topic linking it to a *document-type.xml* internal authority list where 23 different categories of inscriptions are described. The <*physDesc*> and the <*history*> elements contain information about the monument's physical characteristics and history. Of these, within the former the following daughter elements are embedded:

```
<objectDesc>…</objectDesc>
<handDesc>…</handDesc>
<decoDesc>…</decoDesc>
```

The <*handDesc*> element is where the palaeographic description of the script and the hand(s) is indicated. <*decoDesc*> is dedicated to the representation of the monument's decorative elements, reliefs, etc., if such are available. The rest of the physical features of the monument, however, are described by sub-elements embedded withing the <*objectDesc*> element. They are as follows:

```
<supportDesc>…</supportDesc>
<layoutDesc>…</layoutDesc>
```

The inscription's layout, i.e. the exact position of the text on the surface of the monument in relation to its other material constituents is handled by the <*layoutDesc*> element. All else is covered by the <*supportDesc*> element containing the following sub-elements:

```
<support>…</support>
<material>…</material>
```

<*material*> describes the material of which the monument is made, most often different types of stone such as marble, limestone, etc. that are also linked to an internal *material.xml* authority list. As for the <*support*> element, it contains information about the monument's physical type (<*objectType*> daughter element linked to an *object-type.xml* authority list describing more than 15 different types of monuments such as altar, slab, statue base, etc.) as well as about its dimensions:

[35] Source code taken from *IGBulg_0013.xml*, front-end publication at: https://telamon.uni-sofia.bg/en/epi/view_ins/IGBulg_0013.

[36] Source code taken from *TTL2_003.xml*, front-end publication at: https://tituli.epistone.net/epi/view_ins/TTL2_0003.

<dimensions>
<height *quantity="66"*>66**</height>**
<width *quantity="51"*>51**</width>**
<depth *quantity="10"*>10**</depth>**
</dimensions>[37]

The <*history*> element is related to the physical monument's history and has three main daughter elements embedded within it:

<origin>…**</origin>**
<provenance *type="found"*>…**</provenance>**
<provenance *type="observed"*>…**</provenance>**

Similar as they may be in their names, they refer to three different episodes in the monument's history. <*origin*> indicates the ancient place where the monument was produced and first put on display. It may be linked to a gazetteer or another list of ancient places. <*provenance type="found"*> indicates the modern findspot of a monument and may refer to a gazetteer or another list of modern places. <*provenance type="observed"*> can be used in two cases. The first one is if an important previous editor or observer has noted or recorded the inscription in a historical moment between its creation and its current acquisition. The second one is if the monument is currently to be observed in a place outside a museum (in which case it is an alternative to the repository number we discussed above and both can't be indicated at the same time).

In this way, all the metadata connected with a certain epigraphic monument can be described in an exhaustive and flexible way. A database of various inscriptions encoded following this template allows for a rich, dynamic, an informative user experience of the digital collection from the point of view of scholars and the general public alike.

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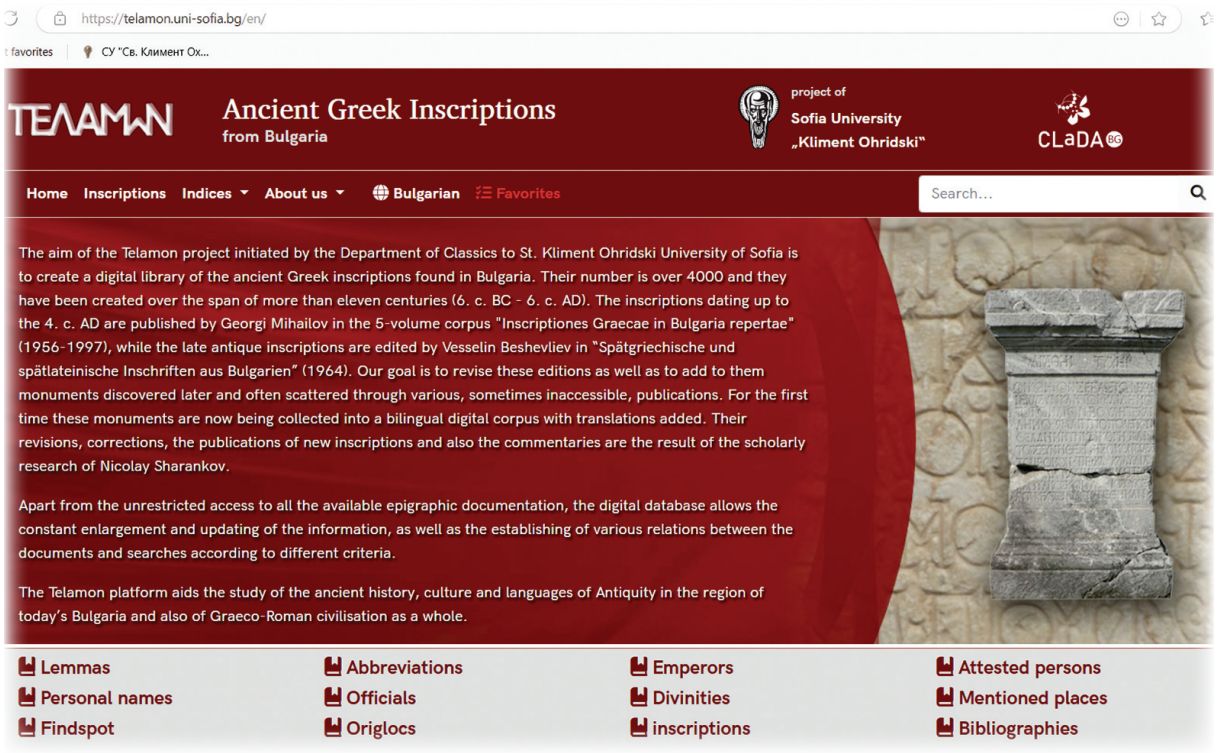
Структурирани метаданни за дигитални корпуси на антични епиграфски паметници от България

Димитър Илиев

Статията представя основните черти на EpiDoc-съвместимия XML шаблон, според който антични гръцки и латински надписи от земите на днешна България се кодират, след което се индексират и показват в онлайн базите данни TELAMON и TITVLI с възможност за разглеждане и търсене.



Unraveling the Threads of Thrace: A Text Mining Expedition in Pliny's Natural History

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Abstract: *This endeavor aims to create an innovative information extraction algorithm for Pliny's "Natural History." We used the state-of-the-art Python NLP library SpaCy and the Latin language models in LatinCy to develop a modern solution. The algorithm accepts a single lemma or a list of lemmas as input, producing a CSV dataset containing citations, context, and lemma variants. This facilitates efficient linguistic analysis of Pliny's work, initially focusing on Moesia and Thrace. We curated datasets on ethnonyms, places, mountains, and waterways. Using Streamlit and Matplotlib, we improved user interaction and visualization, aiding researchers in exploring ancient Thrace in Pliny's writings.*

Keywords: nlp, data science, Roman literature, data mining, lemma
Ключови думи: nlp, наука за данните, римска литература, извличане на данни, лема

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INTRODUCTION[1]

The objective of our work is to develop an algorithm for data mining instances and mentions of Thrace in classical Latin literature. We stopped on the work of Plinius *Naturalis Historia* or Natural history, because of its encyclopedic nature. The work of Pliny is a massive source of information containing around half a million tokens.

Finding a suitable version of the text to turn into a dataset for mining was the first stage in our ongoing research. We opted after a prolonged search to use the Tesserae project data made available by Kyle P. Johnson in their GitHub repository[2].

Algorithm for Data Mining Naturalis Historia

An algorithm was written to convert the data available in the Tesserae project repository in the TESS file format into a CSV dataset. A dataset was constructed from the available textual data. When this first step of our project was

[1] The present paper is a result of the activities within the "Measuring Ancient Thrace" project no. КП-06-Н50/3 from 30.11.2020, financed by BNSF.
[2] *Burns* 2019: https://github.com/cltk/latin_text_tesserae

completed, a decision was made not only to be able to search a word, phrase, or a sentence in the work of Pliny, but with the ability to simultaneously search all the forms of a word, simply by typing its lemma. So instead of searching the list of words: *culina*, *culinae*, *culinarum*, *culinis*, *culinas*, etc. we can simply use *culina* as input to get all the forms of the word. To create such a data mining algorithm, we utilize one of the LatinCy models in the NLP library SpaCy[3]. But only getting a list of uses of a lemma in dataset didn't provide us with exhausting enough information, so we opted to enrich the algorithm with a chapter lookup function. This function would allow us to see which form of the word at hand is used and where it was used.

ENHANCEMENTS FOR EFFICIENT SEARCHING

To further enhance the data mining algorithm, we created a contextualization feature, which would also give the words surrounding the lemma we are searching for. An algorithm was created, based on the following equation:

context(i)=' '.join(tokens[j].text | j in range (max(0,i−5),min(len(doc),i+6)))

In which *i* is the index of the token at hand, the variable *tokens* simply represent the list of tokens in the document. To ensure that the context doesn't go out of bounds we use max(range(0, *i*-5)) and min(len(doc), *i* + 6)). The equation concatenates the text of selected tokens with a space between them, providing context around the token at index *i* with' '.join. By considering the surrounding tokens within a specified range, we aim to provide a nuanced perspective for exploring the dataset.

To optimize the time consumption of the algorithm we created a possibility to search for a list of lemmas in the dataset *e.g.*, input: *thracia*, *moesia*, *dacia*. With the computational power available in the LatinCy model, we managed to create an algorithm that not only searches for a word in a dataset, but provides tokenization, contextualization, book, and chapter lookup as well a multiple word search.

DATASET CONSTRUCTION AND ENRICHMENT

With the algorithm described in the first part of the paper we managed to create datasets of variable sizes concerning different aspects of the research at hand like ethnonyms - mainly names of tribes like the *triballi*, *getae*, *sapei* etc., places *abdera*, *maronea*, rivers - *strymon*, mountains: *rhodopa* and *haemus*, we also searched for prominent leaders in Thrace like Sitalces and Theres without a result. From the different prompts a curious find was documented: when we use the word *getae* which is plural and is used to name the tribe, no results were found, but when we modify the query and search for *geta*, the model yielded relevant results associated with the tribe.

A total of 73 preliminary entries about Thrace were found and collected into a dataset. Each section of the dataset represents a lemma, the context in which it appears, and the book/chapter from Pliny's work where it can be found.

The dataset provides insights into the cultural, historical and geographic landscape of ancient Thrace including entities, such as cites (e.g. "*abdera*", "*cherronesum*"), rivers (e.g. *hebrus*), mountains (e.g., "*haemus*"), and ethnonyms (e.g., "*bessi*", "*dardani*"). We may be inclined to think that the incorporation of diverse geographical entities, shows Pliny's comprehensive investigation of the province. The dataset's specific interest on Thrace and contextualized references in Pliny the Elder's work make it an important asset for researchers and specialists interested in finding more in-depth information regarding the province.

DISCUSSION AND INTERPRETATION

The lemma *abdera* appears in the context of geographical descriptions in book 4 chapter 27 and book 6 chapter 70. Similarly, *dardani* is mentioned in various contexts across different books, suggesting it might be a significant term concerning the larger context of Thrace. The

[3] *Burns, Bernhardt, Geelhaar, Koch*: https://huggingface.co/latincy/la_core_web_lg

lemma *thracia* appears frequently in the dataset and it is mentioned in a wide range of topics, including geography, climate, agriculture, and natural history. For instance, one excerpt mentions the fertility of Thrace because of cold and heat[4], while another discusses the Maronian wine originating from the coastal part of Thrace[5]. Pliny's Natural History is renowned for its extensive coverage across diverse fields, including history, botany, geography, and medicine. Within the dataset, references to the Strymon River shed light on the utilization of the tribulus plant, notably in the feeding of horses (*foliis tribuli equos saginant*)[6]. The historical practice of Thracians feeding tribulus to their horses offers intriguing insights into ancient customs. Furthermore, the usage of this plant in certain Asian cultures as a remedy for kidney stones[7] may underscore a shared understanding of medicinal plants. This observation aligns with scholarly consensus regarding the medical focus of Book XXII of *Naturalis Historia*[8].

This dataset could prove to be a valuable resource for studying Pliny's Natural History, particularly for understanding how he describes and categorizes the natural world. A visualization tool was created with Streamlit[9] and matplotlib[10] to give the end user of the dataset a method of exploring it, without any technical know-how.

STREAMLIT VISUALIZATION TOOL: ENHANCING DATASET EXPLORATION

Incorporating a Streamlit visualization tool has been instrumental in transforming raw dataset information into an interactive and user-friendly format. This tool provides a streamlined interface for users to explore and interpret the dataset generated through our algorithmic approach to mining instances of Thrace in Pliny's Naturalis Historia.

The tool's primary functionality includes the selection of CSV files, visualization of lemma frequency, and exploration of chapter-wise lemma mentions. Utilizing Plotly Express, the tool generates interactive and visually appealing plots[11], adding depth to the statistical insights it offers.

Users can select specific CSV files, such as "allData.csv", "places.csv", "ethnonyms.csv", and more, allowing for a focused exploration of different aspects of the dataset concerning Thrace. The tool provides basic statistics on lemma frequency and token count, giving users a quick overview of the dataset's composition. Interactive plots, including a bar chart illustrating lemma frequency and a pie chart depicting the distribution of lemma frequencies as can be seen on **Fig. 1**, enable users to have insights into usage of specific lemmas within the dataset. Chapter-wise lemma mentions are visualized through a bar chart, offering a detailed view of lemma occurrences across different sections of Pliny the Elder's work.

To facilitate a more in-depth exploration, the tool includes an expander feature. Users can click to view detailed context information for each lemma, including the lemma itself, the corresponding book/chapter, and the context in which the lemma appears as can be seen on **Fig. 2.**

The Streamlit data visualization tool enables us to transform data into an interactive format, encouraging users, researchers, and enthusiasts to engage in a more insightful exploration of Pliny the Elder's *Naturalis Historia*.

CONCLUSION

Our study offers a thorough method for locating references to Thrace in classical Latin literature, with an emphasis on Pliny the Elder's *Naturalis Historia*. A feature-rich dataset and the created algorithm have produced insightful information about the geographical, historical, and cultural features of ancient Thrace.

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[4] Plin. Nat. 17.5.
[5] Plin. Nat. 14.16.
[6] Plin. Nat. 22.12.
[7] *Kamboj, Aggarwal, Singla, Puri* 2011: 154.
[8] *Doody* 2010: 9.
[9] Streamlit: https://streamlit.io/
[10] *Hunter* 2007: 90-95.
[11] *Plotly* 2015: https://plotly.com/python/plotly-express/

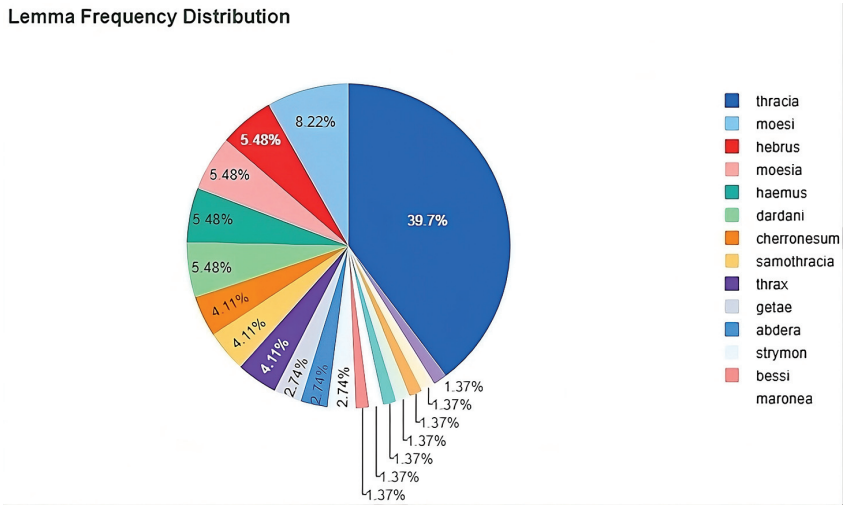

Figure 1. Plotly Express pie chart representing the lemma frequency distribution in the whole dataset made from Pliny's *Naturalis Historia.* (Author: K. Simeonov).

Lemma: haemus

Book/Chapter: plin. nat. 31.19

Context: arborum alimenta consumebant sicut in haemo obsidente gallos cassandro cum valli

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Lemma: hebrus

Book/Chapter: plin. nat. 4.19

Context: sapaeos odomantos odrysarum gens fundit hebrum accolentibus carbiletis pyrogeris drugeris caenicis

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Lemma: hebrus

Book/Chapter: plin. nat. 4.19

Context: minores rhodopae subditi inter quos hebrus amnis oppidum sub rhodope poneropolis

---

Lemma: hebrus

Book/Chapter: plin. nat. 4.20

Context: gygemeros meritus melamphyllos flumina in hebrum cadentia bargus syrmus macedoniae

Figure 2. Streamlit visualization of the output from the Python text mining algorithm showing lemma, book/chapter references from *Naturalis Historia,* and the context in which the lemmas were used. (Author: K. Simeonov).

We enhanced the dataset with a range of features, such as contextualization, chapter lookup functions, and lemma-based searches, by algorithmically transforming the Tesserae Project data into a CSV format. The dataset offers a thorough examination of place names, rivers, mountains, and ethnonyms connected to Thrace, consisting of 73 preliminary entries. The proposed context formula, which considers the index of the current token and its surrounding context, has proven to be a valuable tool for exploring the dataset with a nuanced perspective. The Streamlit tool enhances the usability of the dataset, ensuring that it can be leveraged by a broader audience for research and educational purposes.

Our findings demonstrate the significance of considering different word forms in data mining endeavors, as highlighted by intriguing nuances in language usage. Despite not aiming to present an exhaustive list, our work highlights the potential for further research and exploration in this domain.

FUTURE PERSPECTIVES AND PLANS

Looking forward, our plans involve enhancing the algorithm to be able to identify named entities and further optimization would be made to reduce its search speed. We recognize the importance of creating a more comprehensive primary dataset containing the whole classical Latin literature, thus enabling us to do a more complete search process. With this enhancement we would make the algorithm a versatile tool applicable to multiple areas of authors and interests.

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Разплитане на нишките на Тракия: Извличане на данни от „Естествена история“ на Плиний Стари

Кристиян Симеонов

Целта на изследването е да се разработи алгоритъм за извличане на информация за Тракия в текстове на класическата римска литература, като се фокусира върху „Естествена история“ на Плиний Стари. Алгоритъмът, който може да се адаптира за всяко произведение на класически латински език, преобразува данните от формата TESS в CSV набор от данни, което дава възможност за търсене по лема и разпознаване на контекста на съответната глава от произведението с помощта на NLP моделите LatinCy от библиотеката SpaCy. Добавената функция за контекстуализация показва съседните на търсената лема думи. Алгоритъмът е оптимизиран за търсене по няколко леми, поддържа функция за токенизация, контекстуализация и търсене на книги/глави от произведението. Наборът от данни, създаден с помощта на алгоритъма, включва 73 записа, свързани с етноними, топоними, реки и планини в Тракия, което дава възможност за културни, исторически и географски наблюдения. Инструмент за визуализация, разработен с програмната библиотеката Streamlit, осигурява лесен достъп до данните, като чрез интерактивни графики позволява на потребителите да изследват честотата на лемите, споменаванията на глави и контекста. Изследването предоставя метод за намиране на споменавания на Тракия в труда на Плиний, като в бъдеще се планира да се подобри функцията за разпознаване на записите и да се създаде цялостен първичен набор от данни за класическата римска литература.

Thracian Numismatics in the Light of the SILVER Website
(Die Studies Database and Greek Overstrikes Database)

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Abstract: *This presentation aims to illustrate the benefits one can expect using the two ERC SILVER databases: DSD (Die Studies Database) and GOD (Greek Overstrikes Database) (see https://silver.kbr.be/SILVER). For the circumstance, it focuses on the territory of ancient Thrace.*

Keywords: coin die studies, Greek overstrikes, digital humanities, ERC Silver, numismatic website

Ключови думи: проучвания на монетните печати, гръцки контрамарки, дигитална хуманитаристика, проект ERC Silver, нумизматичен уебсайт

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The SILVER website (https://silver.kbr.be/SILVER) is a by-product of the ERC advanced grant SILVER (2017-2024), a generously funded European project led by geophysicist Francis Albarède (Lyon, Ecole Normale Supérieure). This SILVER project itself aims to study the flow of silver in the ancient world through two innovative approaches: analyzing the isotopic compositions of both coins and ores and examining lead isotopes as well as the often-neglected silver isotopes.

The SILVER website, however, does not focus on metallographic analysis. Instead, it concentrates on two types of numismatic data: die-studies and overstrikes ("surfrappes", "Überprägungen", "riconazioni"), with the goal of better understanding the production and circulation of money throughout the Mediterranean basin. I am deeply grateful to Francis Albarède for generously funding this website through the European Research Council's grant. This support has allowed me to fulfill a long-standing ambition: to make accessible the databases I have been developing for over three decades – the Die Studies Database (DSD) and the Greek Overstrikes Database (GOD)[1].

The Die Studies Database (DSD) sig-

[1] Here in a long collaboration with David MacDonald (see *MacDonald* 2009).

nificantly expands upon the two quantitative compilations published in 1997 and 2003, which already offered standardized information for approximately 630 cases[2]. The Greek Overstrikes Database (GOD) aims to compile and edit all recorded instances of overstrikes in the Greek world in the broadest sense, spanning from Spain to the India[3].

As we write, the site is still in the preparatory phase but already contains the equivalent of 8,500 pages (of which two-thirds can be considered edited) and 640,000 property values.

1. COMMON FEATURES

The SILVER website and its two databases are built entirely upon the ontology created by NOMISMA, driven by the visionary efforts of Andrew Meadows. Through NOMISMA, stable URLs are assigned to each workshop, individual, and authority name. NOMISMA's goal is not to subsume other sites but to ensure that all entities within this digital ecosystem utilize its framework. Today, the field of Greek numismatics benefits immensely from a shared lexicon and digital tools[4]. Similarly, all entries in DSD and GOD are referenced by a unique number (some 12,000 to date).

Adopting this ontology and establishing as many connections as possible with NOMISMA, the SILVER website itself was developed by Bernhard Krabina, the IT specialist, who crafted the site using the MediaWiki technology as he had previously done for the FINA (*Fontes Inediti Numismaticae Antiquae*) website[5]. Similar to FINA, the SILVER site offers various navigation methods, providing a plethora of options (especially for maps and statistics) (**Fig. 1**).

The two databases open with a map that encompasses all cases mentioned in the database. For DSD, over 2,770 die studies have already been entered, with over 2,600 pertaining to the Greek world (May 2024). The objective here is to also integrate coin studies from the Celtic, Roman (imperial and provincial), and even Byzantine worlds. For GOD, over 2,950 overstrikes from the Greek world have already been incorporated (May 2024), with more than 2,000 considered fully edited.

In the example shown here, number 3196

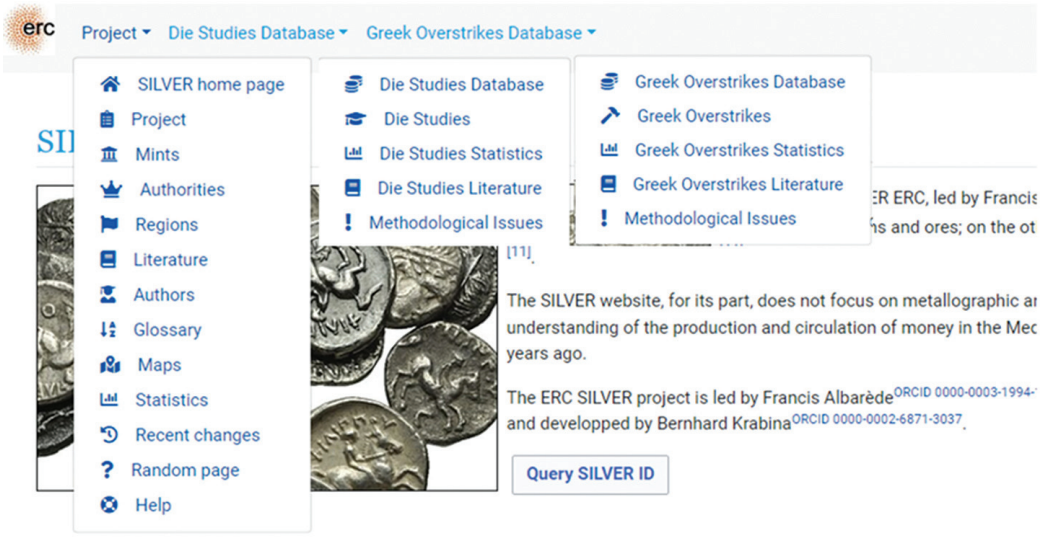

Figure 1. Main menus of the SILVER website (https://silver.kbr.be/SILVER).

[2] *Callataÿ* 1997 and 2003. For Sicily as a case-study of the DSD, see *Callataÿ* (to appear).

[3] For a general presentation, see *Callataÿ* 2017b; for a general explanation, see *Callataÿ* 2018a; for the historiography of the topic, see *Callataÿ* 2023a; for studies focusing on more precise issues or areas, see *Callataÿ, Carrier, Hanczack, Albarude* (to appear) (Sicily), *Callataÿ* 2017a (late Mesembrian Alexanders), *Callataÿ* 2021a (late Hellenistic tetradrachms in Thrace and Macedonia), *Callataÿ* 2023b (Pontic kingdom) *Callataÿ* 2018b and 2022 (5th-4th c. Pamphylia-Cilicia) *Callataÿ* 2021b (Alexander tetradrachms from Tyre).

[4] https://numishare.blogspot.com/2023/07/greek-types-from-iris-integrated-into.html

[5] Focusing on unpublished sources related to ancient coins before 1800, this site, with its nearly 6,000 letters and 2,500 characters, now stands as the foremost source of information for numismatic antiquarianism (https://fina.oeaw.ac.at/FINA#!).

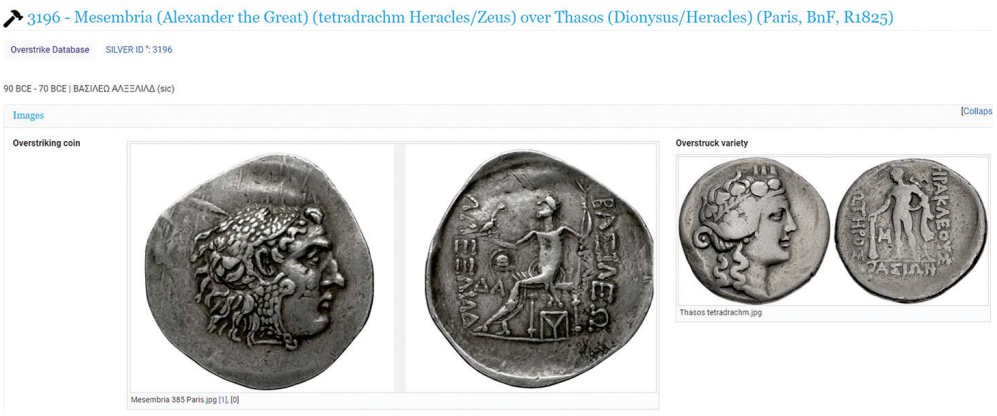

Figure 2. ID 3196 – Overstrike of a late tetradrachm of Mesembria in the name of Alexander the Great over a late tetradrachm in the name of the Thasians. (https://silver.kbr.be/Special:URIResolver/?curid=3196).

corresponds to the overstrike of a late tetradrachm of Mesembria in the name of Alexander the Great over a late tetradrachm in the name of the Thasians (**Fig. 2**). Every entry provides the description of both types as well as their printed and digital references (referring to IRIS) (**Fig. 3**).

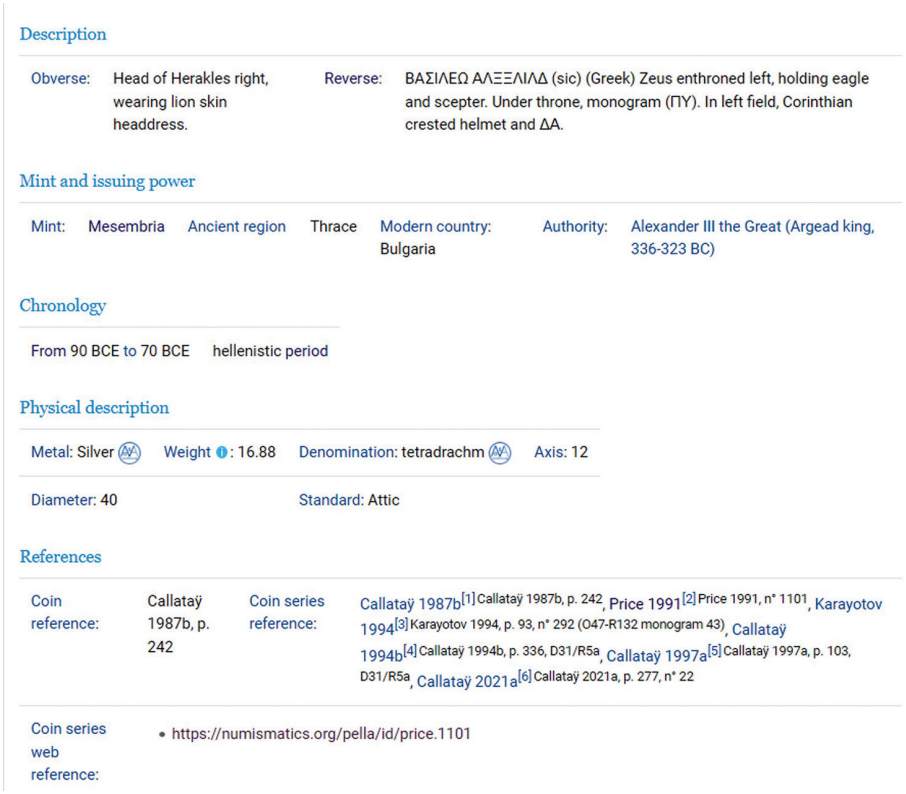

Figure 3. Description of the overstriking coin (ID 3196). (https://silver.kbr.be/Special:URIResolver/?curid=3196).

From there, it is possible to click on each entry (the workshop, the authority, or the bibliographic references). For example, here, you are taken directly to the bibliographic entry "Karayotov 1994" (**Fig. 4** – also providing all the entries where this reference is used [in this case, a few die studies and several dozens of overstrikes]) and from there to its author "Ivan Karayotov." (**Fig. 5**).

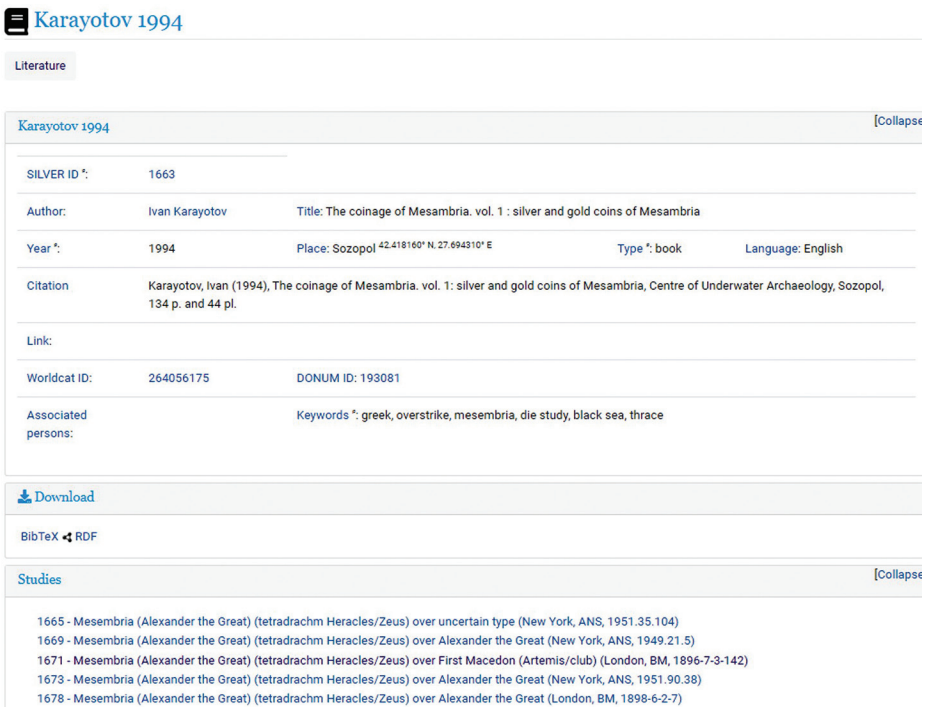

Figure 4. ID 1663: Karayotov 1994.
(https://silver.kbr.be/Special:URIResolver/?curid=1663).

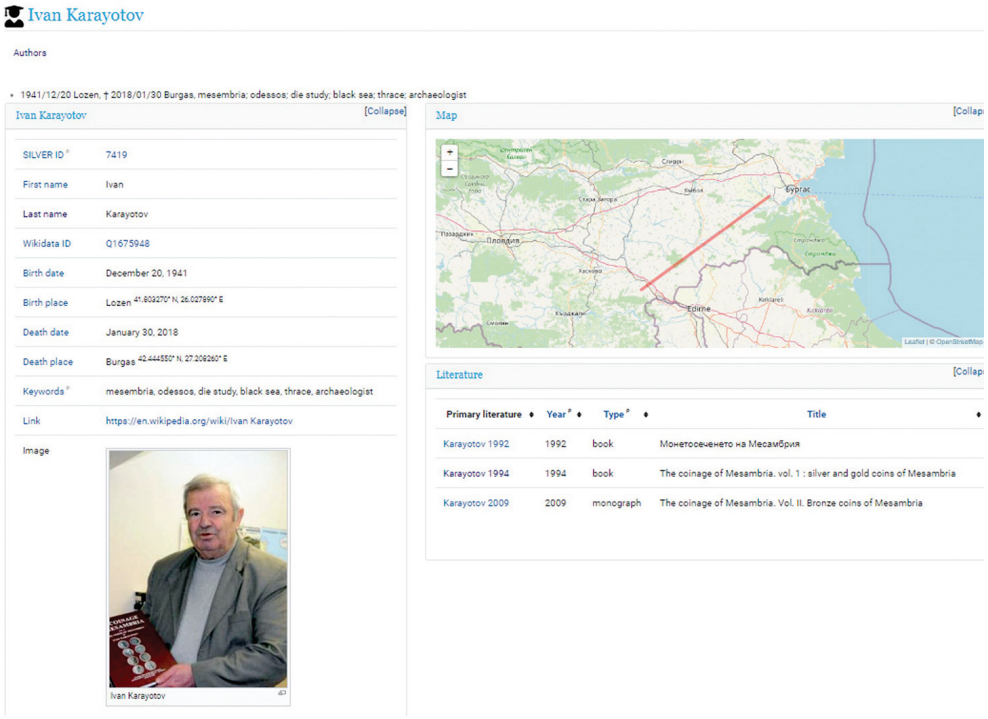

Figure 5. ID 7419: Ivan Karayotov.
(https://silver.kbr.be/Special:URIResolver/?curid=7419).

2. The Die Studies Database (DSD)

The DSD database was designed to aid in the economic understanding of the monetary phenomenon in antiquity. With already ca 2,800 die studies integrated, DSD offers a comparative power that has been lacking in the scientific community until now. Special attention has been given to the automatic generation of statistics (**Fig. 6**).

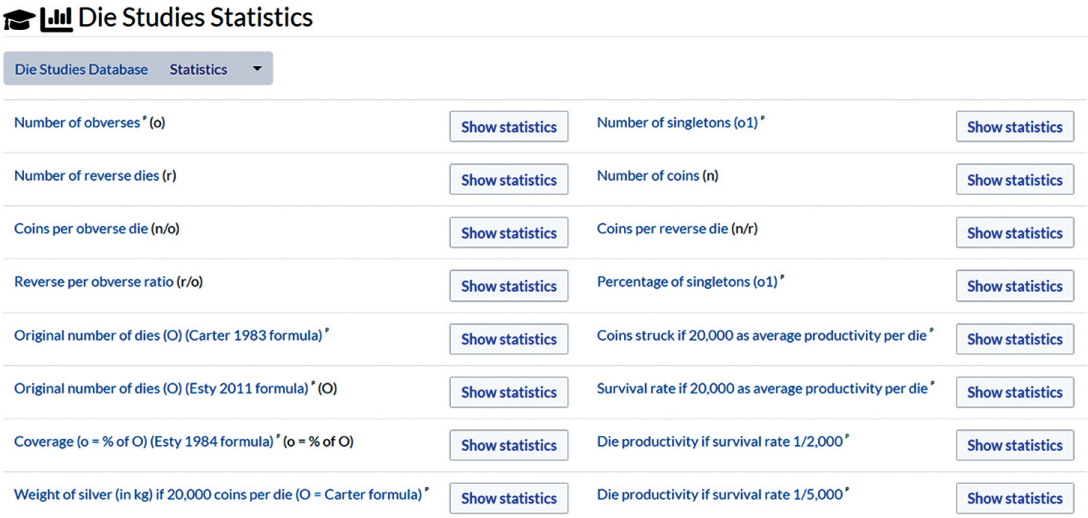

Figure 6. Die studies statistics offered by DSD.
(https://silver.kbr.be/Die_Studies_Statistics).

Its most striking yet speculative advancement is perhaps the proposal of a table depicting production volumes calculated in tons of coined silver. Included here are only the coinages in gold and silver with a ratio "number of coins/number of obverse dies" greater than two. For the sake of necessary simplification, the gold/silver ratio has been set at 10:1 for all coinages, and the average coin production per obverse die at 20,000 specimens. These assumptions are, of course, subject to significant qualification (see methodological remarks provided on the website), but they serve the purpose of enabling a general comparison by at least providing an order of magnitude. The overall table indeed reinforces the plausibility of such estimations, with amounts exceeding the equivalent of 100 tons of coined silver only achieved by the very large producers: Carthage, Rome, Athens, Alexander the Great, and the Ptolemies (**Fig. 7**).

Figure 7. Map of estimating coin production sizes (DSD).
(https://silver.kbr.be/Map_of_Estimated_Coin_Production_Size).

For the Thracian territory, the productions are of limited scale, with none reaching 50 tons of coined silver (indicated in orange or red). The only production exceeding 20 tons (in yellow) is from the late Alexanders minted in Mesembria, amounting to nearly 35 tons (**Fig. 8**).

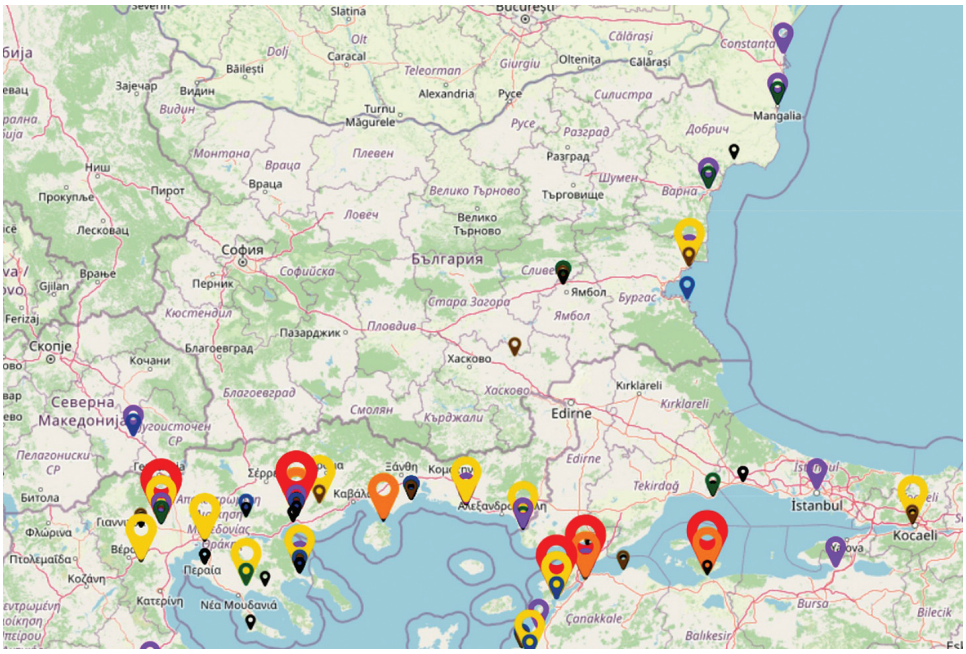

Figure 8. Map of estimating coin production sizes – Thrace (DSD).
(https://silver.kbr.be/Map_of_Estimated_Coin_Production_Size).

Out of the 2,770 die studies already entered into DSD, 84 originate from the geographic areas occupied by Bulgaria today (38 for "Thrace (uncertain mint)," 22 for "Mesembria," 12 for "Cabyle," 7 for "Seuthopolis,", 2 for "Dionysopolis" and "Odessus," and 1 for "Apollonia Pontica") (**Fig. 9**).

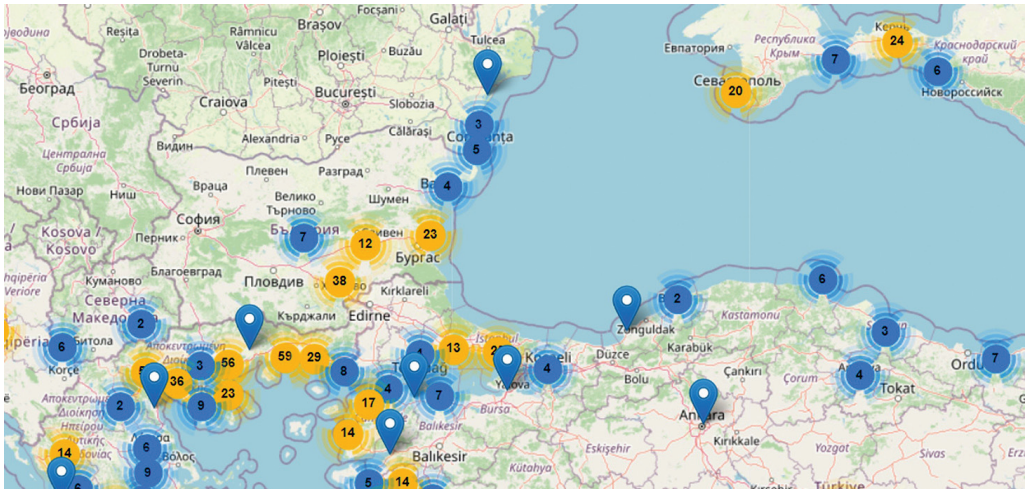

Figure 9. Die studies for Bulgaria (DSD).
(https://silver.kbr.be/Die_Studies_Database_Map).

An interesting feature provided by SILVER is the ability to create maps by adjusting a variety of parameters, including start and end dates, mint, authority, metal, and weight. Additionally, it offers two criteria that require some interpretation:

1) The number of workstations, with three options: likely one workstation, likely two workstations, and likely more than two workstations.

2) The nature of coinage, with four possibilities: undefined, likely non-military, likely military, and surely military.

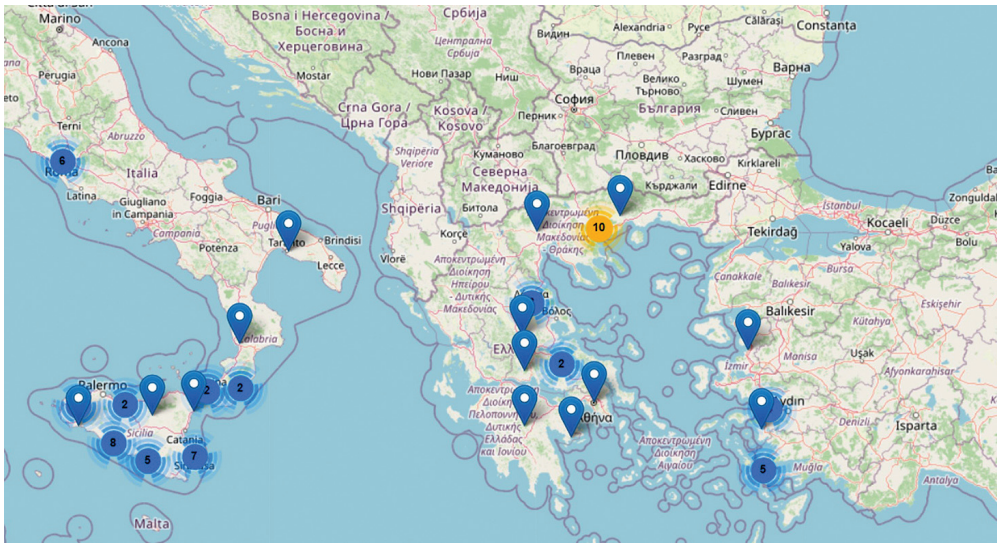

Figure 10. The distribution map (central part) for coin issues with two or more workstations working at the same time (DSD). (https://silver.kbr.be/Special:BrowseData/Die_Study).

The map provided here includes the 92 cases identified so far where the complexity of the die links suggests that there were multiple teams working simultaneously (**Fig. 10**). It can be observed that this phenomenon is quite widespread in Sicily but relatively rare in Asia Minor and unobserved so far for the coinages supposed to have been issued on the territory of modern Bulgaria.

By using the authority criterion, one can create maps displaying all coin issues featuring the types of Alexander the Great or Lysimachus (**Fig. 11**), with detailed lists available for each request.

Figure 11. Dispersion map of all the Alexander and Lysimachus coin issues (DSD). (https://silver.kbr.be/Die_Studies_Database_Map).

However, this filter can be combined with one or more others (metal, weight, chronology). For instance, if we limit the selection to coin issues minted after 150 BC, we get the following map, which clearly shows that the Alexanders and Lysimachus coins were only minted in the west Black Sea area during that period (**Fig. 12**).

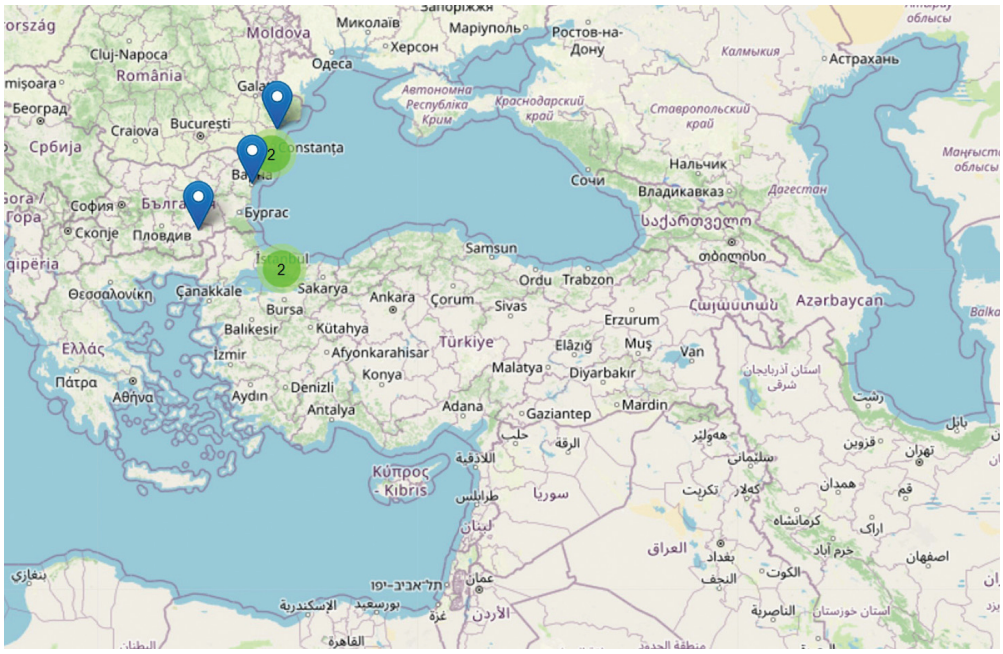

Figure 12. Dispersion map of all the Alexander and Lysimachus coin issues struck after 150 BCE (DSD). (https://silver.kbr.be/Die_Studies_Database_Map).

3. THE GREEK OVERSTRIKES DATABASE (GOD)

Navigating into the Greek Overstrikes Database (GOD) is easy with the help of three maps: the first offers numerous filter options; the second allows for the visualization of all overstriking coins, while the third does the same for all identified cases of overstruck coins (**Fig. 13**).

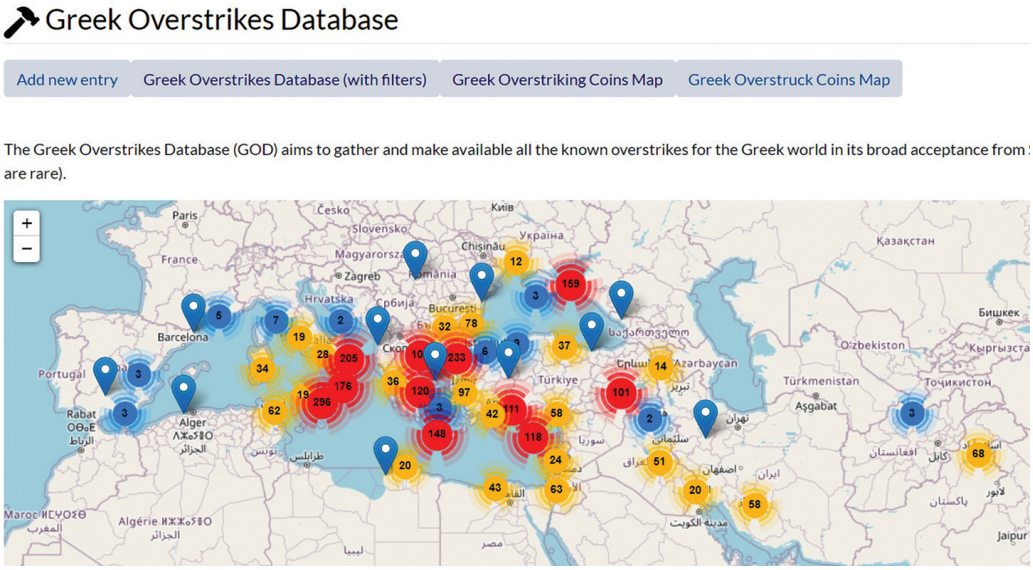

Figure 13. Homepage for navigating the GOD portal. (https://silver.kbr.be/Greek_Overstrikes_Database).

GOD already includes over 110 cases for the territory of present-day Bulgaria, with the majority originating from the Mesembria mint (**Fig. 14** – for an example, see also **Fig. 2**). It should be noted that in instances of widespread occurrences, a decision was made to limit the record to 30 examples for each type of overstrike (involving the same coinages, both overstruck and overstriking).

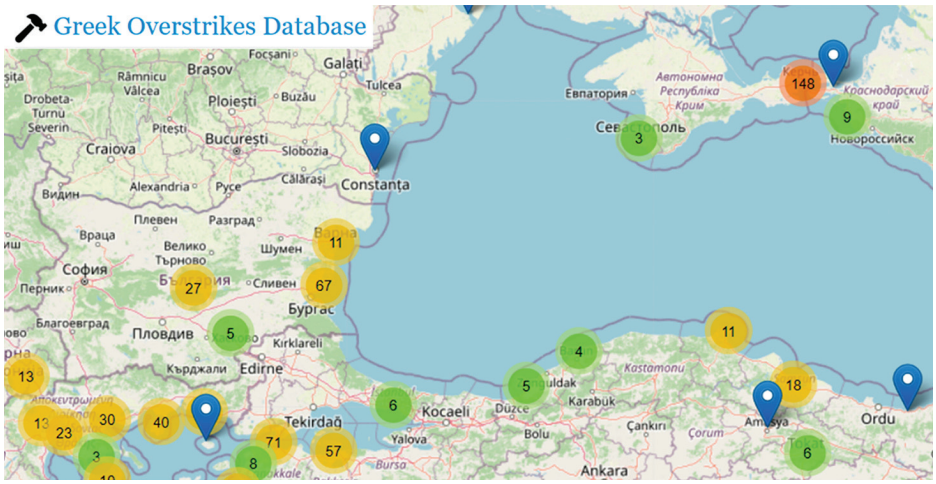

Figure 14. Dispersion map of the Thracian overstrikes (GOD).
(https://silver.kbr.be /Overstriking_Coins).

Considering the quantities issued, the tetradrachms in the name of Alexander the Great were rarely overstruck (**Fig. 15**).

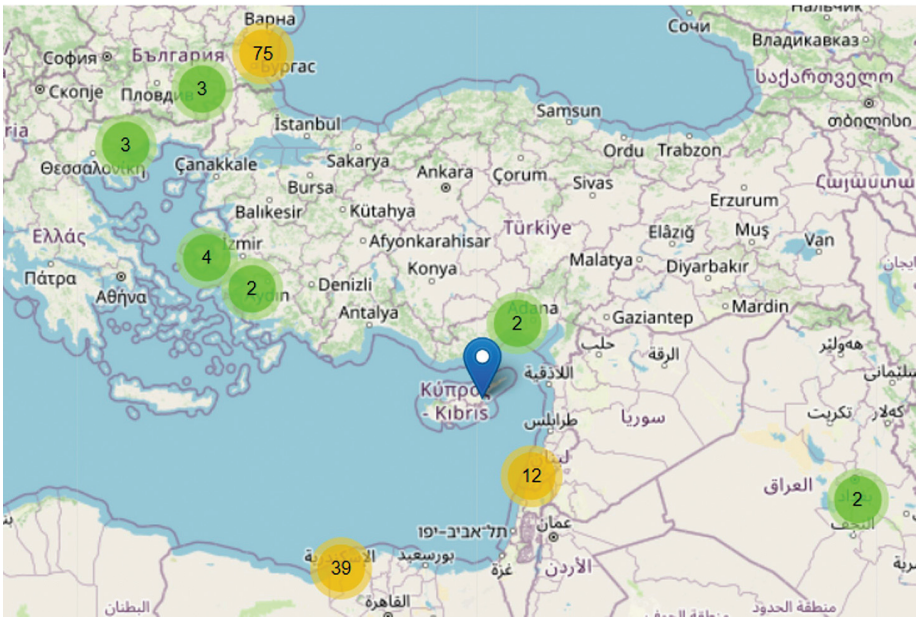

Figure 15. Dispersion map for all the tetradrachms in the name of Alexander the Great
(https://silver.kbr.be/Overstriking_Coins).

More precisely, they were almost never overstruck except in a few specific cases: in Phoenicia in the years 330-320, in Egypt (i.e., Alexandria) after Ptolemy I Soter established a closed monetary economy with a change of weight standard in 305, and in Mesembria after 150 BCE.

The map of overstruck coins allows for the visualization of phenomena by indicating the direction of certain metal flows, from their initial place of production to their subsequent reuse. For the horizon of the northern Aegean Sea, the movement of a series of coinages can thus be traced. For example, it is observed that the stephanephoric tetradrachms of Athens, massively imported into Macedonia in the second half of the 120s, were primarily overstruck in Mesembria (as Alexanders), Thasos (as coins featuring Heracles), and Thessalonica (as coins in the name of Aesillas) (**Fig. 16**). Conversely, no stephanephoric tetradrachm has yet been detected as overstruck anywhere other than in the northern Aegean.

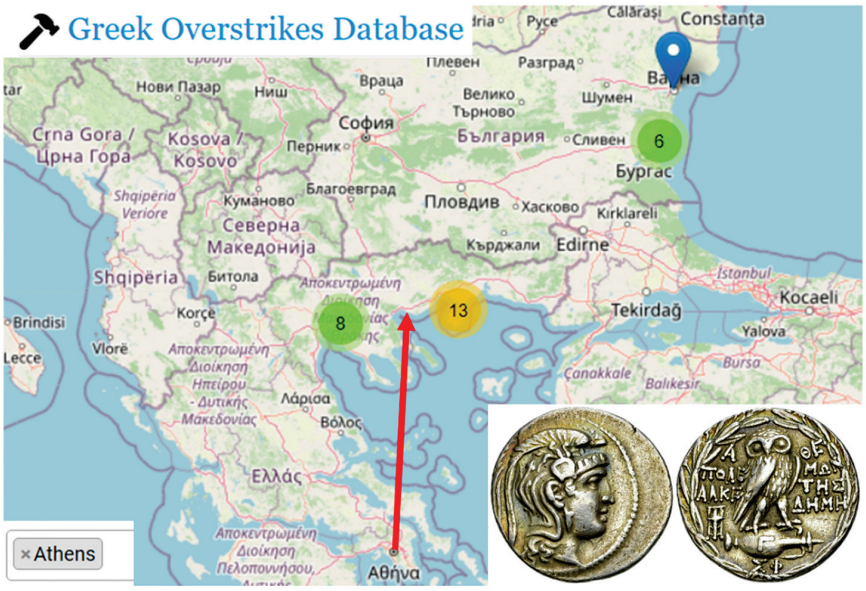

Figure 16. Dispersion map for overstruck stephanephoric tetradrachms of Athens. (https://silver.kbr.be/Overstruck_Coins).

For the coinages of Macedonia and Thrace issued at the end of the Hellenistic period under Roman authority, the movement consistently pushes eastward. This is the case for the Macedonian tetradrachms of the First Region (**Fig. 17**), whose overstruck examples are found in Mesembria and – much more significantly – in Asia Minor, in Ephesus and Tralles, in the form of cistophoric tetradrachms issued by Attalus III, shortly before he bequeathed his kingdom to Rome.

Figure 17. Dispersion map for overstruck tetradrachms of the First Macedonian Meris. (https://silver.kbr.be/Overstruck_Coins).

And the same phenomenon is observed, on a larger scale, for the last Hellenistic tetradrachms in the name of the Thasians, whose principal quantities were issued in the first decades of the 2nd century with 18 occurrences for the mints along the Black Sea (11 for Mesembria and 7 for Odessus), 5 for the Troad (4 for Tenedos and 1 for Alexandreia Troas) and 3 for Ionia (2 for Ephesus and 1 for Tralles) (**Fig. 18**).

Figure 18. Dispersion map for overstruck late tetradrachms in the name of the Thasians. (https://silver.kbr.be/Overstruck_Coins).

As for the tetradrachms in the name of Aesillas, which for convenience have been assigned an issuing location of Thessalonica here, they also follow an eastern route: they are primarily found overstruck in Thasos (11 cases) and Maroneia (8 cases), but occasionally even further afield in Abydos and Byzantium (**Fig. 19**).

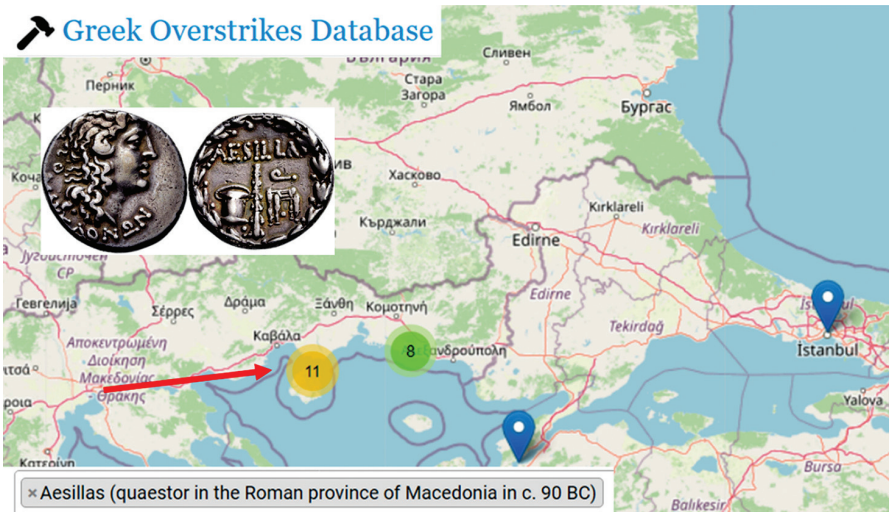

Figure 19. Dispersion map for overstruck tetradrachms in the name of Aesillas. (https://silver.kbr.be/Overstruck_Coins).

Finally, it is interesting to note that the rare three instances of overstrikes on tetradrachms in the name of Mithridates Eupator are also found at the same time in the same region at the intersection of Europe and Asia: Maroneia, Abydos, and Byzantium (**Fig. 20**)[6].

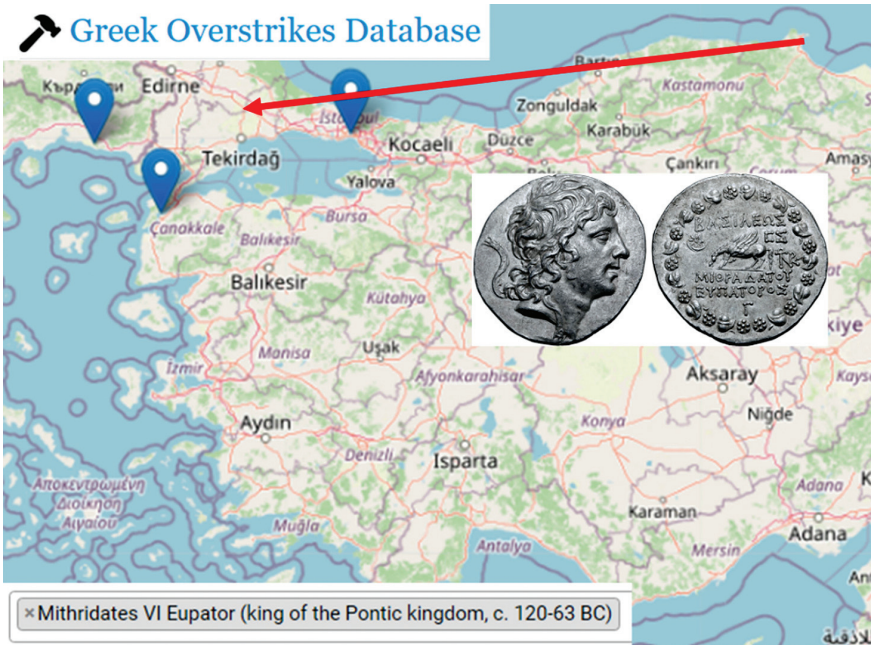

Figure 20. Dispersion map for overstruck tetradrachms of Mithradates Eupator. (https://silver.kbr.be/Overstruck_Coins).

The few results presented here are merely indicative of the richness of these two databases, which offer many other possibilities, particularly through statistical tools that have only been partly evoked here (see **Fig. 6**).

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Тракийската нумизматика в светлината на уебсайта SILVER (база данни на монетните печати и база данни на гръцките контрамарки)

Франсоа дьо Калатай

Целта на настоящия текст е да илюстрира ползите от използването на двете ERC SILVER бази данни: DSD (Die Studies Database / база данни за монетни печати) и GOD (Greek Overstrikes Database / база данни за гръцките контрамарки) (вж. https://silver.kbr.be/SILVER). Тук фокусът е поставен върху територията на древна Тракия. От ок. 2770 записа вече въведени в DSD, 84 произхождат от географските области на територията на Република България (38 за „Тракия (несигурен монетен двор)“, 22 за Месембрия, 12 за Кабиле, 7 за Севтополис, 2 за Дионисополис, 2 за Одесос, и 1 за Аполония Понтика). GOD вече включва над 110 записа (от ок. 3000) за територията на днешна България, като по-голямата част са от монетарницата на Месембрия (65). Картата на контрамаркираните монети дава възможност за визуализиране на явления, като указва посоката на определени метални потоци от първоначалното им място на отсичане до последващата им повторна употреба. Конкретно за хоризонта на северния егейски бряг може да се проследи движението на множество монетосечения.

Numismatic Databases: History of Bulgarian Interdisciplinary Studies

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Abstract: *The report briefly presents the path followed by Bulgarian scientists from the 1990s to today in the direction of using artificial intelligence (AI) in historical research. Emphasis is placed on the creation, the general functional scheme, the data structure, and the functionalities of the Bulgarian expert system for the identification and classification of ancient coins, PSAMS, as a new, modern way of analyzing numismatic material.*

Keywords: Artificial Intelligence, Symbolic and Algebraic Manipulation, Special-purpose algebraic systems, Applications, Interdisciplinary Studies, Numismatic databases

Ключови думи: изкуствен интелект, символни и алгебрични преобразования, системи за компютърна алгебра, компютърни приложения, интердисциплинарни изследвания, нумизматични бази данни

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At the end of 2020, with Protocol 72 of the regular meeting of the Council of Ministers on December 16, 2020, a Concept for the development of artificial intelligence in Bulgaria until 2030 was adopted. According to the official website of the Ministry of e-Government, "the document offers a comprehensive vision for the development and use of artificial intelligence in Bulgaria. It is based on the strategy and program documents of the European Commission, which consider artificial intelligence as one of the main drivers of digital transformation in Europe.

The main objective of the concept is to unite efforts in the development and implementation of artificial intelligence systems by creating scientific, expert, business and management capacity. It is planned to provide modern communication and scientific infrastructure for the development of new generation digital technologies. The education and lifelong learning system will be improved. The development of scientific research and the implementation of innovations in key sectors will be supported, and work will be done to introduce an ethical legal and regulatory frame-

work that enjoys public trust[1].

This is the current situation. Since December 2023, the INSAIT Institute at Sofia University has been operational in Bulgaria, joining approximately 50 organizations worldwide as part of the historic first global Alliance for Artificial Intelligence. Recently announced in the US by IBM and Meta, this initiative aims to unite the world's foremost minds from the private sector, academia, and institutions to develop open, safe, and accountable AI. The Alliance carefully selected its founding members, including some of the strongest universities and development centers globally. Notably, the Bulgarian INSAIT Institute aligns itself with esteemed scientific institutions such as NASA, CERN, Harvard University, Yale University, University of California, Berkeley, ETH Zurich, among others, as well as leading technology companies like Sony, Linux, Intel, AMD, and Dell.

The Bulgarian Institute not only participates in the Alliance but also registers its name among the founders of the initiative, which aims to reshape the future of AI on a global scale. The collective impact of the organizations involved is underscored by aggregated data: their combined budget for development activities exceeds $80 billion annually, they employ a total of 1 million individuals, and they educate 400,000 students. Further confirming its active role in AI technology development is the information available on the institution's official website: "INSAIT is developing BgGPT, the first specialized Bulgarian language model tailored for Bulgarian users, institutions, and businesses. As part of BgGPT, INSAIT will release a series of free and open language models" (source: https://bggpt.ai).

After presenting these impressive contemporary statistics, let us now revisit the history of AI in Bulgaria. Establishing the undeniable leading position of our country in the development and application of AI today necessitates a stable foundation. Despite the presence of the Iron Curtain at the time, scientific interest in AI in Bulgaria emerged nearly simultaneously with other European countries, which were closely following trends in the USA. The initial research projects took place within scientific units of the Bulgarian Academy of Sciences, including the Institute of Mathematics (IM), the Institute of Technical Cybernetics (ITK), which was transformed in 1978 into the Institute of Technical Cybernetics and Robotics (ITKR), the Center for Scientific Information, the Center for Science, and the Institute of Philosophy.

The journey began back in 1968 with a team of scientists from the "Mathematical Assurance" section, led by Prof. Petar Burnev, at the Institute of Mathematics of the BAS. This team embarked on projects involving the computer implementation of the first Bulgarian intellectual game, heuristic programming, and learning languages such as "LISP" and "Prolog." Under the guidance of Prof. Valentin Tomov, the focus shifted to analytical transformations, particularly Symbolic and Algebraic Transformations (SAP), known internationally and gaining popularity in Bulgaria as "systems for computer algebra". These systems were specialized in various mathematical fields, such as indefinite integrals, rational functions, matrices, and continued fractions. An expert system was developed, along with language tools, to utilize mathematical knowledge within the Reduce-2 system for analytical transformations.

In 1980, the "Artificial Intelligence in Mathematical Assurance" (IIMO) research group was established within the Department of Mathematics and Physics, led by Prof. Valentin Tomov. Its research primarily focused on the REDUCE 2 and SAC-2 systems, as well as the group's ideas for further developments using these systems.

In 1981, systematic training in artificial intelligence was initiated at the Faculty of Mathematics and Mechanics at St. Kliment Ohridski University. The lecture course was logically led by Associate Professor V. Tomov, who was the first Bulgarian scientist to defend a doctoral dissertation in informatics (1975).

[1] <https://egov.government.bg/wps/portal/ministry-meu/strategies-policies/digital.transformation/itis-national-strategic-documents/ai.development.concept.2030> (accessed 26.02.2024).

He was also the founder and initial head of the "Artificial Intelligence" section at the Institute of Mathematics of the BAS, laying the groundwork for interdisciplinary research utilizing AI.

By 1985, the IIMO group evolved into the "Artificial Intelligence" section under the continued leadership of Prof. Valentin Tomov. Following his untimely death in 1995, Prof. Alexander Gerov assumed leadership of the section. In 2010, several members of the section retired, leading to its closure at the end of the year. Throughout its decades-long existence, the section was characterized by active research and scientific-applied endeavors.

As early as 1974, Prof. V. Tomov conducted the pioneering interdisciplinary research utilizing AI, alongside Ivan Velchev, focusing on the design and management of ventilation systems in mines to prevent explosions (known as the Hades system). Over the following two decades, scientists from the AI section at the Institute of Mathematics of the BAS embarked on numerous projects in the field of informatics, collaborating with researchers from diverse disciplines. These collaborations included ventures in archaeology with Prof. Henrietta Todorova, history with Prof. Margarita Tacheva, and music composition with Simeon Pironkov. Additionally, collaborations extended to fields such as mechanics, led by Prof. Kolyo Minkov from the Institute of Mechanics of the BAS, and neurophysiology and sensory systems with Prof. Angel Vassilev, focusing on information processing in the visual system, among others.

The first collaborative project in the realm of humanities was initiated alongside the Problem Group on Interdisciplinary Research at the Archaeological Institute, later evolving into the Section for Interdisciplinary Research at NAIM-BAS under the leadership of Prof. H. Todorova. Scientists from the AI section embarked on developing a system for the recognition and classification of archaeological ceramics employing production rules. Efforts were made to integrate the newly formulated fuzzy set theory by the esteemed American scientist Prof. Lutfi Zadeh.

A significant milestone in the advancement of AI in Bulgaria was the organization of an international conference on AI, featuring invitations extended to prominent foreign scientists. The initiative stemmed from Assoc. Prof. Dr. Vasil Sgurev, the acting director of ITKR at the BAS, and Assoc. Prof. Dr. Boris Petkov from the Center for Science and Technology at the BAS. The inaugural scientific conference AIMSA'84 (Artificial Intelligence, Methodology, Systems, and Applications) took place in September 1984 in the Golden Sands resort, near Varna. Prof. Wolfgang Bibel, a West German scientist and chairman of ECCAI (European Coordination Committee on Artificial Intelligence), provided active support in the organization. Conference proceedings were published by the "Nord-Holland" publishing house. It was decided that the AIMSA international conference would be held biennially under the auspices of ECCAI. During this pivotal inaugural conference, Assoc. Prof. V. Tomov's team presented the outcomes of their interdisciplinary research in the fields of archaeology and history[2].

The Second International Conference AIMSA'86 stands out as particularly successful, with the participation of an International Program Committee chaired by Prof. Philippe Joran, director of the Laboratory of Informatics and Artificial Intelligence in Grenoble, France. The presence of renowned British scientist Prof. Robert (Bob) Kowalski, a leading figure in the development of the Prolog language, generated significant interest. Notably, a substantial delegation of leading scientists from the Computing Center of the Academy of Sciences of the USSR, led by Academician Hermogen Pospelov, contributed to the conference proceedings. During this event, Bulgarian scientists showcased their advancements in AI, presenting progress in interdisciplinary studies and unveiling the ESIT expert system for analyzing ancient historical-geographical texts about Ancient Thrace[3].

[2] *Tomov, Sahno* 1985.

[3] *Tomov, Tacheva, Grigorov* 1987; *Tomov, Tacheva, Grigorov* 1989. The team of the historians from the Sofia University was led by Prof. M. Tacheva and included also her students, and then colleagues Dilyana Boteva and Konstantin Boshnakov.

The tradition of hosting the AIMSA conference persisted even after the democratic changes in Bulgaria. From 1994 to 2018, seventeen editions of the conference were held, marking the longest series of events with international participation organized by BAS. This achievement stands as a testament to the remarkable contributions of Bulgarian scientists in the field of AI.

The development of an expert system for the recognition, classification, and archiving of coins and coin treasures using AI, known as PSAMS, commenced in the late 1980s. The team from the "Artificial Intelligence" section at the Institute of Mathematics of the BAS, led by Prof. V. Tomov, collaborated with Prof. M. Tacheva, Dr. Ilya Prokopov, director of RIM Kyustendil, and Valentina Grigorova, a graduate student in the Department of Ancient History and Thracology at Sofia University St. Kliment Ohridski[4]. The primary objective of the system is to educate the machine in recognizing coins, establish a comprehensive database, and effectively manage and utilize it.

The PSAMS system operates in three primary modes: first, creating a knowledge base and populating the database with detailed descriptions of specific coins; second, recognizing and categorizing coins based on their descriptions in the database; and third, fulfilling user requests. Through these functionalities, users can search for specific coins within the database, modify or edit entered data, conduct statistical analyses, and generate reports. An important feature of PSAMS is its ability to incorporate confidence factors in coin descriptions stored in the database and the rules of the knowledge base. This coefficient enables the relativization of numismatic information, particularly for coins with a low degree of preservation and illegible legends.

The expert system underwent successful testing at the History Museum in Kyustendil, utilizing various types of ancient coins from its numismatic collection. The next phase of system development aimed to incorporate Roman provincial coins from Lower Moesia and Thrace (2nd – 3rd centuries) into the database for automatic identification and classification. Unfortunately, the untimely passing of Prof. Valentin Tomov, and Dr. Ilya Prokopov's transition to another role interrupted further progress on this innovative interdisciplinary project, which was partially funded by the Ministry of Education, Science, and Culture.

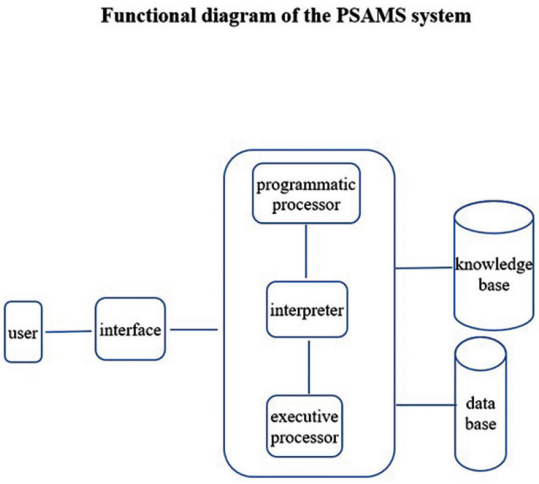

Figure 1. Functional diagram of the PSAMS system.

Continuing the endeavor, Dilyana Boteva took up the task of creating a unified, publicly accessible database in the field of ancient world research. Since 1994, she had been developing a database featuring reliefs of the Thracian Horseman under a project financed by the "Young Scientists" fund of the Ministry of Education and Culture. The project garnered recognition in 1996 with a nomination for the most successful project. Dilyana Boteva continued to populate this database until 2006, and the outcomes of her efforts led to the defense of her degree of "Doctor of Sciences" in 2007[5].

The project "Measuring Ancient Thrace: Re-evaluating Antiquity in Digital Age," (Project no. КП-06-Н 50/3 from 30.11.2020, financed by BNSF) under the scientific leadership of Assoc. Prof. Dr. Julia Tzvetkova, aims to stimulate necessary methodological discus-

[4] *Tomov et al.* 1989; *Grigorova* 1994; *Tomov, Grigorov, Vakarelov* 1994; *Tomov et al.* 1994; *Grigorov, Vassileva* 1994.
[5] *Boteva* 2002; *Boteva* 2006; *Boteva-Boyanova* 2006; *Boteva* 2007; *Boteva-Boyanova* 2007.

sions regarding the role of digital technologies and exact scientific methods in researching the history of ancient Thrace, both theoretically and practically[6]. As part of the project, the development of a web-based application is envisioned to encompass data from various sources, including written records, archaeological sites, epigraphic documents, and numismatic data, with a particular emphasis on the outcomes of archaeometric studies – an integral aspect of the project. This conceptually innovative database seeks to establish standards for describing heterogeneous objects, enabling search, extraction, and visualization of information. It is envisioned as a pivotal research and analytical tool, with its web-based nature ensuring widespread accessibility and the "democratization of information". Fulfilling dual public functions, it aims to aid in building an international academic network while providing expert scientific opinions to the public on contentious topics related to the cultural and historical heritage of ancient Thrace.

The initial phase of product development entails expanding the data model created by Corpus Nummorum to handle both numismatic and epigraphic data simultaneously within a single system.

Corpus Nummorum (CN) Online is a web portal dedicated to ancient coins from historical regions including Lower Moesia, Thrace, Mysia (Asia Minor), and Troad. The project involves collaboration among three institutions: the Berlin-Brandenburg Academy of Sciences (BBAW), the Mint Cabinet at the State Museums in Berlin (Münzkabinett der Staatlichen Museen zu Berlin), and the Big Data Lab at the University of Frankfurt. Funding is channeled through projects aimed at processing ancient Greek coinage by regions and mints, aligned with scientific research objectives and cultural heritage preservation. While there are variations in available data and outcomes across sub-projects targeting specific regions, the overarching goal is to produce type catalogs for relevant mints[7].

The research database for collecting and categorizing numismatic data comprises two primary collections. Drawing from material sourced from approximately 100 mints within the designated regions, it incorporates segments of the collection from the Mint Office, Berlin, as well as the plaster cast collection at the Berlin-Brandenburg Academy of Sciences (BBAW). These collections consist of coin copies from various mints, originating from historically rich yet partially lost collections. Moreover, digital museum catalogs are integrated, and ongoing efforts are made to process new materials. Embracing the ethos of public science, the platform allows for data upload via an online form, thereby enriching the portal. The database facilitates the scientific classification of individual coins, which can be linked to the stamps used for their issue and grouped by type. Users have the ability to sort types, distinguish subtypes, or amalgamate them into larger groups (series/issues). All coins featured on the portal are meticulously detailed in both German and English.

Corpus Nummorum is evolving through an expanding network of partners. Notably, Bulgarian participants within the team have made a significant contribution by introducing the Bulgarian language as the third primary language for the portal. Clear criteria have been established for both image descriptions of individual coins and types, aiding in the enforcement of standardization (accessible via the "Help" button for description rules when adding a coin). Such a concise and multilingual standardization is unprecedented in numismatics, where traditionally each scientist or national school describes coins according to their own set of rules and regulations[8].

The portal cooperates closely with an international initiative under the supervision of the International Numismatic Council (INC) aimed at processing the types of Greek coins in the Semantic Web (https://www.greekcoinage.org/). All relevant fields in the database are linked to normed data (http://nomisma.org).

[6] <https://digithrace.uni-sofia.bg/about/>, (accessed 01.07.2024).
[7] *Peter* 2021; *Peter et al.* 2024.
[8] *Grozdanova* 2018; *Grozdanova* 2021; *Grozdanova*, *Ivanova-Aanaplioti* (forthcoming).

The production of coin type catalogues entails structuring the available material precisely according to the iconographic types associated with individual specimens. Coins are analyzed based on their metric data, provenance information, and descriptions of their legends and images following standardized rules. This approach facilitates the creation of a foundational database for generating type catalogs for each region, which will naturally require ongoing supplementation. Continual additions can be made as coins from other collections within each of the four regions are incorporated into the database. Additionally, registered users have the option to contribute their own coins, thereby expanding access to the scientific community.

The consistent utilization of Linked Open Data and adherence to standardized data formats enable seamless exchange with other collections. Search functionality is accessible both through the general portal and at the level of sub-pages dedicated to individual regions such as Thrace, Lower Moesia, Mysia (Asia Minor), and Troad. For more advanced research endeavors, the SPARQL-endpoint of the portal offers enhanced capabilities: https://www.corpus-nummorum.eu/sparql/

The latest phases of Corpus Nummorum (CN) development are intertwined with the field of artificial intelligence (AI), focusing on applications in natural language processing (NLP) and image recognition (IR). These advancements are available for testing by the general public, with open access provided. https://github.com/Frankfurt-BigDataLab/NLP-on-multilingual-coin-datasets and https://github.com/Frankfurt-BigDataLab/IR-on-coin-datasets

The portal team collaborates closely with Bulgarian researchers and actively participates in various projects, including DiGiThrace and the ACCSN network, established to combat the counterfeiting of ancient coins. The creation of the ACCSN network was supported by the "Humboldt-Alumni-Preis 2021" award from the Alexander von Humboldt Foundation, presented to Prof. DSc Dilyana Boteva-Boyanova. Counterfeiting of numismatic cultural heritage poses a global challenge, impacting historical integrity, scientific authenticity, and the market for cultural artifacts. Counterfeits not only distort historical narratives but also have profound societal and economic repercussions.

In response to this pressing international issue, it is imperative to implement fundamental measures to address the threat. The creation of a robust and proactive academic network represents the most effective approach to prevention. The ACCSN network focuses on enhancing knowledge transfer and fosters academic, cultural, and inter-institutional cooperation. It aims to engage a wide array of international experts and stakeholders, including auction houses, museums, and collectors worldwide. Presently, the network comprises 38 members from 10 countries across three continents.

An essential aspect and objective of the initiative involve the development of an IT-based digital tool to actively combat the proliferation of numismatic counterfeits. There is a critical need for a dedicated platform to facilitate the collection and analysis of data on detected counterfeits. Such a tool is indispensable for refining specialized practices in counterfeit detection and preventing the infiltration of fake numismatic items into collections and historical narratives. The initial stage of tool development involves active collaboration with the CN team. The functionality will be accessible through the CN platform, enabling users to compare suspected counterfeits with original numismatic artifacts. Additionally, the tool will soon be available on the https://accs-network.com website, serving as an essential information resource for advancing scientific processing and identifying fake numismatic objects while disseminating knowledge to mitigate detrimental effects on society.

The collaboration between individual systems is facilitated by the mutual expansion of their databases through the registration of new coins by institutions and individual registered users. A workshop held by the Corpus Nummorum and ACCSN teams in Berlin in December 2023 was dedicated to further developing this collaboration.

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Нумизматични бази-данни: История на българските интердисциплинарни изследвания

Валентина Григорова-Генчева

През 2020 г. България прие Концепция за развитие на изкуствения интелект (ИИ) до 2030 г., като акцентира върху създаването на научен, бизнес и управленски капацитет в подкрепа на напредъка на ИИ. Основните цели включват подобряване на образованието, научните изследвания, иновациите и етичните рамки. От 2023 г. Институтът INSAIT към Софийския университет се присъедини към глобалния алианс за изкуствен интелект, като се нареди до престижни институции като НАСА и Харвард. INSAIT разработва BgGPT, български езиков AI модел. Историята на ИИ в България всъщност започва през 1968 г. с разработки на Българската академия на науките и включва значителни интердисциплинарни проекти и международни сътрудничества, включително и първите приложения на ИИ в исторически изследвания. Системата PSAMS за разпознаване на монети и базата данни BBAW Corpus Nummorum са забележителен принос, интегрирайки ИИ в нумизматиката и насърчавайки международното сътрудничество срещу фалшифицирането на монети.

Grasping the Invisible. An Approach to Frontier Dynamics between Thrace and Macedonia through Digital Numismatics and Archaeology

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Abstract: *Digital numismatics is a rapidly developing field that lays a promising foundation for combined material cross-studies. In the course of research of the project Measuring Ancient Thrace in this field, a new approach towards frontier studies between Thrace and Macedonia and generally any region with abundant enough coin circulation has emerged. It is a methodology that is yet to be applied in two comparative case studies and thus a theoretical proposal. The main aspect of it is that the digital numismatic perspective is the fundamental complementary factor to enhancing already existing methods*

Keywords: frontier studies, digital numismatics, Heraclea Sintica, Deultum

Ключови думи: изследвания върху границите, дигитална нумизматика, Хераклея Синтика, Деултум

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INTRODUCTION TO THE FRONTIER STUDIES APPROACHES

Our knowledge of frontiers generally of the Roman Empire is built first and most of all on literary sources, such as Tacitus, Suetonius, Livius, etc[1]. In archaeology, we depend on the material markers that we understand as direct remains of demarcation. When it comes to the Roman period, these are usually concentrated in the timespan after establishing the main barrier of the Romans towards the barbarians – the *limes*[2]. While having structures connected to a borderline, like walls, fortifications, ditches, and camps, these are mainly architectural

[1] *Moschek* 2011: 45–65.
[2] *Schallmayer* 2011; *Isaac* 1988: 130; *Wells* 2005: 65. There have been many approaches towards frontiers, having in mind all the research on the *limes*, see *Sommer* 2021; *Fassbinder* 2009, *Chyla* 2022; *Utrecht University* 2023; *Universität Wien* n. d.a; n. d.b. This monument's profound significance on both European and global scales has led to continuous scholarly investigations and the initiation of numerous research projects, including a dedicated publication series (*Deutsche Limeskommission* 2007).

measures. Such clear indicators are also *cippi*, like those from the pomerium[3].

The non-material, delimitation measures are not the main focus of the studies. But as often brought up, the concepts of demarcation and delimitation define two aspects: The expression of the first is in physical markers designating borderlines. They are visible and indicate a clear space division[4]. The second concerns strategies to introduce cultural or other practices, such as religious ones. Besides many other aspects, they would determine territory and thus supremacy and power[5]. The remains of those intentional interferences are often elusive. But they can be secondarily observed in iconographic transformations in numerous material objects, from votive plaques to relief pottery and even proven actions such as the dedication of sanctuaries. But most of all in coinage[6].

Another important issue is the one that a frontier does not usually persist, and the territory underlies expansion and reduction, which is a relatively constant paradigm of Roman imperial politics[7]. Because of this dynamic evolution, frontiers are not always expressed in fortification measures and can be traced only by smaller archaeological finds. This is a methodology that needs to be applied to the periods before the *limes*, when temporary boundaries existed. Republican demarcation frontiers have only been investigated in historical research in the western part of the empire, and a particular emphasis is placed on the Principate period and the northwestern periphery[8].

It is important what kind of information the two frontier terms give us. Demarcation always expresses intentional separation (as Hadrian's wall) and can bear, if it's a *cippus* for instance, direct content, that is the existence of the cippus shows clearly what its function is. A cippus can also be seen as a delimitation object through its inscription expressing direct content. But a delimitation object can bear indirect content. For example, a silver vessel, that is not per se a border object, can show a certain iconographic scene, which is spread randomly and defines a certain area. This is theoretically the implication of third-party frontier measures. Delimitation can also be a natural process expressed in material distribution like pottery, which occurs again as a consequence and non-intentionally (**Fig. 1**).

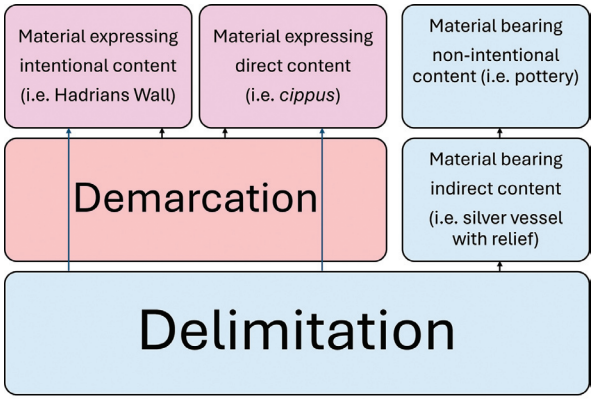

Figure 1. Reflection of the processes of delimitation and demarcation through various characteristics on artifacts or monuments.

In 2011, Costa proposed a methodology for researching the establishment of provincial boundaries through pottery patterns, which includes the consideration of milestones or boundary stones as paramount markers in the context of ancient historical inquiries into territorial dominance[9]. Moreover, attention must be

[3] This Claudian finding has been called one of the top ten discoveries of that year (*Urbanus* 2022). It is however one of hundreds (*Chausson et al.* 2019: 104 n. 49).
[4] *Moschek* 2011: 105.
[5] In pre-Roman studies there have been developments in the theoretical framework, which distinguishes between a demarcation – that is the physical existence of markers, and the delimitation, which would express itself in different physical or non-physical ways (*Fachard* 2016: 195).
[6] One illustrative example of a visible feature, which may not immediately appear relevant to demarcation but can indeed be pivotal, pertains to the religious attributes that characterize the occupied territory (*Belfiori* 2020: 16-17). These attributes manifest through the establishment of sanctuaries, as exemplified by the region of Sintike featuring sanctuaries dedicated to the Roman god Pluto and Zeus Hypsistos (*Chatzinikolaou* 2010: 196-197. 208). Additionally, certain Roman deities featured on early civic coins, such as the Janus types found in Thessalonike and Amphipolis, offer valuable insights into this context (*Betsiou* 2016: 139 note 78, with references).
[7] *Lepore, Silani* 2021; *Stek* 2017: 270-278.
[8] *Wells* 1996: 440-441; *Dyson* 2014; *Mann* 1974.
[9] *Costa* 2011.

given to other epigraphic elements, particularly imperial interprovincial inscriptions, as they can provide indications of earlier boundaries by referencing the divinities associated with territorial demarcation, such as *terminus* and *fines*[10].

ENHANCEMENT OF THE METHODS THROUGH DIGITAL NUMISMATICS

There are other aspects or characteristics than the physical that need to be attested. Next to identifying intentional and non-intentional results of delimitation, we need a multi-faceted object that is also a medium and can help distinguish delimitations of administrative/military or cultural type. For instance, one of a religious type or one of an economic type. Coins bear all that information with designs, legends, technical data, etc. However, they were usually studied and interpreted as (circumstantial) connectors between cultures. The aspect of them as occupation signs has rarely been considered[11]. The analysis of coins as a general source of delimitation traces has yet to evolve. Although coins have been incorporated in some studies, they have never been the fundamental source.

A second research gap is that the frontiers before the *limes* have mostly been discussed for the Western empire and the East had been left out. Coin messages have been considered worth an interpretation but only after the *limes* existed[12]. No in-depth analysis in an exact case has been done, but only theoretically the function of the coin has been examined. That is the case because they could express next to political messages also local ligation and are seen as media with acculturation and integration functions[13]. Considering this and the studies on the Western part of the empire, only coin finds in the East can show us how the Romans tampered with their province territories, since there were the most changes throughout the centuries[14]. The importance of media-based messages needs further interpretation, for it shaped identities, in terms of who and where is allowed to use a certain currency. This was a very legitimate question, especially before AD 212 when the emperor Caracalla made citizenship for everyone in the Empire possible[15].

Foremost the change in the approach should be through the initial research question, which should not inquire where the frontier is, but what intentions and measurements of delimitation can we detect. Then the right material with several characteristics and subsequently the cross points or parameters for other types of material should be chosen[16]. After analyzing the coincidences then those can be compared to circulation patterns that in Roman times should be first seen as territory marking and not a bordering or a connecting factor.

To achieve this, specific objectives must be defined. The first is to document and identify the necessary numismatic material (1). After fulfilling this basic requirement, one must define the role of coinages (2). When the primary information is gathered via iconography, metrology, etc., it can be sorted and grouped after dating and function (fiscal, exchange, introduction of new imagery, etc.). While following their development throughout the Roman period (3) any tangible change in the monetary supply should be accurately pointed out and added as a highlight. This is the most efficient way to test the rate of systematic coincidence when comparing data punctually from before and after the border shifted towards the later

[10] *Kolb* 2017: 12-13.
[11] *Duncan* 1981. See for instance *Bursche* 2002: 126; *Katsari* 2008: 242-250; *Munteanu* 2020: 95; *Munteanu et al.* 2021: 159; *Munteanu, Vornicu* 2022: 258. But rarely in connection with demarcation markers see *Bursche* 2008: 407; *Găzdac* 2002: 737; *Moisil* 2002: 15; *Munteanu* 2017: 926.
[12] *Moschek* 2011: 92-95.
[13] *Gambash* 2015: 3.
[14] *del Hoyo et al.* 2011: 291-304.
[15] *Keresztes* 1970: pp. 446-459. The importance of this issue becomes very clear with similar issues nowadays, mirrored also in research for instance by the European Project B-Shapes that shows the effects of border infliction on cultures. "Borders shaping perceptions of European societies", see *University of Southern Denmark* 2024.
[16] For the premises needed to conduct a cross-study see *Hofmann et al.* 2019: 6-8; *Peter* 2019: 394.

limes on the Danube[17]. Intermediate situations will be detected (4) and local chronological groups that connect to historical events can be isolated (5). When distinguishing local, regional, and pan-Roman currency, those can be connected to historical events, first of local importance and then to other larger contexts. After this is completed, it should be verified if coinage information coincides with other artifacts and literary sources (6). Combining this data, the borders after other resources shall be defined (7) and the spatial positioning of a set of finds and their processing through GIS analyses (8) performed. Building a GIS-relevant data collection is the most relevant section for the main objective. It can be analyzed to which extent the coverage of coins and direct markers coincides. Following this, the strategy changes in Roman administration can be detected (9). This will be possible through a chronologically layered approach and be the last step to follow the dynamics of strategies in monetary means.

PARAMETERS

For the data comparison in different material groups to work some parameters need to be set to detect the mentioned processes. Their determination will create fields for common queries. Any coinciding parameter with confirming media must be included to assess the results of the numismatic evaluation. Important ones are hidden in the characteristics of coin features. For instance, the designs of coins include iconography (1), which describes the imagery, bearing an indication of authority (i.e., Roman administration, local elite, traditional cultural or historical aspects), portraiture is essential for the influence of Roman standards[18]. Style (2) reflects the central or local tendencies and can be spotted in different details (for instance Roman hairstyle)[19]. The legend (3) defines the inscription which can confirm the authority, the mint, the depicted figure, the date of production, and the occasion (i.e. neocory) and connects to epigraphy[20]. Metal (4) indicates not only value but, also the purpose of use, and origin. It is an essential crossing point for metal object exchange[21]. Weight (5) gives information about the standard system and its connection to other regions[22]. Similarly, the diameter (6) usually defines the denomination, related to the value, rarity, and the context of use[23]. Thickness (7) is relevant for analyses of the flan when the description can't provide enough information for the identification. Flan thickness and diameter can indicate the standard for flans and combined with patina color the period when the object was produced or buried. Additionally, traces of overstrikes (8) show the re-usage or substitution via deliberate coverage of old images[24]. Similar is the validation through countermarks (9), which may refer to a new authority[25]. Other technical data (center hole, piercing) gives information about the production or history of the coin, which makes it eligible for evaluation or excludes it from the batch. The find spot (10) indicates in what period the coin was circulating and in what circumstances (trade, religious, or another context). Context is the meeting point with other materials. Available information about the circulation of types etc. is substantial data that can be extracted from numismatic portals via Linked Open Data.

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[17] Before the later Augustan age, see *Karavas, Hanscam* 2023: 2.
[18] *Pavlek et al.* 2022: 95-96.
[19] *Sanz, Fiore* 2014: 7104-7111.
[20] See as an example *Meadows* 2021: 187-222.
[21] *Martorelli et al.* 2019. Thanks to the project DigiDeultum there will be XRF-Metal analyses of metal objects including coins. Those will be compared in the same types of Imperial coinage to see if the supply in the test studies below was centralized or if both provinces were treated differently. A large number of publications is available to compare results on a large scale. Also, a comparison of the same mint in different periods, as well as synchronic-produced coins and other metal objects will be compared (statuettes, ornaments, etc.).
[22] *Cope* 1980: 178-184.
[23] *Taş et al.* 2022: 37.
[24] *de Callataÿ* 2018, 26-28.
[25] *Draganov* 1991, 495-509; *Howgego* 1985.

TECHNICAL REQUIREMENTS

The interaction of the reflected occurrences needs to be assessed through a digital process of the data via an instrument, able to document and connect different materials. It is a technical requirement to achieve the implementation of this approach. It should be able to connect different factors prevailing through the active strategy and identify its proneness to the genesis of other aspects of the ancient status quo like preexisting economic relations. So the cross-points should be detected by automated database filters and used as starting points to visualize the data[26]. Overlapping would suggest confirmation.

Such a tool has been developed in the project Measuring Ancient Thrace after Corpus Nummorum[27], even with standardized design descriptions. It is implemented in the cooperating project DigiDeultum[28]. Using that tool to calibrate the analysis of the separate sites is the ultimate method of approaching the question of how Romans guarded their territory before the physical *limes* existed and will fill a vast methodological desideratum. The results from both provinces Macedonia and Thrace will be compared in tables or diagrams. These visualizations will be the basis for the interpretation of the introduction of coinage in certain areas.

TEST CASE STUDIES

This method will be applied in two Roman sites, Heraclea Sintica and Deultum, and will test this proposal. It will trace not only the frontier course but also how the idea of it was imposed and how these establishments changed as a flexible and dynamic setting throughout the Roman Imperial Period. They either emerged or came under Roman control during the early stages of the empire[29]. In contrast to the studies mentioned above, they are in the eastern part of the Empire. The numismatic perspective is crucial as they are positioned in two rich in monetary means provinces[30]. A major archaeological discovery was made in the province of Macedonia in 2002 when the site of Heraclea was identified[31]. It was thus positioned northern than suspected and gave enough evidence to suspect a further reach of the Macedonians and consequently after the battle of Pydna in 168 BC[32] of the Romans. Deultum on the other hand is a well-known Roman site but the transition from the dominance of local dynast control towards Roman integration, especially from an economic perspective, is yet to be studied[33]. The availability of publications on Deultum[34], based on traditional methodology, will allow for measuring the benefits and restrictions of digital methods.

Heraclea Sintica[35]

The region of Sintike was always a border region and was the northmost part of the Roman province of Macedonia. Researchers have had difficulties in distinguishing the territories of the thraco-macedonian tribes that occupied these areas. Where pottery and other artifacts allow the attribution to certain cultural groups, those cannot be associated with any of the tribes known from literary sources[36]. Heraclea Sintica is the largest archaeological site in the area and as a Macedonian foundation first

[26] As an example, a GIS layered map with data about the frontier indicators and circulation of coinages, and a comparison map showing the mints that are indicated on the sites.
[27] It follows the data model of Corpus Nummorum see, *CN* n.d.
[28] *Grozdanova* forthcoming.
[29] *Vagalinski* 2022, 20.
[30] The definition of borders in Thrace is in the pre-provincial state of affairs very difficult and always questionable. It has been labelled the "land without borders" (*Peter, Stolba* 2022: 3-7). While other cultural markers as pottery, are not able to, coinage usually indicates the producer and can help in identification of the territorial claim.
[31] *Mitrev* 2003: 263-271.
[32] *Delev* 2015; *Gruen* 1976.
[33] *Balabanov, Petrova* 2002.
[34] *Kostova, Sharankov* 2023; *Boteva* 2020; *Milčeva* 2020; *Vagalinski* 2018; *Sharankov* 2017; *Preshlenov* 2015; *Nollé* 2014 et. al.
[35] The research is supported by Project no. КП-06-Н50/3 from 30.11.2020, " Measuring Ancient Thrace: Re-evaluating Antiquity in Digital Age", funded by the Bulgarian National Science Fund.
[36] *Delev* 2014.

shows a clear definition of the Macedonian lands after their claim[37]. This was a pre-existing condition allowing the Roman army and administration to develop a certain strategy to designate the territories after conquering them. That intentional tampering is manifested in this area in delimitation remains. The city provides abundant numismatic material revealing the development of the supply[38]. Their context is the forum and represents an objective sample of the circulating monetary means. The notable restrictions imposed are visible through the distributed numismatic material, the appearance of Roman Republican *denarii*, and massively of bronze coins with the implementation of Roman designs like those with Janus from Thessaloniki (**Fig. 2**), Victoria with Standards[39] (**Fig. 3**), or the *sulcus primigenius* (**Fig. 4**). But a strong Macedonian identity was cultivated with the Macedonian koinon emissions (**Fig. 5**). These reflections of administrative strategies address the issue of delimitation

Figure 2. Thessalonike, copper alloy coin with Janus and two centaurs. History Museum Petrich, Heraclea Sintica, found 2018, Field Inv. Forum 1515. Weight 3,92 g; Die axis 12 h; Diameter 17,3 mm; Hellenism, after Pydna.

Figure 3. Philippi, copper alloy coin with Victoria and Standards. Museum Petrich, Heraclea Sintica, found 2018, Field Inv. Forum 1518. Weight 3,60 g; Die axis 12 h; Diameter 17,7 mm. Claudian.

Figure 4. Philippi, copper alloy coin with portrait of Drusus or Augustus and *sulcus primigenius*. History Museum Petrich, Heraclea Sintica, found 2018, Field Inv. 1578. Weight 4,69 g; Die axis 5 h; Diameter 17,9 mm; Augustan or Tiberian.

Figure 5. Macedonian koinon, copper alloy coin with Macedonian shield and legend indicating the alliance. History Museum Petrich, Heraclea Sintica, found 2018, Field Inv. Forum 1565. Weight 2,77 g; Die axis 0 h; Diameter 14,5 mm; 1st century AD.

and prove coins to be most appropriate for this task. Their study will lay the groundwork for numismatics as the essential source for the extraction of information about the delimitation tactics and coins as a frontier marker. A find of a Republican military camp close to Heraclea shows that an active strategy was applied and any delimitation indications are significant and not collateral facts[40]. This makes the flourishing Roman city[41], a principal site that could be most illustrious for the uncovering of the significant material sources of delimitation, that can be perceived in other sites.

[37] *Nankov* 2015: 19.
[38] From the Hellenistic until the Late Roman period. *Ivanova-Anaplioti* forthcoming.
[39] *Filipova, Ivanov* 2015.
[40] *Alexandrova* 2020: 58.
[41] *Vagalinski* 2017: 94.

Deultum[42]

On the western coast of the Black Sea lies another promising site as a potential antipole for Heraclea. Deultum, founded in 70 AD was the only researched Roman colony in what was to become the province of Thracia[43]. The similar situation with the Thracian tribes, the direct proximity to the Greek colonies on the Black Sea[44], and the natural frontiers allow a diachronic comparison through case studies opposing the processes needed for the so-called Romanization. Deultum has yielded mostly late antique coins and very few hundreds of the early period. However, the presence of a colony itself and the coinage[45] of the city is a prominent display of territory claim. Tracing back in time the supply with different types of coinage and enriching our knowledge of the development dynamics of the then society over the centuries, is decisive for a comparative case. So, coin finds like the Mesambrian (**Fig. 6**) or Rhoimetalkes ones (**Fig. 7**) are important as pre-colonial indicators.

Figure 6. Mesambria, copper alloy coin. Municipal History Museum-Sredets, Deultum, Inv. n.79. Weight 5,75 g; Die axis 12 h; Diameter 20,0 mm. c. 2nd century BC.

Figure 7. Rhoimetalkes I, copper alloy coin the king with Pythodoris and Augustus. Municipal History Museum-Sredets, Deultum, Field Inv. 260. Weight 7.77 g; Die axis 5 h; Diameter 23,2 mm; c. 11 BC – 12 AD.

EXPECTED RESULTS AND CONCLUSIONS

To develop a method of cross-study and referencing, which involves automated detection of crosspoints, the sequence of steps will be tested in which way data should be gathered and entered so that the process is time efficient and leads to automated analyses. This cross-study should be conducted between numismatic as a base and other archaeological material because it has been proven to be effective when common patterns exist[46]. As a major new input, digital numismatic[47] will be considered a methodological shift shedding light on intentional strategies reflected in various media and artifacts. There are several important conditions for the numismatic data to be useful. That includes a portal with standardized and Linked Open Data[48], but on a level above the material or monument groups. Features like persons or gods are stable and can be included in an image or a word, thus cross-referenced. The study environment must be steered by a digital tool or tools that can be adjusted for ar-

[42] The research is supported by Project КП-06-Н80/7 from 08.12.2023, "Upgrading the Historical Narrative: From Deultum to DigiDeultum", funded by the Bulgarian National Science Fund.

[43] *Jurukova* 1973.

[44] *Ivanova-Anaplioti* 2023: 70-84. The maritime area of Deultum was under the influence of the Greek *apoikia* Apollonia Pontica before the colony was founded Apollonia was the main coinage supplier in the area from 510 BC until around 300 BC and reduced its production during the turbulent Hellenistic age. In 71 BC, however, it was destroyed by the Roman army. Its mint stopped production until the end of the 1st century AD. A gap between 71 BC and the Roman emperor Antoninus Pius is visible in Apollonia and in other local civic mints such as Anchialos and Mesambria (*Tachev* 2018; *Topalov* 1995). Only Byzantion starts earlier its mint than the colony Deultum (*Schönert-Geiß* 1972). However, before that, the area was part of the Sapean kingdom which was clientele to Rome. Thus, the study of circulating coins is essential to understanding the complexity of territory control of the Roman empire after they clashed with the Thracians.

[45] *Draganov* 2007: 2005; *Jurukova* 1973.

[46] New approaches emerge exactly when applying digital technologies in different monument groups, but with common patterns, such as style, see *Calomino et al*. 2023: 12-18.

chaeological material, but strongly interconnect to the developing numismatic semantic web[49].

The general incorporation of numismatic research into a broader context is facilitated by existing studies that address various aspects. These encompass investigations into the local urban boundaries of Heraclea Sintica[50], examinations of urbanization processes within the middle Strymon region and the broader Strymon Valley[51], field research conducted west of the Strymon[52], and explorations north of Heraclea[53]. Additionally, south of the Bulgarian border, collaborative efforts have taken place through a survey and mapping project undertaken by Greek authorities[54]. In the Deultum case, the constant excavations and studies also provide enough published material to collect data about demarcation processes comparable to the coinage[55]. The extracted spatial and material data from publications will be entered as the coin data in the database and be cross-checked. The methodological approach to the examination in this research follows a structured sequence, commencing also with the primary demarcation sources. The gathering and careful selection of content about the subject matter hold significant importance for subsequent phases of the investigation.

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[47] For the benefits see *Grozdanova* 2021: 63-68.
[48] *Gruber et al.* 2014: 249-258.
[49] For the implementation and connecting of the different see *Grozdanova* forthcoming.
[50] *Mitrev* 2015.
[51] *Mitrev* 2012.
[52] *Vagalinski et al.* 2017.
[53] *Kolev* 2020.
[54] *Dadaki et al.* 2014.
[55] *Preshlenov* 2015.

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Улавяне на невидимото. Към анализа на граничната динамика между Тракия и Македония с методите на дигиталната нумизматика и археология

Христина Иванова-Анаплиоти

Статията представя нов подход за дефиниране на динамични гранични ситуации и стратегии за териториален контрол, действащи през началните години на съществуване на римските провинции Македония и Тракия. В основата му са заложени концепции от дигиталната нумизматика, но включва и регулиращи традиционни археологически ракурси. От решаващо значение е разглеждането на артефактите като демаркационни и делимитационни материали, като монетите са ултимативно средство за проследяването на тези процеси. Те са многопластов извор, своеобразна медия, която предоставя данни включително за административните промени. С имплементацията на дигитални ресурси нумизматичните данни могат да бъдат обвързани по специфични параметри с подбрани археологически паметници. Сравнителният анализ ще разкрие маркери указващи разграничителните процеси отразени в находките. За тестване на подбраните методи предмет на изследването са два археологически обекта с различни характеристики: Хераклея Синтика, като граничен град и Деултум, като колония, т.е. демаркационен елемент.

‘Measuring’ the Chronology of the So-called Moesian Countermarks

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Abstract. *The study discusses the so-called Moesian countermarks. They are stamped in rectangular fields with the letters “TI CA” and “TICAE. The current text discusses two sites: the first is a military camp (ancient Almus), and the second (near modern Rasovo) is a civic settlement of the local inhabitants. Single coins from the time of the Flavians have been found at Almus, while at Rasovo such are totally lacking. The available data provided by the two sites demonstrates weak coin circulation during the time of Nero and of the Flavian dynasty. The authors believe this is the most likely time of circulation of the discussed countermarked coins.*

Key words. Countermarks, Lower Danube limes, Roman coins
Ключови думи: контрамарки, Долнодунавски лимес, римски монети

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The Early Imperial period (1st – beginning of the 2nd century AD) witnessed the total conquest of the Lower Danube area, its gradual return to peaceful life and adjustment of the provincial structure of the Roman Empire. The process took more than a hundred years and ended with the establishment of urban settlements (*coloniae* and *municipia*) during the reigns of Trajan and Hadrian. One of the most important innovations of the Romans in that period was the introduction of the ‘monetary’ economy. During the 2nd – 1st centuries BC, only large denominations (tetradrachms, drachms, and denarii) circulated in the area. Small coins (asses) were introduced as early as the reign of Augustus. During that period (1st century AD), it seems that countermarked coins were circulating intensively in the province of Moesia (divided into Upper and Lower after AD 86). R. Martini established a typology of those countermarks. They are classified into three groups: (A) Pannonian types; (B) as-

sociated Pannonian and Moesian types; and (C) Moesian types. The last group is divided into three further subgroups and a relative chronology is proposed[1]. Their recorded number exceeds 3,500, although more such coins presented in private collections, with almost no information about their archaeological context, should be calculated to this number. The current article is devoted to the so-called "Moesian" countermarks, typical of the province of Moesia[2]. Scholars have expressed different opinions about their dating: as early as Tiberius[3], or Claudius/Nero[4]. Most recent suggestion is that the production of such countermarks "must have continued, if not begun, under the Flavii, peaking between the reign of Titus and that of Domitianus"[5].

Explanations about countermarking during the early imperial period differ. Some scholars argue that countermarks meant *donativa* (a gift to the soldiers by the emperor) from the private treasuries. Others assert that countermarks were denominated as property of the legions and to ensure that a minimum supply of coins remain at the military fortifications[6]. In any case, the distribution of the countermarked coins suggests that they were in use in the local "limes" market[7].

Until recently, the coins with Moesian countermarks lacked proper archaeological context. Attempts to clarify their date are based almost on the deciphering of the abbreviation (TI CA; TI CAE and TI CAE + AVG), or on general observations on the chronology of the Roman expansion on the Lower Danube. The present article is an attempt to present the monetary circulation from 1st century AD sites and to correlate the coins with other well-datable finds, particularly fibulae. In this regard, two sites can be examined. One of them is an auxiliary fort and the other is a local civic settlement. The two sites are situated about 10 km apart and provide well-datable archaeological material that can be used to correlate the date of the countermarks.

THE ARCHAEOLOGICAL CONTEXTS

ALMUS, MODERN LOM, MONTANA REGION

The site is well-known in academic literature. It is multi-layered site of successive settlements, starting from the middle of the 1st century AD[8]. The countermarked coins (**Fig. 1**) were found in the deepest layer, which corresponds to an Early Imperial Roman auxiliary fort[9]. This layer (labeled ALM I) lies beneath a Roman street with a portico (labeled ALM II). Two coins provide *terminus post quem* for the construction of the street: one of Trajan and one of Hadrian. The building and the street correspond to a Roman *vicus* that was established with the supposed adjustment of the provincial border in the late years of the reign of Hadrian, thus providing *terminus ante quem* for the auxiliary camp beneath. All archaeological features from the camp are heavily burned and its end is marked by a large fire. Surprisingly, *via sagularis* is disturbed by a pit with a horse burial inside. Most probably, this extraordinary situation attests to a siege; during such an event permission was granted to bury the dead animal inside the military infrastructure of the fort. One of the coins of interest was found next to the horse's skeleton. A hoard of bronze vessels, dated to AD 80s, was also found during construction works between 1970–1980. In an upcoming publica-

[1] *Martini* 2003: 7-8, 10-11, 19-24.
[2] Most of the countermarked coins were found in North Central and Northwestern Bulgaria (see *Banov* 2012; *Martini* 2002; 2003; *Paunov 2021*: 435-438). There are a few exceptions, coming from other places (*Gerasimov* 1946: fig. 26.14; *Vladimirova-Aladjova* 1999 published such coins from Appiaria).
[3] *Kabakchieva* 2000: 34.
[4] *Martini* 2002; *Martini, Paunov* 2004: 169-170.
[5] *Martini* 2003: 11.
[6] *Miškec* 2005: with discussion and literature quoted.
[7] *Paunov* 2021: 438-439.
[8] Material from the Late Bronze age is present in the deepest layers. However, no archaeological features from this early period have been preserved.
[9] Still unidentified cavalry unit (*ala milliaria* or *quingenaria*). Two upper ranks of a *turma* are attested epigraphically.

Figure 1. Coins from Almus.

tion, the chronological frame of layer ALM I is established between the middle of the 1st century and the 80s AD[10]. These roughly outlined arguments give ground to assume that the fort was taken in an enemy attack. To date, 14 coins (**Fig. 1**) have been found in layer ALM I. Seven of them bear countermarks of isolated TI CA or TI CA + AVG; in one case TI CA was placed later and disturbed AVG. The earliest coins were minted under Augustus. Four coins were minted during the reigns of Caligula and Claudius, around the time when the fort was erected. Besides the countermarked coins, the reign of Caligula-Claudius provides most of the coins. The latest coins (single issues) belong to the three Flavian emperors[11].

RASOVO

The site was partly explored through rescue excavation during the construction works of the South Stream Gas Pipeline Project. It consists of semi-sunken houses and numerous pits. Twelve coins from the 1st century AD were found on this site. The earliest belongs to Augustus, the latest – to Claudius (**Fig. 2**). Based on the coins, the chronological boundary of the site can be placed in the first half of the 1st century AD. However, a relatively large number of fibulae (**Fig. 3**) speak for a broader chronological range. The basic types, attested at the site, are presented below:

• Spoon-shaped fibulae are the earliest type (**Fig. 3.1**). They are dated from the end of the 1st century BC to the beginning of the 1st century AD[12]. The dating of the earliest fibu-

[10] *Zhivkov* 2023.

[11] The latest coin was minted in the time of Domitian. However, it was found on the edge of a Late Antique pit and its attribution to the ALM I layer is uncertain.

[12] Type 16a after *Rustoiu* 1997: 49, fig. 51-55; type LT III.4 after *Stamberova* 2023: 343-344.

Figure 2. Coins from Rasovo.

lae coincides with the earliest Augustan coins from the site (see below).

• Arched fibulae[13] are present with several variants. The earliest variant has rectangular excisions (**Fig. 3.2**). Similar fibulae have been dated to the late 1st century BC and the first half of 1st century AD[14]. The variant with circle incisions (**Fig. 3.3**) is dated between the reigns of Tiberius and that of the Flavii[15]. The variants with solid foot (**Fig. 3.4**)[16] are dated throughout the entire 1st century, however, they seem more typical for the second half of the century[17].

• The Aucissa fibulae (**Fig. 3.5**) is the most well-known type[18]. Their dating falls mostly in the first half of 1st century, although examples originating from up to the early 2nd century are also known.

• One of the fibulae belongs to the so-called "disc type", with a rhomboid plate (**Fig.**

[13] Group 4 after *Almgren* 1923.
[14] Type 8a1a after *Cociş* 2004: 47, dated to the first decades of the 1st century; type 9.a after *Gencheva* 2004: 28-29; type 19.a after *Rustoiu* 1997: 53.
[15] Type 9.2 after *Bojović* 1983: 33-34; type 19.b after *Rustoiu* 1997: 53, who dates them in the first three-quarters of the 1st century. It is close to the variants 8a1b after *Cociş* 2004: 46; type 9.b after *Gencheva* 2004: 30-31.
[16] Type 9.3 after *Bojović* 1983; type 19.c after *Rustoiu* 1997: 53.
[17] *Cociş* 2004: 49; *Gencheva* 2004: 31.
[18] Type 2 after *Bojović* 1983: 21; type 13 after *Gencheva* 2004: 37-39; type 29 after *Rustoiu* 1997: 60; type 5.5 after *Riha* 1979: 123.

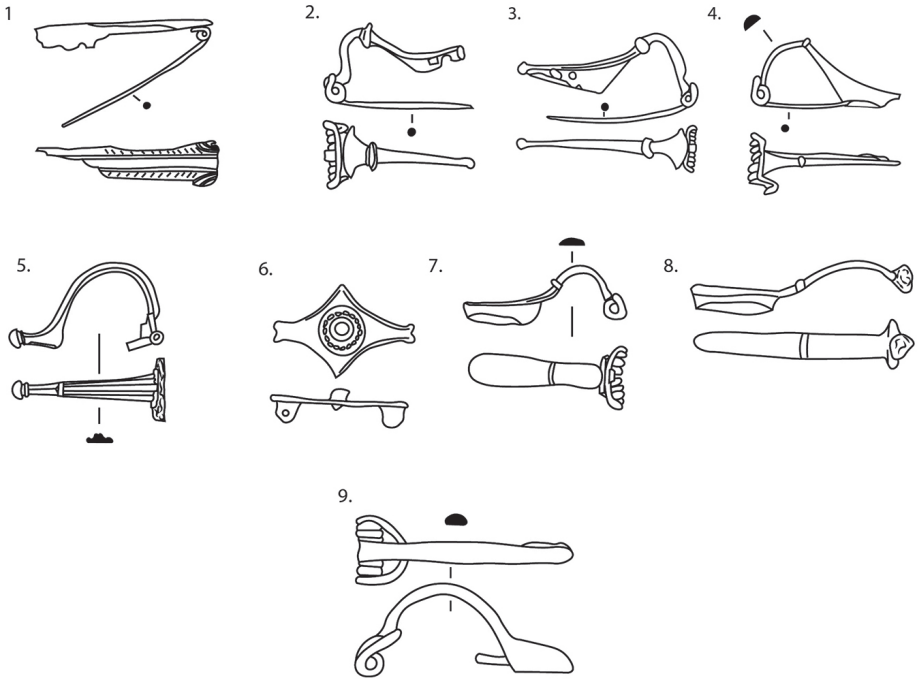

Figure 3. Fibulae from Rasovo.

3.6). Similar fibulae were found in archaeological contexts from the time of Claudius and were in use during the reign of the Flavii[19].

• Fibulae with "eyes" (**Fig. 3.7–8**) have a wide chronology. Their date is between the second decade of 1st century up to the third quarter of the same century[20]. The specimens from Rasovo lack incised circles ("eyes") and in one case the bow is less curved (**Fig. 3.8**) which probably indicates their later dating, after the middle of the 1st century.

• The latest type of fibulae belongs to the so-called "Soldaten" type (**Fig. 3.9**). They are typical for the time of Domitian, with the latest specimens belonging to the beginning of the 2nd century[21].

Based on the types of the discovered fibulae, the existence of settlement near Rasovo should be placed between the end of the 1st century BC until the last decades of the 1st century AD. One should note the even distribution of different types of fibulae typical of the entire period.

All twelve discovered coins[22] cover partly this period. The earliest coins date from the reign of Augustus (**Fig. 2.1–5**), followed by those of Caligula (**Fig. 2.10**) and of Claudius (**Fig. 2.11–12**). Four coins are countermarked with a "TI CA/CAE" (**Fig. 2.3, 2.7–2.9**). The coins provide *terminus post quem* for the demise of the settlement during the reign of Claudius, as no later coins have been found.

DISCUSSION

The lack of publications of sites from the period of the Early Roman Empire hinders at the moment the chronological positioning of the countermarked coins. Possibly, one coin of interest was found in Ratiaria[23]. According to this publication, there is a TI CLA … PIMP (?) countermark, placed on a coin of Agrippina the Elder. The only site with a monographically study of the discovered coins is Novae[24]. In the publication are shown 58 coins until the reign of Antoninus Pius, and only one of these bears a countermark[25]. The original coin was

[19] Type 25, variant a after *Gencheva* 2004: 66; type 31, variant b after *Rustoiu* 1997: 61; type 7.4 after *Riha* 1979: 182.
[20] Type 39 after *Gencheva* 2004: 80; type 2.3 after *Riha* 1979: 68; *Rustoiu* 1997: 57, fig. 67.
[21] Type 1.4 after *Bojović* 1983: 22; type 4.b after *Gencheva* 2004: 19-20; type 9 after *Rustoiu* 1997: 42, fig. 36-37.
[22] The coins were identified by Varbin Varbanov.
[23] *Boškova* 1987, cat. 2, Tabl. XXIII.2.
[24] *Ciołek, Dyczek* 2011.
[25] *Ciołek, Dyczek* 2011: cat. 10. Only CA preserved. Most probably this is another type of countermark.

minted during the reign of Claudius.

An obvious gap in the monetary circulation can be observed in both examined cases (Almus and Rasovo), and it covers the time after the reign of Claudius I. The general absence of Flavian coins makes the withdrawal of countermarked coins after the Civil War and under Vespasian[26] an unlikely scenario. It seems that the main period of their circulation, at least based on the two sites examined, was during the reign of Nero and the Flavians. In our opinion, the suggested reconstruction of **Ti**tvs **Cae**sar **Avg**vstvs[27] seems most likely. This might refer to Vespasian (more likely[28]) or his first-born son – Titus (less likely). However, the problem with the eastern distributions of the countermarked coins remains. The logical conclusion from previous research is that the absence of those coins is based on the annexation of this territory (east of the Yantra/Iatrus River) after the reign of Nero. The latest moment for circulation of countermarked coins is placed up to his reign, or shortly after[29]. However, the coins from Ryahovo (anc. *Appiaria*)[30] – and most recently from Shirokovo[31] – might indicate that future excavations of archaeological features from the second half of the 1st century AD could shed light on the distribution of such coins in the eastern part of the Lower Danube.

Based on the data presented, we consider the period of the Flavian dynasty the most likely time for the circulation of countermarked coins of the TI CA / TI CAE type. The intensive countermarking attests to insufficient monetary mass in the hinterland during that period. A possible explanation of this phenomena could be found in the expansion of the Roman *limes* up to the Danube delta, and the extensive construction of new forts in this area. Some scholars place the renovations of older forts (replacement of the old earth and timber fortifications with stone walls) in the same time[32]. However, more stratified finds should be published. Until then, the current view should be considered only as a hypothetical.

The place of production and countermarking is still to be localized. The already suggested sites – Ratiaria and Oescus[33] seem unlikely options, as only single countermarked coins are known from them. As presented here, the coins circulated both in the military sites and the nearby local settlements. This might suggest that the nearby settlements were indeed included in the so-called *limes* market.

CATALOGUE OF THE COINS

1. ALMUS[34]

1.1. Augustus, as, 7 BC.
Obv. …[A]VG …, head facing left.
Rev. MSA[LVIVSOTHOIIIV]IRAAAFF, around SC.
5.96 g; 25.3 x 25.7 mm. RIC I, 432

1.2. Unreadable, as.
Two worn countermarks, rectangular.
5.82 g; 26.7 x 23.4 mm.

1.3. Unreadable, as.
Worn countermark [TIC]·A. 4.16 g; 21.3 x 23.4 mm.

1.4. Unreadable, as.
Worn countermark [TI]CA.
4.96 g; 24 x 23.5 mm

1.5. Unreadable, as.
Two countermarks TI CA and third AVG.
5.08 g; 26.6 x 25.5 mm.

1.6. Unreadable, as.
Obv. head facing left ? Countermark TI·C·A.
4.40 g; 22.7 x 21.9 mm.

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[26] *Martini, Paunov* 2004: 170.
[27] by *Martini* 2003: 107.
[28] An important remark about the small number of coins of Vespasian has been pointed out for Novae – see *Gencheva* 2002*:* 69.
[29] *Paunov* 2021: 438.
[30] Published by *Vladimirova-Aladjova* 1999.
[31] Single coin discovered during excavations by *D. Dragoev* (see *Dragoev* 2024).
[32] For example: *Gencheva* 2002: 16-23, 60-69; *Kabakchieva, Lazarova* 2012: 12; also, *Vagalinski* 2011 publishes lime kilns, probably used in those constructions.
[33] *Martini, Paunov* 2004: 170.
[34] Catalogue numbers correspond to the numbers in **Figure 1.**

1.7. Unreadable, as.
Countermark TI C·A, placed upon older [AV]G.
8.78 g; 26.2 x 23.7 mm.
1.8. Agrippa (minted under Caligula), as, Roma, 37 – 41 AD.
Obv. M·AGRIPPA·L· F·COS·[III], head of Agrippa facing left.
Rev. Neptune, holding a dolphin and a trident. SC.
9.35 g; 27.7 x 28.3 mm. RIC I, 58
1.9. Agrippa (minted under Caligula), as, the same as the previous.
8.88 g; 27 x 27.7 mm. RIC I, 58.
1.10. Claudius, sestertius, Roma, 41 – 50 AD.
Obv. [TICLAVDIVS]CAESARA[VGPMTR PIMP], head of Claudius facing right.
Rev. [SPESAVGVSTA], Spes walking left, holding a flower.
18.33 g; 33.6 x 33.9 mm. RIC I, 99.
1.11. Claudius, as, Roma, 41 – 50 AD.
Obv. [TICLAVDIVS]CAESARAVGPMTRP IMP, head of Claudius facing left.
Rev. Minerva, walking left, holding a spear and a shield. S C on both sides.
9.72 g; 28.5 x 28.1 mm; RIC II/I^2, 442, Roma.
1.12. Vespasian, as, Roma, 71 AD.
Obv. [IMPCA]ES[VASPASIANVSAVG]CO SIII.
Rev. VICTO[RIA NA]V[A]LIS, Victoria, facing left upon a ship, holding a palm and a wreath, SC on both sides.
7.63 g; 23.1 x 24.9 mm; RIC II/I^2, 336, Roma.
1.13. Germanicus (minted under Titus), as, Roma, 80 – 81 AD.
Obv. [GERMANICV]SCAESARTIAVGF DI[VIAVGN], head of Germanicus facing left.
Rev. IMPTC[AESDI]VIVESPFAVGREST, S C in the middle; RIC II/I^2, 442, Roma.
1.14. Domitian, as, Roma, worn.
Obv. Head of Domitian with wreath facing right.
Rev. [....AVG]VST[.] Standing figure walking left.
9.47 g; 26.7 x 27 mm.

2. RASOVO[35]

2.1. Augustus, as/dupondius. Roma, 18 BC.
Obv. AVGVSTVS/TRIBVNIC/POTEST, in a wreath.
rev. [TCR]ISPINVSSVLL[PICIANIIIVIRA AAFF] with S C.
6.51 g; 23.1 x 23.3 mm. Possible RIC I 333.
2.2. Augustus, as, Roma, 18 – 15 BC.
Obv. AVGVSTVS/[TRI]BVNIC/[PO]TEST in a wreath.
Rev. worn, S C in the middle.
6.41 g; 22.4 x 23.2 mm.
2.3. Augustus, as, Roma, 18 – 15 BC.
Obv. [AVGVSTVS/TRIBVNIC/POTEST/ in a wreath.
Rev. worn, [S] C; two countermarks AV[G] and [TI·C]·A.
4.42 g; 25.8 x 23.8 mm.
2.4. Augustus, as, Roma, 18 – 15 BC.
Obv. [AVGVSTVS]/TRIB[VNIC]/ [P]OT[EST] in a wreath.
Rev. [ ]AAAFF, S C in the middle.
7.87 g; 25.2 x 26.7 mm.
2.5. Augustus, as, Roma, 7 BC.
Obv. [CAESARAV]GVSTPONTMAX[TRIB VNICPOT], head of Augustus facing right.
Countermark AVG (in a ligature).
Rev. MMAECILIVSTVLL[VSIIIVIRAA]AFF. S C in the middle. Unreadable countermark.
11.11 g; 28 x 27.7 mm. RIC I 435.
2.6. Probably Augustus, heavily worn, as.
S C on the rev.
5.86 g; 24.8 x 23 mm.
2.7. Unreadable, heavily worn, as.
Three rectangular countermarks: AVG, [AVG] and T[I]·C·A; one round countermark – helm?
4.89 g; 24.3 x 24.6 mm.
2.8. Unreadable, heavily worn, as.
Rectangular countermark TI·C·[A]. Unreadable second countermark.
7.27 g; 24.9 x 23 mm.
2.9. Unreadable, heavily worn, as.
Rectangular countermark [T]I·CAE.
4.42 g; 23.2 x 21.4 mm.
2.10. Agrippa (minted under Caligula), as,

[35] Catalogue numbers correspond to the numbers in **Figure 2.**

Roma, 37 – 41 AD.
Obv. MAGRIPPAL·F·COS·III, head of Agrippa facing left.
Rev. Neptune, holding a dolphin and a trident. S C.
10.64 g; 29.5 x 28.3 mm. RIC I, 58.
2.11. Claudius I, sestertius, Roma, 41 – 50 AD.
Obv. [TICLAVDIVSCA]ESARAVG[PMTR PIMP], head with a wreath, facing right. Countermark D V, placed on the neck.
Rev. [SPESAVGVSTA], Spes, walking left, holding a flower.
17.87 g; 33.5 x 32.4 mm. RIC 99.
2.12. Agrippina the Elder (minted under Claudius I), sestertius, Roma, 50 – 54 AD.
Obv. AGRIPPINAMFGERMANICICAE-SARIS, bust of Agrippina facing right.
Rev. S C in the middle, around – TICLAV-DIVSCAESARAVGGERMPMTRPIMPPP.
29.13 g; 35.6 x 35.4 mm. RIC I 102.

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„Измерване“ на хронологията на т.нар. мизийски контрамарки

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Статията разглежда така наречените мизийски контрамарки. Те са нанасяни в правоъгълни полета с надписи “TICA” и “TICAE”, понякога съчетани с други контрамарки – най-често “AVG”. Към момента са известни над 3500 монети. Всички те са дребни номинали (асове). Все още липсва публикация, която да е посветена на археологическия контекст на монетите с мизийски контрамарки. Тук авторите представят два обекта. Първият е военен лагер на анонимна към момента конна част (ала) под днешния град Лом (античния Алмус). Лагерът е възникнал около средата на I в. и е загинал през 80-те години на същия век. Вторият обект е селище на местно население, попадащо в землището на село Расово. То отстои на 10 километра от военния лагер при Лом. Селището също е загинало през втората половина на I в. Към момента от Алмус произхождат единични монети от времето на Флавиите, а при Расово те напълно липсват. Наличните данни, предоставени от двата обекта, демонстрират слаби постъпления на монетна маса от времето на Нерон и Флавиевата династия. Към настоящия етап на проучвания изглежда много вероятно този „хиатус“ в монетната циркулация да се запълни именно с контрамаркираните монети от типовете TI CA и TI CAE. Публикуване на други археологически контексти от I в. в бъдеще ще изясни тяхната хронология.

Silver Coins from Ancient Cities of Aegean Thrace through XRF Analysis

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Abstract: *The ancient cities of Aegean Thrace—region between Nestos and Hebros Rivers—began issuing silver coins of various denominations almost immediately after their founding. This not only affirmed their status as city-states but also demonstrated their direct access to Thrace's abundant and renowned precious metal reserves, deposits that according to archaeological evidence were likely being exploited as early as the late 6th century BC. This study provides insights into the region's historical metallurgy and economy and aims to evaluate the quality of the silver used in these coins by analysing their chemical composition and comparing different chronological phases.*

Key words: ancient numismatic, Greek coins, Greek colonies, ancient mines, silver alloy.

Ключови думи: антична нумизматика, гръцки монети, гръцки колонии, антични мини, сребърна сплав.

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Several factors such as including the integration of the region into robust trade networks that facilitated increased economic interactions, as well as access to rich resources such as fertile agricultural land, timber, and metals, contributed to the early adoption of coinage. Especially for Aegean Thrace, connections with Ionian cities and the Persian Empire, as early as the 7th century BC through pottery imports, played a pivotal role in the initial expansion of monetization in the northern Aegean. As the home to numerous colonial settlements of Ionian cities that eventually evolved into autonomous city-states, the inception of minting promptly following their establishment in the late 6th century BC testifies to this status[1]. Moreover, it demonstrates their direct access to Thrace's abundant and renowned precious metal reserves[2]. Abdera, Dikaia and Maroneia struck silver coins systematically till the end of the 4th century BC and with interruptions due

[1] *Isaac* 1986: 73-158; *Tiverios* 2008: 91-118; *Triantafyllos* 2009.
[2] *Stos-Gale* 2023.

Figure 1. Map of Aegean Thrace showing major Greek colonies.

to difficult historical events till the first half of the 1st century BC (**Fig. 1**). Thus, by analysing the chemical composition of silver issues using a portable HHXRF[3] and comparing them as per chronological phase, our aim is to evaluate the purity of silver acquired in each case and how this might have changed over time, particularly during periods marked by historical crises. It is worth noting, that the majority of the examined coins emanate from –namely circulate in– two important archaeological sites of the region, Molyvoti and Zone that provided us with 2.500 and 7.000 coins respectively[4]. A total of 96 silver coins have been analysed. Upon verification, the statistics in the tables have been updated, as we have retained only those coins for which we are confident in the accuracy of their quantitative data, i.e. 44 silver coins.

A total of 14 silver coins of various dates and denominations originating from the mint of Abdera were subjected to examination, though eight gave precise and accurate quantitative data (**Tab. 1**). As a colony founded by Clazomenians in the 7th century BC, Abdera did not initially issue its own coins until new settlers from Teos arrived. May in 1965 places the beginning of its issues around 540 BC but this date was subsequently revised by Chryssanthaki two decades later[5]. The city continued to mint silver coins uninterrupted until the mid-3rd century BC, paid for several years tribute to the Delian/Athenian League, while in 424 BC along with Dikaia had to pay the enormous sum of 75 talents. The substantial number of dies (over 300) confirms an extensive and long-lasting production, supporting the inference that Abderitans had access to precious metals. Notably, while examples for period four are missing, period six is fully represented with a silver tetradrachm, the largest denomination of the period, a half stater, a drachm, and finally, a hemidrachm analyzed. We would also point out that during this period the invasion of the Triballoi with the participation of the Maronitans resulted in the destruction of the city in 375 BC[6]. Subsequently, the following

Table 1. Results from coin analysis of Abdera.

A/A	Coin No.	Denomination/period/ date (BC)	Weight/g.	Reference	Ag %	Cu %	Pb %	Au %	Pt %	Ti %	Fe %
1	11463	Obol, I, 520-500	0.60	CN 51525	97.83	1.34	0.38	0.40	0.01	n.d.	n.d.
2	1448	Drachm, III, 475-450	3.04	CN 48219	97.86	n.d.	2.12	n.d.	0.01	n.d.	n.d.
3	C494	Diobol, V, 415-395	0.76	CN 28419	96.17	3.09	0.32	0.25	0.11	n.d.	n.d.
4	973	Half Stater, VI, 395-360	5.13	CN 47916	96.77	2.39	0.72	n.d.	0.07	n.d.	n.d.
5	C430	Stater, VI, 395-360	10.31	CN 29199	94.35	3.00	2.35	0.26	0.01	n.d.	n.d.
6	C254	Drachm, VII, 360-350	1.50	CN 6505	95.82	2.86	0.96	0.32	0.02	n.d.	n.d.
7	1755	Drachm, VIII, 346-336	2.57	CN 51683	95.80	2.84	0.71	0.64	n.d.	n.d.	n.d.
8	846	Drachm, IX, 336-311	1.73	CN 48186	96.52	n.d.	1.65	1.49	n.d.	n.d.	n.d.

[3] The instrument used is a portable hand-held X-ray Fluorescence (HH-XRF) device (Bruker Tracer 5g). Calibration was achieved using the deconvolution curve for precious metals stored in the system. Each spectrum was checked for an accurate determination of the major and secondary peaks for each of the detected elements. Two measurements were taken, one on each side of every coin and the average was calculated.

[4] *Psoma, Karadima, Terzopoulou* 2008; *Arrington et al.* 2016; *Tasaklaki* forthcoming b; *Galani-Krikou, Tasaklaki, Tselekas* 2015; *Tsatsopoulou et al.* 2015. In light of this, we extend our gratitude to the Ephorates of Antiquity of Rhodope and Evros for granting us the necessary permissions for this research endeavor.

[5] For the coinage of Abdera, see *May* 1965; *Chryssanthaki-Nagle* 2007. For a brief history of the city, see IThrAeg 159-182.

[6] IThrAeg 162; *Chryssanthaki-Nagle* 2007: 124-125; *Psoma, Karadima, Terzopoulou* 2008: 175.

eighth period was relatively brief, as Philip II's arrival in the region soon after led to significant geopolitical changes. During this period, Abdera minted gold coins, although none is present in the Museum's collection. However, one drachm was analyzed. The data from Abdera clearly show debasement over time. The silver contents decrease from the earlier examples toward the later ones, while lead and copper levels increase.

Dikaia, presumed to be a Samian and/or the organization of the Delian/Athenian League (**Tab. 2**). Overall, there are fluctuations in silver contents during the two main periods of the Dikaia issues. The trend line shows a very subtle decease over time. Yet four of the second period coins contain above 97 % silver suggesting that the city had a reliable access to a source of silver for the time represented by these coins.

Maroneia, akin to Dikaia in striking electrum coins and following Abdera in producing gold coins, did not issue large denominations

Table 2. Results from coin analysis of Dikaia.

A/A	Coin No.	Denomination/period/ date (BC)	Weight/g.	Type/Reference	Ag %	Cu %	Pb %	Au %	Pt %	Ti %	Fe %
1	9033	Hemiobol, I, 510-480	0.24	Agora A55, 10.05.2016, 29	98.06	0.88	n.d.	n.d.	n.d.	0.08	n.d.
2	4909	Hemiobol, II, 480-450	0.42	CNG eA406, 27.09.2017, 119	98.04	0.64	1.30	n.d.	n.d.	n.d.	n.d.
3	5885	Trehemiobol, II, 480-450	0.43	CN 50591	96.65	2.75	n.d.	0.56	0.02	n.d.	n.d.
4	8432	Hemiobol, II, 480-450	0.11	Agora eA56, 31.05.2016, 17	99.50	n.d.	n.d.	0.41	0.01	0.05	n.d.
5	11461	Triobol, II, 480-450	1.80	Nomos, A30, 06.11.2023, 1268	98.97	n.d.	0.27	0.75	n.d.	n.d.	n.d.
6	910	Obol, II, 480-450	0.46	CN 50583, CN 8211	94.21	2.48	1.71	n.d.	n.d.	n.d.	1.02
7	11503	Obol, II, 480-450	0.50	CN 50583, CN 8211	95.40	2.28	1.99	0.28	0.02	n.d.	n.d.
8	11484	Hemiobol, II, 480-450	0.29	CNG eA406, 27.09.2017, 119	98.85	0.82	n.d.	0.32	n.d.	n.d.	n.d.
9	11505	Hemiobol, II, 480-450	0.28	CNG eA406, 27.09.2017, 119	97.54	1.96	n.d.	0.48	n.d.	n.d.	n.d.
10	11523	Hemiobol, II, 480-450	0.16	Agora eA56, 31.05.2016, 17	97.48	1.76	0.39	0.34	n.d.	n.d.	n.d.
11	11474	Hemiobol, II, 480-450	0.14	Agora eA56, 31.05.2016, 17	97.95	1.25	0.21	0.52	n.d.	0.05	n.d.
12	11499	Hemiobol, II, 480-450	0.13	Agora eA56, 31.05.2016, 17	98.08	1.14	0.47	0.29	n.d.	n.d.	n.d.
13	11507	Hemiobol, II, 480-450	0.53	Agora eA56, 31.05.2016, 17	97.28	2.29	n.d.	0.41	n.d.	n.d.	n.d.

Milisian colony, as iconographic types of the first period certainly point to, on the other band of Vistonis Lake, starts issuing silver and electrum coins – for the moment no excavated electrum examples from the site are known[7]. The payment of increased tribute to the Delian League from 454 BC onwards, the number of dies – 8 in 1975 – and the large denominations – double staters – also suggest the city's access to a mining zone. Its history is intimately intertwined with neighboring Abdera, which is evident in the fact that for some years they paid their tribute to the Athenian League together. Two silver coins are attributed to the first period according to May and Schönert-Geiss. The subsequent period, characterized by a larger volume of examples, likely corresponds with such as the eight-drachm observed in Abdera or the double stater in Dikaia until the late 5th century BC[8]. However, its silver coinage persisted uninterrupted until the end of the 4th century BC, with a last final issue dated to the period of the Mithridatic wars. As for the five coins belonging to the early series of 520-430 BC, the results have shown that these are made of purer silver with no added copper (**Tab. 3**). It seems that copper becomes a more consistent alloying addition from the 450s onwards – period V –, when the production of the coins is more systematic – with 44 obverse dies for double staters.

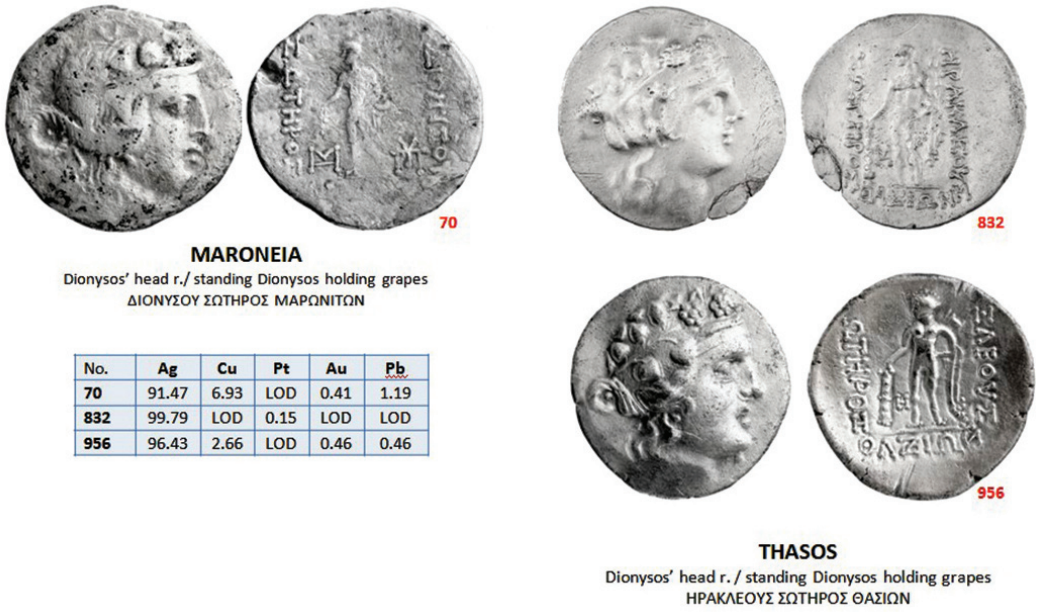
In the first century together with Thasos they issue silver tetradrachms bearing Dionysos head on the obverse and Dionysos and

[7] CN 8156 and CN 8158. For the numismatic corpus of Dikaia see, *May* 1965; *Schönert-Geiss* 1975; *Tasaklaki* forthcoming a. For the archaeological evidence and the city's history, see *Triantaphyllos, Tasaklaki* 2012.
[8] For the coinage of Maroneia, see *Schönert-Geiss* 1987; *Psoma , Karadima, Terzopoulou* 2008; *Tasaklaki* 2024.

Table 3. Results from coin analysis of Maroneia.

A/A	Coin No.	Denomination/period/ date (BC)	Weight/g.	Type/Reference	Ag %	Cu %	Pb %	Au %	Pt %	Ti %	Fe %
1	80	Stater, I, 520-500	8.92	CN 1310	97.77	0.30	0.20	1.71	n.d.	n.d.	n.d.
2	C297	Drachm, II, 500-480	3.48	CN 1830	98.49	n.d.	1.50	n.d.	n.d.	n.d.	n.d.
3	11460	Hemidrachm, III, 480-450	1.49	CN 3437	95.36	0.38	4.23	n.d.	0.01	n.d.	n.d.
4	8063	Hemiobol, IV, 450-430	0.24	Nomos, A16, 11.11.2020, 48	99.72	n.d.	n.d.	0.27	n.d.	n.d.	n.d.
5	11493	3/4 obols, IV, 450-430	0.24	CNG eA484, 27.01.2021, 92	96.28	1.98	1.37	n.d.	n.d.	0.07	n.d.
6	11470	Hemiobol,IV, 450-430	0.93	CNG eA484, 27.01.2021,92	99.94	n.d.	n.d.	n.d.	0.05	n.d.	n.d.
7	11514	Hemiobol,IV, 450-430	0.36	Nomos,A23, 12.06.2021, 236	95.50	2.12	n.d.	2.36	n.d.	n.d.	n.d.
8	8434	Hemiobol, IV, 450-430	0.14	Nomos,A23, 12.06.2021, 236	97.61	1.72	0.41	0.25	n.d.	n.d.	n.d.
9	8435	3/4 obols, IV, 450-430	0.43	CNG eA484, 27.01.2021, 92	99.28	n.d.	n.d.	0.71	n.d.	n.d.	n.d.
10	8422	Tertartemoria, V, 430-400	0.09	Nomos,A23, 12.06.2021, 50	97.61	1.67	0.38	0.32	n.d.	n.d.	n.d.
11	1059	Drachm, VI, 400-377	3.18	CN 53058	99.98	n.d.	n.d.	n.d.	0.01	n.d.	n.d.
12	2106	Tetradrachm, VI, 400-377	13.93	CN 51673	98.14	1.21	0.21	n.d.	0.04	n.d.	0.35
13	11485	Hemidrachm, VI, 400-377	1.18	CN 47972	95.43	3.64	0.66	0.26	n.d.	n.d.	n.d.
14	11519	Hemidrachm, VI, 400-377	1.05	CN 47972	96.094	2.81	0.81	0.26	n.d.	n.d.	n.d.
15	5361	Drachm, VI, 400-377	1.23	CN 53058	95.60	2.62	1.41	0.32	0.01	n.d.	n.d.
16	C137	Drachm, VII, 377-365	1.01	CN 2689	95.89	2.63	1.01	0.42	n.d.	n.d.	n.d.
17	9184	Drachm, VII, 377-365	2.43	CN 5592	95.82	2.74	0.90	0.50	0.01	n.d.	n.d.
18	11456	Drachm, VII, 377-365	2.16	CN 48557	95.64	3.45	0.61	0.26	0.02	n.d.	n.d.
19	11483	Drachm, VII, 377-365	2.11	CN 48375	93.69	4.71	1.28	0.30	n.d.	n.d.	n.d.
20	11479	Drachm, VII, 377-365	0.87	CN 5424	96.64	2.25	0.66	0.34	0.05	n.d.	n.d.
21	C272	Drachm, VIII, 365-330	2.07	CN 5401	94.97	3.37	0.56	1.06	0.01	n.d.	n.d.
22	8387	Drachm, VIII, 365-330	2.30	CN 12474	98.21	0.59	0.36	0.83	n.d.	n.d.	n.d.
23	C722	Drachm, VIII, 365-330	2.25	CN 5401	95.84	2.78	0.60	0.75	n.d.	n.d.	n.d.

Hercules as saviours on the reverse (**Fig. 2**)[9]. Those have been found in large quantities in the Thracian hinterland and have been imitated both by Thracian tribes and Celts[10]. This group of coins in particular is certain to owe its issue to the Mithridatic wars and the payment of soldiers. The analysis has shown that coin No. 70 from Maroneia is debased, containing 6.9 wt% copper as is coin No. 956 from Thasos with 2.6 wt% copper. On the contrary, the oth-



No.	Ag	Cu	Pt	Au	Pb
70	91.47	6.93	LOD	0.41	1.19
832	99.79	LOD	0.15	LOD	LOD
956	96.43	2.66	LOD	0.46	0.46

Figure 2. Tetradrachms of Maroneia and Thasos, 1st c. BC. Inset table shows their composition.

[9] *Psoma, Karadima, Terzopoulou* 2008: 179-182.
[10] *Prokopov* 2006.

Table 4. Results from coin analysis of Neapolis.

A/A	Coin No.	Denomination/period/ date (BC)	Weight/gr	Type/Reference	Ti	Fe	Cu	Ag	Pt	Au	Hg	Pb
1	5666	Diobol,500-480	1.49	SNG ANS 423	n.d.	n.d.	1.26	98.24	0.02	0.29	n.d.	0.34
2	11470	Diobol,500-480	0.93	SNG ANS 423	n.d.	n.d.	n.d.	99.93	0.06	n.d.	n.d.	n.d.
3	5665	Obol, 450-430	0.41	CNG, eA 274, 22.02.2012, 62	n.d.	n.d.	2.10	96.97	0.01	n.d.	n.d.	0.92
4	11455	Obol, 450-430	0.56	CNG, eA 274, 22.02.2012, 62	n.d.	n.d.	3.01	96.13	n.d.	n.d.	n.d.	0.86
5	11478	Obol, 450-430	0.44	CNG, eA 274, 22.02.2012, 62	n.d.	n.d.	3.60	95.59	n.d.	0.30	n.d.	0.51
6	11494	Obol, 450-430	0.49	CNG, eA 274, 22.02.2012, 62	0.07	n.d.	2.24	96.04	n.d.	n.d.	n.d.	1.54
7	11515	Obol, 450-430	0.51	CNG, eA 274, 22.02.2012, 62	n.d.	n.d.	2.33	97.18	n.d.	n.d.	n.d.	0.49
8	6062	Obol, 450-430	0,45	CNG, eA 274, 22.02.2012, 62	n.d.	n.d.	1.49	96.79	0.01	n.d.	0.64	1.39
9	8516	Hemiobol, 450-430	0.23	CNG, eA 286, 05.09.2012, 39	n.d.	n.d.	0.458	99.236	n.d.	0.306	n.d.	n.d.
10	9045	Hemiobol, 450-430	0.21	CNG, eA 286, 05.09.2012, 39	n.d.	n.d.	3.32	95.90	n.d.	0.51	n.d.	0.26
11	C589	Hemiobol, 450-430	0,31	CNG, eA 286, 05.09.2012, 39	n.d.	n.d.	1.85	94.62	n.d.	1.67	1.38	1.16
12	11504	Hemiobol, 450-430	0.18	CNG, eA 286, 05.09.2012, 39	n.d.	n.d.	3.19	96.04	0.02	0.30	n.d.	0.44

er coin from Thasos, namely No. 832 is exceptionally pure in silver.

Neapolis' coins[11], especially those of the second half of the 5th century BC, are numerous at the sites of Molyvoti and Zone and are found together with Dikaia's and Maroneia's low denominations. All the 12 Neapolis' coins (**Tab. 4**) we analyzed seem to follow a similar compositional pattern with those from Dikaia and Maroneia with two examples made of purer silver and the rest containing low copper contents of 2 % in average. The alloy synthesis and the fact that all those have been found in Stryme or Zone and not in Abdera can support a hypothesis that is a denomination of Maroneia mint.

Finally, examples from Ainos, Apollonia Pontica and Thracian Chersonnese are isolated for now and can only provide limited data for comparative use available to other scholars (**Tab. 5**).

Providing a general overview of the results of the chemical composition analysis it appears that, in addition to silver, most of the coins contain varying amounts of copper, lead, and gold, with lower contents of platinum being present in only a few cases. Impurities such as iron and titanium are rare and have been detected in a limited number of coins. The mean value of silver is 97.01 % with a range of 93.69 to 99.98 %. It is obvious that higher concentrations of copper and lead are present in the coins with the lowest silver content.

Looking at the silver contents across the whole assemblage, it has been noted that 90.9 % contain up to 95 % silver. About 29.5 % of the coins contain up to 98 % silver showing that higher purity coins are not the majority. Copper is present in contents between 0.3 and 4.7 wt% with the majority in the 1 to 3 wt%

Table 5. Results from coin analysis of various issuing authorities at the Archaeological Museum of Komotini.

City	Coin No.	Ti	Fe	Cu	Ag	Pt	Au	Hg	Pb
Thasos	956	n.d.	n.d.	2.66	96.43	n.d.	0.46	n.d.	0.46
Thasos	832	n.d.	n.d.	n.d.	99.79	n.d.	0.15	n.d.	n.d.
Thasos	139	n.d.	n.d.	2.93	96.12	n.d.	0.28	n.d.	0.67
Ainos	1353	n.d.	n.d.	1.53	96.64	n.d.	n.d.	n.d.	1.83
Ainos	248	n.d.	0.72	0.97	95.70	n.d.	1.58	n.d.	1.04
Apollonia	204	n.d.	n.d.	5.30	93.39	n.d.	0.28	n.d.	1.15
Chersonnesos	C378	n.d.	n.d.	11.99	87.52	n.d.	0.29	n.d.	0.40
Athens	5667	n.d.	n.d.	n.d.	98.54	0.01	n.d.	n.d.	1.45
Athens	8749	n.d.	n.d.	0.22	98.02	n.d.	n.d.	n.d.	1.76

[11] *Papaevangelou-Genakos* 2000.

range, and a smaller group of coins with contents below 1%. According to previous studies the presence of copper in excess of 0.5 % represents a deliberate addition, most probably to increase the hardness of the alloy which otherwise would have been too soft to be worked[12]. It is therefore reasonable to speculate that in our case too copper was added deliberately. The silver/copper correlation diagram displays a rather populated group in the range of 1-3.5 % copper with only 1 coin with copper contents above 4 %. Lead contents range between 0.2 and 4.2 % displaying two rather loose groupings as shown in the silver/lead correlation diagram. Such concentrations might be the result of the cupellation process applied for the separation of silver most probably deriving from argentiferous lead ores. Alternatively, it could derive from deliberate addition particularly when it is detected above 1 %. In the assemblage under study, 21 coins contain lead in concentrations of 0.3 to 1 % and these might be suggestive of its origin from cupelled ores. For 11 coins, lead concentrations are between 1 and 3 % suggesting a probably intentional addition while in one case, the amount of 16.8 % of lead indicates deliberate debasement. The silver/gold correlation shows that the majority of coins contain gold in concentrations below 1 % in both low and higher purity coins. Four coins contain gold in contents between 1 and 1.7 % and a fourth one 2.3 %. Since lead contents are either absent of very low in these four coins this might be suggestive of a long cupellation process during which an increase in silver and gold could occur with a simultaneous decrease in lead values. The frequency of gold in the assemblage shows the majority falling within the compositional range of 0.15 to 0.62 % (24 coins), followed by a smaller number of six coins in the range of 0.62-1.09 %. This consistent pattern of low values seems to corroborate the hypothesis that gold was present in the argentiferous ores such as chlorargyte or acanthite used for the extraction of silver.

For the time being and based on a small volume of coins we can proceed with the analysis of silver coins from the three major cities of Aegean Thrace, i.e. Maroneia, Dikaia, and Abdera and to draw some preliminary conclusions. This has shown how the supply of silver had been more or less constant from the late sixth to the second century BC although some small devaluation is apparent in the long term. This devaluation through time has been more pronounced for the case of Abdera and might be related to the political and military history of the city as the invasion of the Tribalioi in particular coincides with the 6th series of coinage after which devaluation becomes more prominent. The coins of Maroneia show some fluctuations through time with higher and lower silver contents coexisting, as is the case with the coinage from Dikaia. The results testify that the deposits of Thrace were under exploitation from at least the late 6th century BC when the earliest coins in the region were struck. The main alloying agent was copper that was added in most cases between 1 and 3 %. And finally, lead could be considered as an alloying addition for at least 11 coins where its concentration is between 1 and 4.2 % and for the rest reflects a reminiscent from the cupellation process. Our results are in accordance with the geological/geochemical studies, confirming that most of the silver-bearing deposits of Thrace contain low gold contents. Three main types of mineralisation present in northeastern Greece should be considered in this context (**Fig. 3-4**). Galena is one of the main minerals exploited for its rich silver contents and secondary jarosite and anglesite are present in these mineralisations. The most important carbonate replacement bodies are located in NE Chalcidice, Thasos and Palaia Kavala[13] with increased silver and gold contents and ample archaeological evidence for ancient mining. The carbonate replacement system in Thermes, north of Xanthi is characterized by low silver

[12] *Karydas, Anglos, Harith* 2008; *Kladouri, Skaltsa, Gerodimos, Pezouvani, Karydas* 2023.
[13] For Chalcidice, see *Wagner, Pernicka, Vavelidis, Baranyi, Bassiakos* 1986; For Thasos, see *Wagner, Weisgerber* 1988; For Kavala, see *Photos, Koukouli-Chryssanthaki, Tylecote, Gialoglou* 1989; *Vavelidis, Gialoglou* 1997; *Fornadel, Spry, Melfos, Vavelidis, Voudouris* 2011. *Vavelidis, Christofidis, Melfos* 1997.

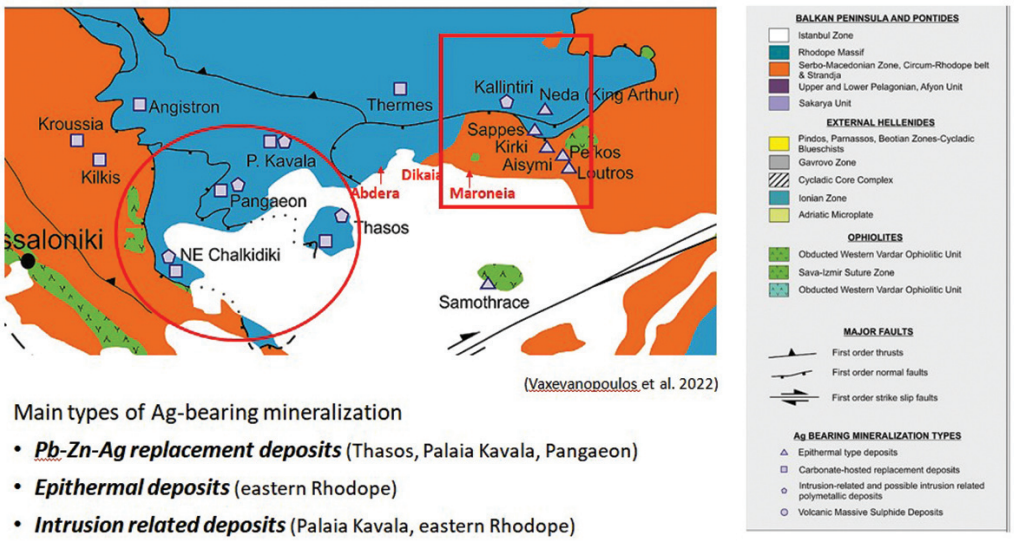


Figure 3. Map of Easter Macedonia and Thrace with main types of Ag-bearing mineralization.

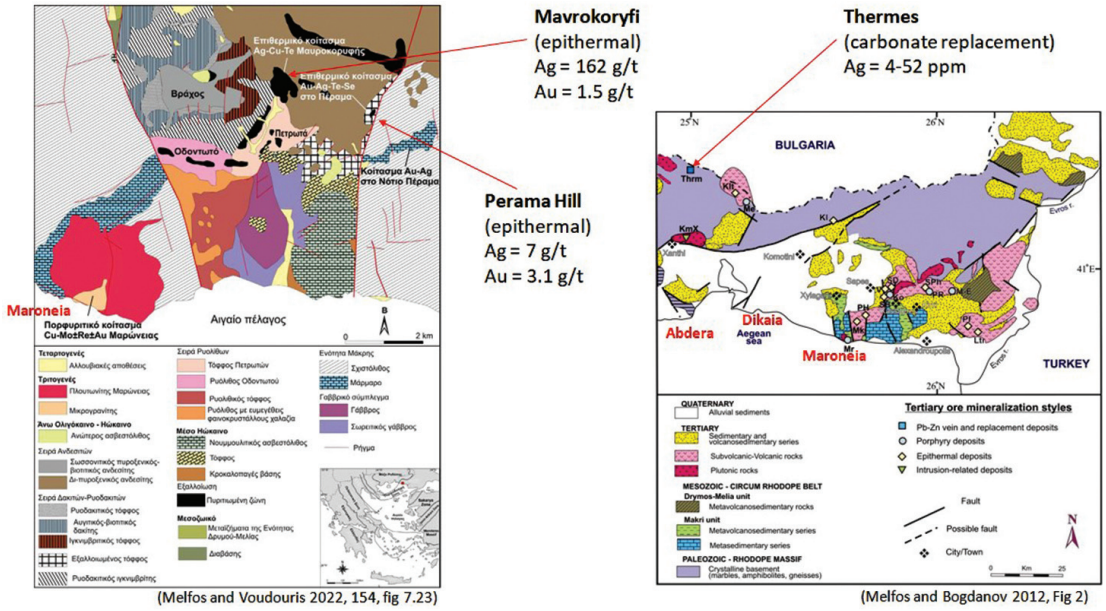


Figure 4. Maps of Aegean Thrace with epithermal mineral deposits.

concentrations[14]. Significant epithermal deposits exist at the eastern Rhodope Mountain range in the regions of Sapes-Kirki, Neda, Pefka but also at Maroneia and Melitaina[15]. The epithermal deposit at Perama Hill in eastern Rhodope/Evros is located at the eastern margin of the tectonic fault of Petrota-Maroneia[16]. Last is the nearby epithermal deposit of Mavrokoryfi[17].

All these deposits are potential sources of silver for the coins under study but before

[14] There is evidence for tentatively mining in the Roman period and associated to a military camp found nearby and to the Mithras relief, see ΟΔΥΣΣΕΥΣ, the official site of Hellenic Ministry of Culture (http://odysseus.culture.gr/h/2/eh251.jsp?obj_id=715:Maria Chrysaphi).

[15] The first contain up to 66 ppm Silver according to a recent study. Although the area of Kirki has Silver-rich mineralisations only a Large-scale modern mining has been detected. Prospection through trenches and adits at Aisymi, Sapes, and Neda might have obliterated ancient phases of mining and extraction of minerals. *Melfos, Vavelidis, Bogdanov* 2003.

[16] For Perama, see *Voudouris, Melfos, Spry, Moritz, Papavassiliou, Falalakis*, 2011; For Maroneia, see *Papastamataki, Orphanos, Demetriou, Triantafyllos, Karadima* 2001.

[17] *Voudouris* 2011.

performing lead isotope analysis and/or trace elements analysis, it is premature to arrive at any conclusions concerning provenance. Additionally, we need to stress that despite the progress in recent years of lead isotope studies, the overlapping isotopic compositions of several deposits across northeastern Greece shows the complexity of assigning coins from this region to specific geological sources. Thus, approaching such issues of procurement of raw materials one needs to take into consideration not only the geological and geochemical information but also the political relations and their fluctuations over time between the different cities affecting their access to such resources.

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CN = Corpus Numorum, https://www.corpus-nummorum.eu/

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Сребърни монети от антични градове в Егейска Тракия представени чрез XRF анализ

Марина Тасаклаки, Неранцис Неранцис

Проучването има за цел да анализира качеството на сребърната сплав, използвана за монетосеченето, чрез неинвазивна оценка на елементния състав на монетите. По време на началния етап бяха изследвани общо 96 сребърни монети с помощта на преносим XRF апарат. Количествени данни бяха получени само за 44 монети и резултатите са представени тук. Особено внимание заслужават предварителните аналитични данни, получени от монети от сребърни сплави, произхождащи от три известни града в Егейска Тракия – Абдера, Дикая и Маронея. Разгледани са и примери от монети, за които се предполага, че са емитирани в Неаполис. Елементният състав разкрива наличието на сребро (Ag), мед (Cu), олово (Pb), злато (Au), както и следи от платина (Pt), желязо (Fe), титан (Ti). Предварителните данни показват постоянна наличност на сребро от края на VI до II в. пр. Хр., с някои данни за дългосрочна девалвация.

Studies on Ancient Metalworking Techniques: Preliminary Report

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Abstract: *This preliminary report focuses on two techniques of jewellery production. The first technique is granulation, and the second is filigree. We know both techniques from different gold jewellery from ancient Thrace. The aim of this study is to gain more knowledge about the use of these techniques, the production steps, and possibly, the technological knowledge of the fine working metalworker. With the help of experimental archaeology, both techniques are examined to draw conclusions about their application, the tools used and the technological knowledge of the craftsmen.*

Keywords: Craftmanship, Granulation, Filigree
Ключови думи: занаятчийски умения, гранулация, филигран

From various Thracian sites, we have jewellery objects with granulation and filigree such as the gold earrings from Mogilanska mogila[1] in the Vratsa Region or some parts of the horse-trapping from Kralevo[2] from the Targovishte Region. Other known jewellery objects with this kind of decoration are from the Malka mogila[3] in the Stara Zagora region or the Arabadzhiyska mogila[4] and Mushovitsa mogila[5], both located in the Plovdiv region. The objects from the Stara Zagora and Plovdiv regions are discussed in more detail below, as the author was able to study them in the original[6].

OBJECTS WITH GRANULATION AND FILIGREE FROM ANCIENT THRACE

Necklaces

From each of the three Mogili (i.e. mounds)[7], comes a necklace with lenticular- and

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[1] *Torbov* 2015: 63, plate XXIV 1a – б.
[2] *Ginev* 1983: fig.26, 27, 30.
[3] *Kitov* 1994: 65.
[4] *Filow* 1934: 132-133, fig.154-155.
[5] *Filow, Welkow* 1930: 306 - 312, fig.31-32; *Filow* 1934: 85-87, fig.108-109.
[6] I would like to thank Momchil Marinov, Director of the Museum of History Iskra Kazanlak and Meglena Parvin, as well as Kostadin Kisiov, Director of the Regional Archaeological Museum in Plovdiv and Ekaterina Ilieva and Lyubomir Merdzhanov for the opportunity to do research on the originals.

biconical beads. At first glance, they look very similar. But with a more detailed view, there are some differences. All three necklaces have a rosette as the central element of the lenticular beads, only on three beads of the necklace from Arabadzhiyska mogila (Inv. Nr. 1646) this element is missing. The rosettes were made with four, five, six or eight leaves. On the necklace from Malka mogila (Inv. Nr. MIK A 1582) the rosettes look a bit like waterlilies, because they are made of three layers (**Fig. 1**). All three show

Figure 1. Detail of the rosettes from the necklace of Malka mogila. (Photo: S. Simon).

a

b

Figure 2. Frontview of the necklace from **(a)** Mushovitsa mogila and **(b)** Arabadzhiyska mogila. (Photo: S. Simon).

that the rosettes are made of a plain filigree wire with a single granule in the centre. These granules have not always the same size. The lenticular beads were made from two halves which are soldered together, and the rim is surrounded by filigree wire, which has different styles, on some beads it's plain (the ones from Arabadzhiyska mogila (Inv. Nr. 1646) (**Fig. 3a**) and on others twisted wire is used (Mushovitsa mogila (Inv. Nr. 1534,1535,1536) and Malka mogila (Inv. Nr. MIK A 1582). On the beads of the necklaces from Arabadzhiyska – and Mushovitsa mogila the granulation is arranged as circle granulation and areal triangle granulation[8] (**Fig. 2**). The backside of the necklace from Mushovitsa mogila shows also circle granulation and areal triangle granulation as well as single granulation (**Fig. 3b**).

a

b

Figure 3. (a) Detailed view of the granulation and filigree from the necklace from Aradadzhiyska mogila (without scale); **(b)** Backside of the necklace from Mushovitsa mogila. (Photo: S. Simon).

Pendants

Two pendants were analysed. Both come from Malka mogila (Stara Zagora region). The first one (Inv. Nr. MIK A 1583), which is made of two hemispheres, shows filigree and granulation work (**Fig. 4**). On both hemispheres plain filigree wire is arranged as beehives[9] with a single granule at the top. Around the centre there is twisted filigree wire. On the bottom of the pendant there is a rosette.

The second one (Inv. Nr. MIK A 1581), which is connected to a loop in loop chain, has the form of an amphora (**Figure 5a-b**). This amphora is made from several individual

[7] Malka Mogila, Arabadzhiyska mogila and Mushovitsa mogila.
[8] *Wolters* 1983: 14-17, Fig.3.18, Fig 4.19.
[9] *Wolters* 1987: 1085-1086, Fig.6.2.

parts and shows filigree and granulation, with a rosette as the central front element (**Fig. 5a**). The rosette is made of a gold sheet, filigree wire, with a single granule in the middle. Rosettes can also be found on the tube, which connects the amphora with the loop-in-loop chain and above the acorn. Other elements of the front are twisted wires, which form two palmettes around the rosette (one above and one beneath). Inside the palmette decoration is a line granulation, consisting of eight granules. Overall, the main decoration on the front side is made with filigree. The backside (**Fig. 5b**) of the amphora shows granulation, which is arranged as grape- or pyramidal granulation after Wolter's classification[10].

Omega-shaped ornaments of head dress

From Arabadzhiyska and Mushovitsa mogila we have four omega-shaped ornaments of a head dress. All four ornaments have a pyramid made of granules on their ends, the pyramids on the ones from Arabadzhiyska mogila (Inv. Nr. 1641-1642) end with a small ring made from beaded wire (**Fig. 6a**), while the ones from Mushovitsa mogila (Inv. Nr. 1538) have a granule on top (**Fig. 6b**). The decoration of the four ornaments is different. The ornaments from Arabadzhiyska mogila (**Fig. 6a**) have granulation and filigree also on the wire. The ornaments from Mushovitsa mogila have their decoration only underneath the pyramids. Here different styles are used, on one ornament we see, S-spirals, made of plain wire, and beaded wire with single granulation and beaded filigree wire. The other ornament shows on the one side a decoration with beaded wire and on the other side with plain wire.

Earrings

There are different kinds of earrings from Arabadzhiyska and Mushovitsa mogila.

The basket earrings from Arabadzhiyska mogila (Inv. Nr. 1647) show granulation and filigree on the front side, in form of different styles of granulation and plain filigree wire, which forms a S. Inside this filigree decoration we can see granules arranged as grape granu-

Figure 4. Pendant with granulation and filigree from Malka mogila. (Photo: S. Simon).

Figure 5. Front- and backside of the Amphora shaped pendant from Malka mogila. (Photo: S. Simon).

Figure 6. Omega shaped parts of head dress from **(a)** Arabadzhiyska mogila and **(b)** Mushovitsa mogila. (Photo: S. Simon).

[10] *Wolters* 1983: 18, fig.5.1-2.

lation. The Backside is without decoration. On the edge where the two halves are soldered together, a line granulation is running (**Fig. 7a**).

The ten earrings from Mushovitsa Mogila (Inv. Nr.: 1537) can be divided into three groups. Group 1 (**Fig. 7b**) consists of six earrings. All have traces of wearing and are hardly rubbed, as seen on the decorations. The earrings are made of a sheet of gold, which is rolled into a tube. Due to the damage, it is apparent that the earrings are not made of wire. They are decorated with granulation and filigree wire. The filigree wire is rolled to a cylinder and on top, there is a rosette with four leaves with a granule in the centre. Group 2 (**Fig. 7c**) has three earrings. They are decorated like the ones from group 1, but they are not a damaged. The granules are visible, as well as, the filigree wire, and the rosettes on top. Group 3 (**Fig. 7d**) is a single earring, which is made from plain wire, and is tapered towards the ends. It is decorated with granulation, beaded wire as well as plain wire, and has granulation and filigree (beaded wire) in the centre part. The granules are arranged as triangle area granulation. The ends of the earring show a granule and beaded wire. The earring is made from a forged round wire.

Figure 7. Earrings with granulation from **(a)** Arabadzhiyska moglia and **(b-d)** Mushovitsa mogila. (Photo: S. Simon).

The technique of granulation and filigree

The Techniques of granulation and filigree have their origins in the 3rd millennium BC presumably in Mesopotamia[11] and have since then spread to various regions over the following centuries[12]. Early objects with granulation and filigree are known, for example, from Troy, were different kinds of earrings with granulation and filigree come from[13] or from Kâmid el-Lôz in Lebanon, where two silver discs with granulation were found[14]. Granulation is a technique where small gold beads, so-called granules, are attached to the jewellery object. This is done with diffusion bonding, meaning that the metalworker used a diffusion solder, like copper salt[15]. It is important that the granules and the metal have a high fineness and the same melting point, otherwise the diffusion bonding would not work, and it could be that one part of the object is melting, while the other one hasn't reached the right temperature[16]. Filigree is a technique in which fine wires are applied to the jewellery object to form different patterns and ornaments. These wires come in a variety of styles and can be made from plain wire, beaded wire, or twisted wire[17] and they are also attached to the jewellery with diffusion bonding[18].

After analysing the jewellery objects, experimental archaeology was used, to examine these techniques.

The analyses of the objects showed that there are different types of granulation and also different types of filigree wire. In these

[11] *Wolters* 1983: 68; *Wolters* 1987: 1095; *Nestler, Formigli* 1993: 11.
[12] *Wolters* 1983: 68.
[13] *Tolstikow, Trejster* 1996: fig.13, fig.66.
[14] *Hachmann* 1983: fig.95.
[15] *Williams, Ogden* 1994: 26-27.
[16] *Williams, Ogden* 1994: 27.
[17] *Wolters* 1987: 1067-1077.
[18] *Wolters* 1987: 1144.

first experiments, granules will be produced for granulation and then applied to a curved surface, also wire will be produced. Which will be later processed into various filigree wires[19].

Experiments

These first experiments on granulation and filigree are carried out with fine silver. Fine silver and fine gold are very similar in their characteristics, except that fine gold is more elastic than fine silver, which is why fine gold can be hammered out into extremely thin layers. Another advantage, working first with silver is, that mistakes in working can exclude in later working with gold.

Before starting with the experiments, the necessary aids and materials must be prepared. Granules, an organic glue and copper salt are required for granulation. The granules and the organic glue were produced by the author, the copper salt, which is used in the form of malachite powder, was purchased from a specialised retailer.

The granulation experiments start with the making of the granules. Small pieces of silver were cut from a fine silver sheet. If possible, they should all have the same size, to ensure the uniformity of the granules. There are two methods to make the granules. The first consists of melting each piece on a piece of charcoal until it forms a ball[20]. The second method involves melting down several granules at the same time in a crucible, where several layers of charcoal powder and metal pieces layered and then the crucible is placed into a kiln[21]. Since no kiln was available, the first method was applied (**Fig. 8a-c**).

After making the granules, the other materials were prepared. Since the soldering required copper salt, malachite powder was used, along with quince seeds and water as an organic glue[22]. The pectin from the seeds reacts with the water and becomes a gluing liquid. This liquid was mixed with the copper salt, and with a small brush, the pattern was painted on the surface. After that, the granules were attached to the surface, with a brush wetted with the organic glue (**Fig. 8d**). After approximately 10 minutes, when the glue had dried down, the silver sheet and the granules were heated with

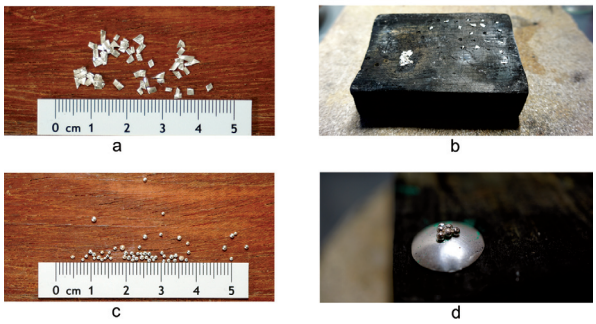

Figure 8. Granulationexperiment: **(a)** small pieces of silver; **(b)** silver pieces on charcoal; **(c)** silver granules; **(d)** silver granules on curved silversheet. (Photos: S. Simon).

a flame low in oxygen, to which more oxygen was gradually added. The surface of the jewellery had to be heated close to the melting point, which could be determined by the colour. As soon as the surface turned shiny, the heat was turned off, and the granules were fixed to the surface. Excess copper salt had to be removed before heating, as it can lead to discolouration and a rough surface (**Fig. 9**).

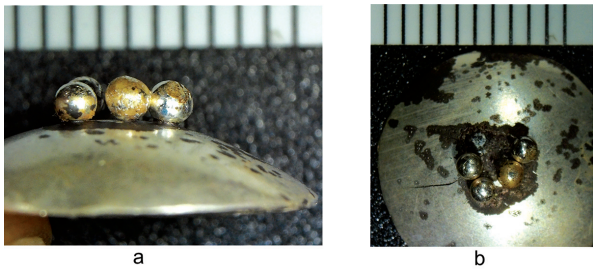

Figure 9. Surface of the granulated object: **(a)** detail of diffusion; (**b)** detail of the rough surface. (Photos: S.Simon).

The next experiment aimed to recreate the filigree wire. Since there is little evidence for the use of a drawing plate in antiquity[23], the wire for the experiments was rolled from a thin strip of metal[24]. Thus, a strip of fine silver

[19] As the experiments have not yet been completed, only the production of a wire will be described.
[20] *Wolters* 1983: 46; *Nestler, Formigli* 1993: 41-43.
[21] *Wolters* 1983: 46-47; *Roth* 1986: 56-57, fig.26; *Nestler, Formigli* 1993: 50-54.
[22] *Moesta* 1983: 126.
[23] For more detailed information about the use of drawing plates see for example *Ogden* 1991; *Özşen* 2021.
[24] *Nestler, Formigli* 1993: 47; *Williams; Ogden* 1994: 23.

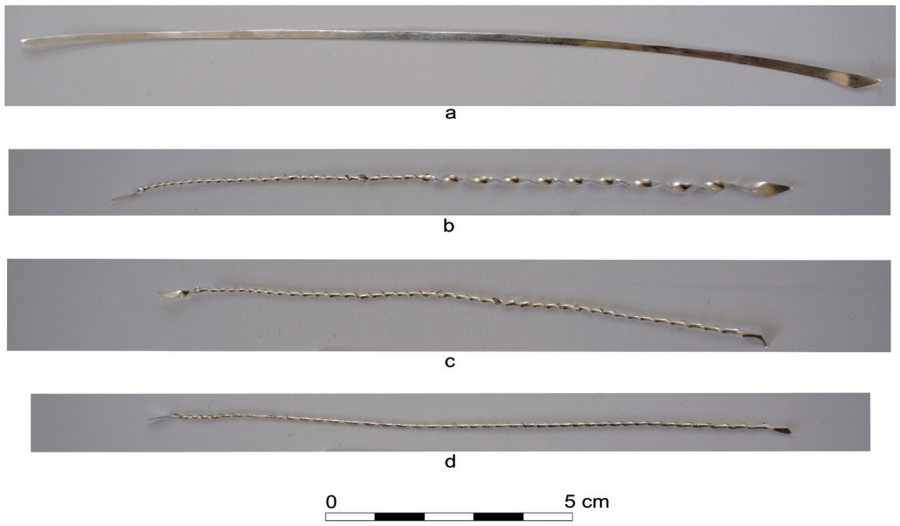

Figure 10. Different steps of making wire from a small sheet of silver. (Photos: S.Simon).

was used. The fact that it was common practice in antiquity to make metal in this manner can be seen on some of the objects discussed above, such as the necklace from Arabadzhiyska mogila (Inv. Nr.1646). Here the edges of the sheet that was rolled into a plain wire are still visible (**Fig. 3a**).

For the experiment, the strip was twisted manually as far as possible. Then, it was placed between two pieces of metal, and with a slight pressure, rolled into a plain wire. The technique of rolling wire, is more challenging than it may seem at first sight. The method must be mastered; otherwise, the wire will either not be rolled correctly or break from uneven pressure distribution during rolling (**Fig. 10**).

Conclusion

This preliminary report was intended to show impressions and results of a series of further experiments that are being carried out as part of a study on ancient Thracian jewellery. The experiments showed that several factors need to be considered in the making of jewellery. The results of the experiments serve as a first basis for answering the question of which soldering techniques were used for granulation and filigree. It should be investigated whether a reaction solder, i.e., a copper salt, or a metallic solder, an alloy with a lower melting point than the starting alloy, was used. The craftsman needs to have extensive knowledge about the qualities of the material, such as gold and silver, while also being aware of diffusion solder like copper salt or the use of organic adhesives like pectin found in the quince seeds.

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Проучвания на античните техники на металообработка: Предварителни наблюдения

Свеня Симон, Университет на Саарланд

Статията анализира древни техники за обработка на метал с фокус върху техниките на гранулация и филигран. Разгледани са различни бижута от Старозагорско и Пловдивско, за да се установят приликите и разликите. Изследванията показват, че телта, използвана за украса на бижутата, не е произведена чрез изтеглянето на метала, а чрез валцуване на метална лента. Въз основа на резултатите от изследването бяха проведени експериментални тестове за получаване на гранулация и филигран. Тези експерименти показаха, че много различни фактори трябва да се вземат предвид при производството на бижута. Резултатите от експериментите служат като основа за отговор на въпроса кои техники за запояване са използвани в древността или как е произведена нишката и какви знания са необходими за работа с техниките.

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