

Katarzyna de Lellis-Danys

From Constantinople to Warsaw: A Byzantine Amphora from the National Museum in Warsaw

Contact: Katarzyna
de Lellis-Danys,
National Museum in
Warsaw – Polish Centre
of Mediterranean
Archaeology, University
of Warsaw, Warsaw,
Poland; e-mail:
kdelellis@mnw.art.pl.

ABSTRACT: This paper discusses a late Byzantine transport container, known as a Günsenin III type amphora, currently housed in the National Museum in Warsaw. Donated in 1921 by Władysław Semerau-Siemianowski, the vessel was originally discovered in the ruins of Constantinople. This paper examines the provenance of the amphora in the historical context of early Polish scholars' interest in Byzantine studies, as well as the fate of the museum collection during the Second World War. It explores the debate over the amphora's origins between Chalcis and northern Anatolia and traces their distribution across the Black Sea region, Poland, and Scandinavia during the 12th and 13th centuries CE.

KEYWORDS: Byzantine pottery – amphorae – Constantinople – trade – Semerau-Siemianowski collection

Introduction

Amphorae of the Günsenin III type are amongst the most recognisable transport containers of the Late Byzantine Empire. They were primarily used to transport wine, which was often produced in monastic estates. The specimen discussed in this paper was found in Constantinople and is currently housed in the National Museum in Warsaw (MNW). Whilst the object is a valuable archaeological artefact in itself, its object biography offers a compelling lens through which it is possible to examine the broader historiography of Byzantine collections in Central Europe. Its provenance attests to Byzantine-oriented interest in past material culture

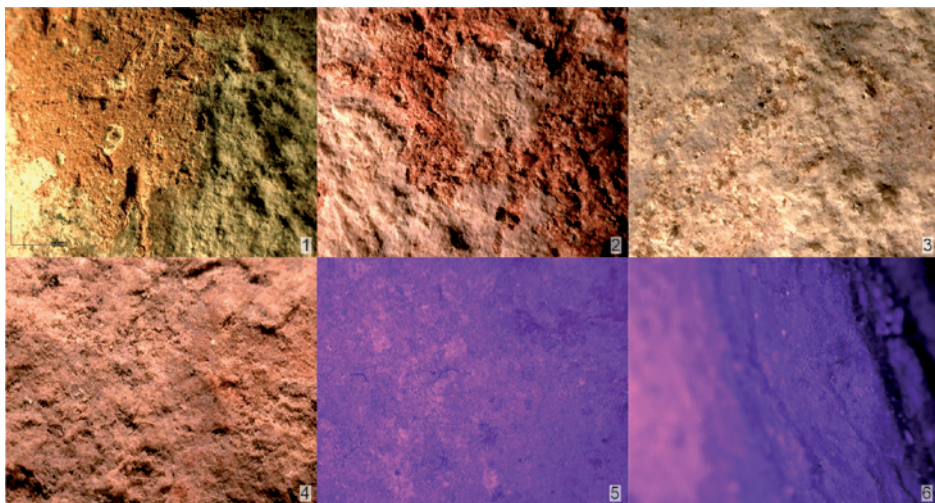
dating back to the early 20th century, marking a milestone in the formation of the Byzantine collection in the MNW. As a unique object within the museum, this amphora narrates significant histories within the institution's space, serving as tangible evidence to the complex economic dynamics and vibrant connectivity of the 12th and 13th centuries Byzantine markets with distant regions.

Amphora classification and origin

The vessel is catalogued under the Inv. No. 236138 MNW [Fig. 1], a piriform container 62 cm in height, with a rounded, outward-curving rim 7 cm in diameter, set upon a slightly flared cylindrical neck. Two ribbon-like handles with an ovoid cross-section are attached to the shoulders and the upper part of the neck, rising significantly above the rim. Globular shoulders (max. diameter 28 cm), covered with striation, transition into a slender body, terminating in a conical base with a characteristic knob. The exterior surface is cream-coloured and smoothed, a texture resulting from post-depositional salt encrustation [Figs. 2, 3–4]. Because the vessel is intact, its fabric remains not visible. In accordance with museum conservation policies, invasive archaeometric sampling, such as petrography and organic residue analysis, cannot be performed on the object. To preserve



↑ Fig. 1. Amphora, Inv. No. 236138 MNW from Constantinople; National Museum in Warsaw. (public domain; Photo: Filip Plewiński; Illustration: Katarzyna de Lellis - Danys).



↑ Fig. 2. Macroscopic images of the exterior with salt encrustation (1–2), salt encrustations (3–4), and interior in UV light (5–6). (Photo: Katarzyna de Lellis–Danys).

its structural and aesthetic integrity, the methodological framework is limited to non-invasive macroscopic and morphological assessment. The original surface is accessible, macroscopic examination reveals an orange-coloured matrix containing visible grains of quartz and yellow mineral inclusions, tentatively identified as limestone [Figs. 2, 1–2]. These surface details were documented photographically using a digital microscope (Dino-Lite AD4113T-I2V, 20–200× magnification) utilising integrated infrared (IR) and ultraviolet (UV) illumination, with images processed via DinoCapture 2.0 software. Non-invasive observation of the accessible interior within the rim and neck under UV light, following established protocols for the ultraviolet analysis of museum objects and comparative referential data,¹ detected no traces of resinous substances [Figs. 2, 5–6]. Consequently, the vessel's interior was most likely uncoated.

Amphora Inv. No. 236138 MNW belongs to the Günsenin III type,² which corresponds to Sarāḫane type 61³ as well as to type 5 in the classification established by Charalambos Bakirtzis,⁴ who categorised these spindle-shaped containers within the broader context of Late Byzantine transport and storage pottery. Those exported to Kyivan Rus' have been categorised into Group II and type 2.⁵ These

1 The observations followed the protocol for studying the museum's objects with UV light by Marta Simpson Grant (2000a; 2000b), and referential data in King 2015; Michel and Rots 2022.

2 Günsenin 1990, pp. 28–30, 214, Pl. 39–52; Günsenin 2018, pp. 100–102.

3 Hayes 1992, p. 76.

4 Bakirtzis 1989. Along with other Byzantine amphorae, they are also labelled by the general term of megarika, which is derived from Megara, a city in Greece, where such vessels were used for wine and oil transportation. Bakirtzis 1989, p. 79.

5 Koval 2010, pp. 157–159, Fig. 57.

containers were manufactured in various places, including Central Greece, like Chalcis, and are dated to the late 12th and early 13th centuries CE.⁶ Finds from the Levant are labelled ‘high-handled’ amphorae, descriptively referring to their most striking feature.⁷ Recently published typological reconsideration of the Günsenin III type highlights further division based on size.⁸ Whilst their variability of capacity may be a significant factor in studies of economy, a detailed typology can be securely applicable to completely preserved specimens, and thus leaving fragmentary preserved ones in a general description of Günsenin III. Archaeometric studies strongly suggest Chalcis⁹ in Greece as the primary production centre. The identification of Chalcidian origin features light-coloured fabrics of a cream or yellow hue, with variable-sized limestone inclusions.¹⁰ It is further evidenced by the occurrence of Günsenin III wasters outside of the fortification walls of Chalcis.¹¹

Hypotheses proposing alternative production zones have sparked debate about other sources, based on the sheer volume of finds in the Black Sea. For instance, one of them is the Propontis area within the Sea of Marmara region and Ganos (modern Topagaç), an archaeological site featuring a monastic complex and pottery production, both associated with wine commerce.¹² Some scholars suggested Triglia, located north of Chalcis on the coast of the Thermaic Gulf.¹³ Another proposed a production centre for such containers is Trabzon, in north-east Turkey on the Black Sea.¹⁴ Furthermore, most of the finds from the Turkish coastal area of the Black Sea are of orange and red-brick fabrics,¹⁵ unlike those petrographically identified as of Chalcidian origin. The most recent archaeometric study of Byzantine amphorae found in Poland identified different provenances for these finds, including Ganos and Crimea, contributing to the variability of production centres, although they were primarily represented by body sherd fragments attributed to Günsenin I and IV types.¹⁶

6 Günsenin 2018, p. 101; Vroom 2014, p. 97.

7 Avissar and Stern 2005, p. 105, Fig. 44, 1, Pl. 29, 1. It is worth noting that Dominique Pieri (2005, p. 91) suggested Late Roman Amphora 2 as possible predecessor of Günsenin III type.

8 Sazanow and Engovatova 2024.

9 Studies on Byzantine amphorae, highlighting the significance of the Chalcis workshop were held by the POMEDOR Project, Waksman 2017.

10 Waksman et al. 2018.

11 Vroom 2021, p. 63.

12 Günsenin 1990, p. 283; Günsenin and Hatcher 1997.

13 Koval 2010, pp. 212, 157; Volkov 2006.

14 Bulgakov 2000.

15 Günsenin 1990, pp. 212–214.

16 Korokhina et al. 2025.

Provenance and the Semerau-Siemianowski collection

The discussed amphora, acquired by the National Museum in Warsaw (MNW) on 2nd July 1921, has been found in the ruins of ancient Constantinople at a depth of only 15 cm by Władysław Semerau-Siemianowski (1849–1938), a Polish physician, traveller, and one of Poland's most distinguished numismatists of the pre-war period. He donated his extensive collection of antiquities to the National Museum in Warsaw in 1921. To fully understand the significance of this object, it is necessary to provide some background on the donor.

Semerau-Siemianowski was born in Cierplewo in the Greater Poland region, then under the Prussian partition. In 1870, he began medical studies, first in Wrocław, then in Kraków, and finally graduated from the University of Vienna in 1877. During his stay in Kraków, he developed a passion for archaeology and participated in organising the Archaeological Cabinet at the Jagiellonian University.¹⁷ After completing his medical studies, he worked as an army doctor in the Ottoman Empire, moving between several posts. During this period, he began collecting and cataloguing antiquities, although none of his works survived. He also gathered available literature and archaeological publications, whilst corresponding with other antiquarians.¹⁸

The collection of Semerau-Siemianowski, amassed over decades, numbered nearly 30,000 items. Its core and main interest lied in Greek, Roman, and Byzantine coins, 27,711 objects in total. Alongside these, he also collected 158 examples of Byzantine sphragistics – lead seals, along with icons and crosses, many of which did not survive the Second World War.¹⁹ Ceramic and glass vessels were not his primary interest, although Classic Greek vases are also present in his collection, however, a Byzantine amphora is a unique specimen.

After returning to independent Poland in 1919, Semerau-Siemianowski settled in Warsaw and donated his entire collection to the nation in 1921, housing it in the National Museum in Warsaw and retaining only the role of honorary curator. Over the following years, despite his advancing eye disease, which resulted in an almost complete loss of vision in 1928, he meticulously inventoried and catalogued the numismatic assemblage, latterly with the help of Anna Szemiothowa.²⁰

According to Aleksandra Sulikowska-Belczowska, whilst living in Constantinople, Semerau-Siemianowski did not collect objects solely for their monetary or aesthetic value, but was guided by historical considerations and material diversity, broadening his interest from Antiquity to the Byzantine period. His works

17 Szemiothowa 1938, p. 136; Wiercińska 2014, p. 112.

18 Wiercińska 2014, pp. 114–115.

19 Sulikowska-Belczowska 2021, p. 75; Wiercińska 2014, p. 111.

20 Szemiothowa 1938, p. 137; Wiercińska 2014, p. 111.

and collection laid the foundation for the Eastern Christian Art Collection in the National Museum.²¹

During the Second World War, the collections of the National Museum in Warsaw were systematically looted by the Germans. Objects donated by Semerau-Siemianowski suffered heavy losses, particularly amongst numismatic items, which had been hidden in August 1939 but were found and removed by the Germans as early as 23rd October of that year. Although destroyed chests containing coins were found in 1945 in Lower Silesia, the collection was largely discarded. War losses included almost all of the gold and many silver coins, which survived only as inventory numbers and descriptions.²² A similar fate befell some Byzantine objects, such as crosses,²³ although a large portion of other artefacts, such as lead seals and amphorae, including the discussed specimen, survived the war intact, hidden in the museum's basements. Neither notes prepared by Semerau-Siemianowski, nor his correspondence, survived; therefore, there is no precise location of amphora Inv. No. 236138 MNW findspot.

According to the archival description, Semerau-Siemianowski uncovered the amphora just 15 cm below the surface, suggesting that the findspot was likely an open, accessible area, devoid of dense urban fabric. This assessment is supported by contemporary cartographic evidence, specifically the Necip Bey map of Istanbul from 1918, produced during Semerau-Siemianowski's residence in the Ottoman Empire. It illustrates the city's topography within the Theodosian Land Walls. At that time, the landscape featured a mosaic of orchards, gardens, and cultivated plots, extending across the periphery and the historical core itself.²⁴ Consequently, a vast expanse of open land fits these criteria, leaving the precise location of Semerau-Siemianowski's dig undetermined. The open green landscape in mid-19th-century Constantinople is further illustrated by a photograph by James Robertson showing the view of the Golden Horn [Fig. 3].²⁵

Although the archival record lacks stratigraphic detail or additional contextual data, the discovery of an intact amphora just below the surface suggests that Semerau-Siemianowski may have inadvertently captured a significant archaeological context. This hypothesis aligns with the results of archaeological investigations conducted between 1921 and 1922 in the expansive garden districts of the Sarayburnu foreland. These excavations unearthed Late Byzantine structures alongside a significant assemblage of intact amphorae representing the Günse-

21 Sulikowska-Belczowska 2021, p. 75.

22 Wiercińska 2014, p. 115.

23 Sulikowska-Belczowska 2021, p. 75.

24 Bütüner 2015.

25 The photography was taken by James Robertson (1813–1888) in 1855, whilst he worked at the Imperial Ottoman Mint, engraving coins. He developed interest in photography and produced number of images showing architecture, daily life, nature of Ottoman Empire, India, and China during his later travels. The presented photography (Inv. No. DI 122114 MNW) and more of his art works are available in the Digital Collection of the MNW, Muzeum Narodowe w Warszawie, *undated*, available at: <https://cyfrowe.mnw.art.pl/pl/zbiory/49062/>.



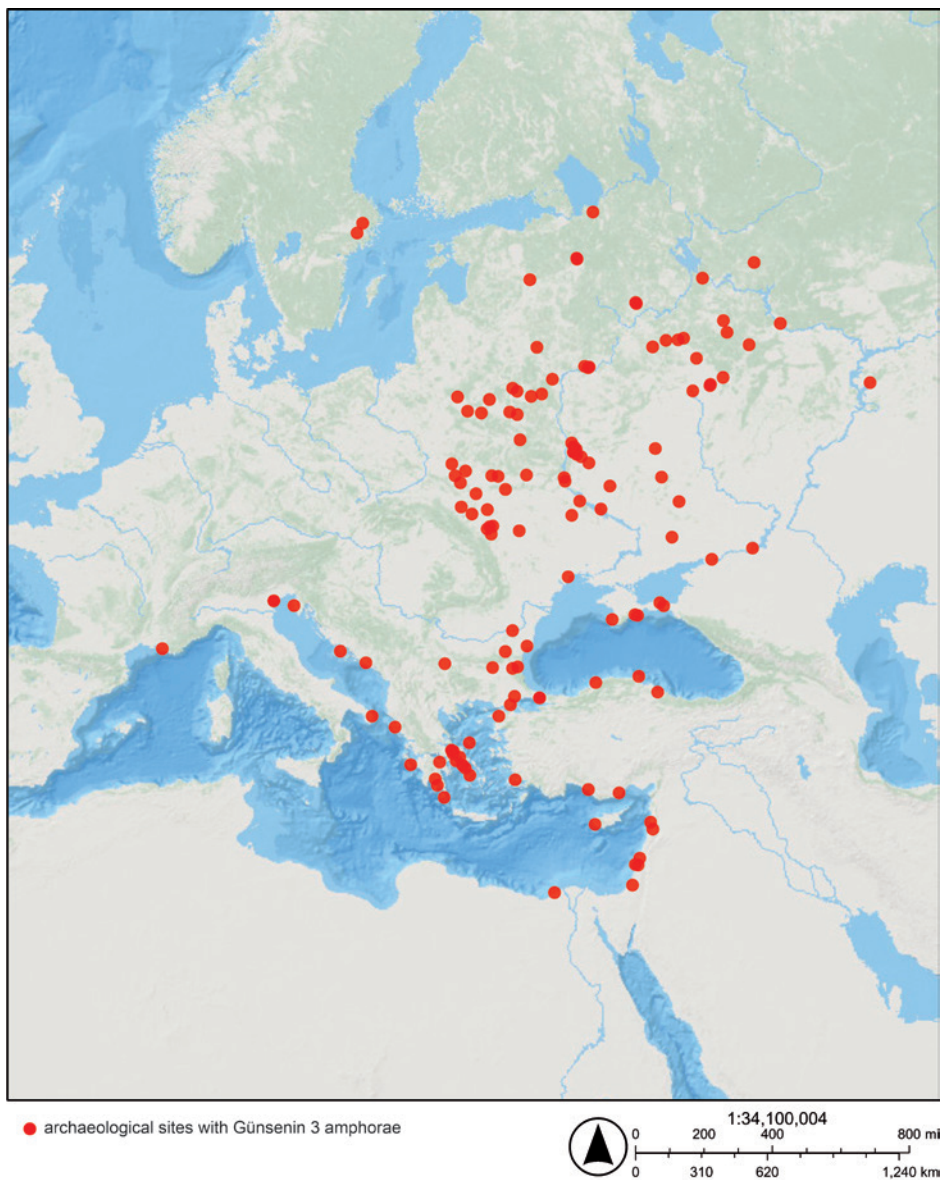
↑ Fig. 3. A view of the Golden Horn about 1855; National Museum in Warsaw. (public domain; Photo: James Robertson).

nin I–IV typology. Notably, forty-seven vessels were recovered from the remains of the Church and Monastery of St. George, sixteen from a palatial context, and thirty-four from various adjacent locations.²⁶ Given this compelling parallel, it is tempting to hypothesise that amphora Inv. No. 236138 MNW originated from a similar archaeological *milieu*.

Economic role of Günsenin III amphorae

Amphora Inv. No. 236138 MNW represents one of the most prolific transport containers of the Late Byzantine period. It mirrors the broader economic dynamics of the Byzantine Empire and narrates them in the museum's space. Extensive archaeological evidence and the widespread distribution of Günsenin III amphorae [Fig. 4] underscore vast maritime and riverine distribution networks, spanning

26 Demangel and Mamboury 1939, pp. 12, 148–149, Figs. 12, 197–199.



↑ Fig. 4. Distribution of Günsenin III amphorae finds. (Illustration: Katarzyna de Lellis-Danys).

from the Levant and Cyprus to the Black Sea littoral and to the inland regions of present-day Ukraine and Russia, and extending westward across the Mediterranean to Italy and France.²⁷ It is worth noting that the distribution presented

27 Günsenin 2018, pp. 101–102; Koval 2010, pp. 156, 226–242; Vroom 2014, p. 99; Yakobson 1979, p. 11.

[Fig. 4] is the first comprehensive illustration to date, including previous studies, discoveries scattered across publications, and unpublished material.²⁸

The production of these vessels was probably tied to the monastic and imperial estates, as evidenced by their frequent presence in ecclesiastical and monastic contexts, such as Chalcis in Euboea. These complexes functioned as integrated socio-economic hubs, with viticulture inextricably linked to the manufacture of ceramic containers. Scholars suggest that this production primarily served the dual requirements of ecclesiastical liturgy and the daily consumption of the clergy in Constantinople.²⁹ Beyond the capital and the Byzantine Empire itself, these amphorae were exported to Kyivan Rus' to meet liturgical demands for wine. However, the majority of the archaeological evidence from this region derives from urban centres and fortified settlements, which played a pivotal role in the broader distribution and supply networks.³⁰ Beyond its religious utility, these containers also served strategic state interests, specifically by provisioning military stations along the Danube frontier. This indicates a state-regulated logistics system capable of supplying high-calorie liquid rations to imperial borders.³¹

Whilst the Günsenin II type has been tentatively identified as an oil carrier, the Günsenin III is associated with the trade of Byzantine wine. The identification of wine as the primary commodity is supported by organic residue analysis. Samples recovered from diverse geographical contexts, including Chalcis in the Euboea region of Greece, Crimea in the Black Sea, and the Levant, consistently exhibit traces of malic and tartaric acids, chemical markers of viticulture. Furthermore, many specimens exhibit an internal coating derived from *Pinaceae* products, such as pine resin. This resinous layer served a technical function as an anti-absorption impregnate, essential for preventing the transpiration of liquids during long-distance maritime transit. However, the detection of animal-based products in several samples suggests a secondary reuse of the vessels, indicating that once the original contents were consumed, these containers were frequently a repurposed store or transport of other commodities.³²

An alternative hypothesis concerning the smaller variants of the Günsenin III – type XX suggests that these vessels may have been utilised for the transport of incense, such as myrrh or consecrated oils used in religious ceremonies, which would account for their frequent presence within ecclesiastical and monastic contexts.³³ However, this theory faces significant challenges regarding the provenance

28 For the general distribution of Günsenin III type see Günsenin 1990, Fig. 16, whilst discoveries from the Kyivan Rus' are presenting by Koval 2010, Fig. 62. Those from the Eastern Mediterranean are illustrated by finds from the Adriatic, Aegean, and Black Sea region, excluding those from southern Levant, Vroom 2021, Fig. 2.14.

29 Günsenin 2009; Morozova et al. 2020.

30 Koval 2010, pp. 171–172.

31 Todorova 2015, pp. 31–32.

32 Pecci et al. 2020. Suggestions of usage as honey containers or beehives may be associated with multifunctionality (Vroom 2021, p. 63) or repurposing these vessels.

33 Morozova et al. 2020, p. 435; Zelenko 2009, p. 277.

and logistics of a potential incense's transportation. None of the primary production zones for Günsenin III amphorae, most notably Chalcis or northern Anatolia, possesses natural sources of frankincense or myrrh. The principal export regions for these resins since Antiquity have been their natural resource zones, such as the Persian Gulf, southern Arabia, and eastern Africa.³⁴ Consequently, whilst the amphorae are found in religious settings, it is more plausible that they served as containers for monastic wine or sacred oil rather than as primary transport vessels for imported aromatics.³⁵

The circulation of these containers often followed specific monastic and riverine conduits, facilitating the movement of wine within closed 'monastic circles'.³⁶ Archaeological evidence from the Manganese district in Fatih, Istanbul, reinforces this ecclesiastical link. Excavations conducted there in the early 20th century revealed significant assemblages of complete Byzantine amphorae associated with the remains of a church and monastery, highlighting the vessels' central role in the Byzantine religious economy.³⁷

The elongated piriform body, coupled with characteristic ovoid cross-section 'high-handles', is a morphological adaptation often associated with stowage on the small ships and barges used in riverine transportation. These elevated handles facilitated the lashing and securing of containers within the cargo hold. Whilst optimised for riverine contexts, this type was equally prevalent in maritime trade, as evidenced by finds from the Black Sea, particularly those concentrated in the Sudak region, as illustrated by the Novy Svet shipwreck.³⁸

The presence of Günsenin III amphorae alongside Günsenin IV types in the cargo of the Çamaltı Burnu I shipwreck, located off the north-west coast of Marmara Island,³⁹ indicates their employment in long-distance maritime shipping. Perhaps the most significant southern evidence is the shipwreck found approximately 30 km north of Tartus, Syria,⁴⁰ which represents the southernmost *in situ* assemblage of this type recorded to date. This cargo comprised nearly 5,000 containers of Günsenin III, demonstrating that these vessels also played a major role in maritime trading.⁴¹

34 Taha 2020.

35 Morozova et al. 2020, p. 441.

36 Günsenin 1990; Günsenin and Hatcher 1997.

37 Demangel and Mamboury 1939.

38 Morozova and Albertson 2012; Zelenko 2009; Zelenko and Morozova 2010; In Morozova et al. 2020, pp. 433–435, Fig. 2, 1–5 these amphorae are classified as Novy Svet type II.LBS. It is worth noting that the area classified as Novy Svet shipwreck probably contains remains of at least two ships, Morozova et al. 2020, p. 430.

39 Günsenin 2001, p. 125, Fig. 9.

40 Günsenin 2018, p. 102; Tanabe 1988.

41 Vroom 2021, 63.

Chronology and distribution

The chronological framework for the amphorae in question spans the 12th and 13th centuries CE. The virtual absence of Günsenin III amphorae in the cargo discovered at Cape Stoba, near Mijet Island,⁴² Croatia, dated to the 10th and 11th centuries CE, provides a *terminus ante quem* for their occurrence. The aforementioned shipwreck yielded a variety of Byzantine transport vessels, such as Günsenin I and II, as well as Sinopean conical vessels and Otranto globular amphorae 1–2. This cargo demonstrates the broader connectivity and standardised use of similar morphologies in Mediterranean and Pontic maritime commerce, predating the use of Günsenin III amphorae.

Such networks are exemplified by the distribution of Günsenin III amphorae along the Adriatic coast, with recorded finds in major maritime hubs such as Otranto and Venice in Italy,⁴³ as well as Poreč and Hvar in Croatia.⁴⁴ Furthermore, evidence linking Byzantine amphorae, including the Günsenin III type, to ecclesiastical wine supplies has been recovered from the basilica in Dubrovnik, dated to the 12th and 13th centuries CE.⁴⁵ Underwater discoveries in this region, such as those from Lučnjak shallows, yield a chronology extending into the turn of the 13th and 14th centuries CE; however, this late occurrence of Günsenin III may likely be attributed to secondary vessel reuse rather than primary deposition. Despite this Adriatic presence, there is currently no archaeological attestation of this type, or other Middle to Late Byzantine transport amphorae, being commercially distributed to the more western reaches of the Mediterranean, such as France or Spain, except for finds from Marseille.⁴⁶ This absence is particularly noteworthy given that Byzantine glazed tablewares are frequently attested in shipwreck cargoes and urban contexts across the entire Mediterranean basin, suggesting a divergence in the trade mechanisms for luxury ceramics versus bulk transport commodities.⁴⁷

In the Eastern Mediterranean, the circulation of Günsenin III amphorae appears relatively restricted, including islands like Milos and coastal sites in Greece like Tanagra.⁴⁸ The most notable maritime evidence is the shipwreck mentioned above, discovered off the Syrian coast near Tartus. On land, several finds from Israel have been recovered from contexts associated with the Crusader period of the 12th and 13th centuries.⁴⁹ Currently, the southernmost confirmed extent of their

42 Kralj et al. 2016.

43 Arthur 1989, Fig. 12; Günsenin 2018, p. 102; Saccardo et al. 2003, p. 404, Fig. 8, 15.

44 Vroom 2021.

45 Ožanić Roguljić et al. 2025, Fig. 5, 3.

46 Vallauri et al. 2003, pp. 140–141, Fig. 2, 4–5.

47 François 1997; Stern 2012, p. 152; Vallauri et al. 2003.

48 Vionis 2008, Fig. 17; Vroom 2014, p. 99.

49 Avissar and Stern 2005, p. 105; Stern 2012, p. 70.

distribution is Alexandria, Egypt, where the presence of the type is evidenced by several fragments.⁵⁰

The distribution of Günsenin III amphorae exhibits two primary clusters of findspots [Fig. 4]. The first is concentrated within the Black Sea basin, where maritime transportation is well-attested by a shipwreck in Sudak Bay.⁵¹ This significant example is the 13th-century CE Novy Svet wreck, which underscores the intensity of trade in this region.⁵² The second major cluster extends across the vast territories north of the Black Sea, following the arterial routes of the Danube and Dnieper rivers into the lands of the Kyivan Rus', a region Christianised in the 10th century CE. The 12th–13th-century chronology of the Günsenin III type aligns with the expansion of a well-organised and settled ecclesiastical network. These circuits facilitated the exchange and supply of liturgical necessities, primarily wine, to distant churches and monastic outposts in newly Christianised territories.⁵³

Of particular interest is the disappearance of imported Byzantine amphorae, including Günsenin III type, from Rus' during the Golden Horde period following the Mongol conquest of Kyiv in 1240 CE. Whilst some researchers tentatively attribute this cessation to the abrupt collapse of urban and ecclesiastical economies, a historical anomaly remains; whereas local trade routes successfully recovered in the following decade to secure the supply of other essential commodities such as salt, wine imports in amphorae failed to return. The terminal horizon for Byzantine amphorae in this region is thus firmly anchored in the late 13th century CE.⁵⁴

The spatial distribution of these vessels closely mirrors the riverine layout. This pattern suggests a sophisticated logistical chain; commodities were initially transported across the Black Sea on large maritime vessels, then transhipped at coastal hubs onto smaller craft suitable for navigation on the Dnieper River. Findings from coastal trading posts and riverine sites draw the dense network of exchange. Subsequently, the distribution of finds along the Dnieper and further into the inland areas illustrates patterns of distribution. This underscores the so-called 'Black Sea Hub' phenomenon and the strategic reorientation of Byzantine merchants towards northern markets. An alternative destination for the Günsenin III amphorae distributed via Black Sea shipping was 12th–13th-century Bulgaria, where, as mentioned above, wine was used for liturgical and military purposes. Interestingly, most of the Late Byzantine amphorae found there were primarily of Günsenin I and II types,⁵⁵ which may indicate that particular containers were

50 The author would like to thank Grzegorz Majcherek for sharing this information.

51 Zelenko 2009.

52 Morozova et al. 2020.

53 Koval 2010, p. 159.

54 Koval 2010, p. 171.

55 Todorova 2012, p. 136, Fig. 5, Pl. II.3–4; See Todorova 2015 for an overview of the Byzantine amphorae in Bulgaria. Of particular interest are finds from a church in Preslav in Manolova–Voykova 2015, p. 216.

associated with different branches of the economy, with Günsenin III possibly linked to ecclesiastical networks.

The occurrence of these amphorae in regions as far north as Sweden highlights the remarkable reach of Byzantine trade along Viking routes, with Birka serving as a primary northern commercial gateway.⁵⁶ To the west of the Rus' territories, fragments of Byzantine amphorae have been identified in Polish urban centres such as Chermno and Chełm, economically associated with the south-east trade routes across the Rus'. These finds serve as significant archaeological markers of 'luxury' imports, reflecting the integration of Central European markets into the broader Byzantine economic sphere.⁵⁷

The distribution of Günsenin III amphorae provides critical archaeological evidence of the vessel's utility across two distinct economic paradigms. The northern finds, following a north–south trade route of exchange, reflect the connectivity between the Byzantine heartland and the Kyivan Rus'. This network, managed primarily by Greek merchants and monastic orders, focused on the riverine distribution of wine, a liturgical and dietary necessity.

Conversely, the southern finds, following an east–west connection, are associated with the extensive maritime mercantile networks of the Venetian and Genoese republics, as well as Crusader logistical chains. In this context, Günsenin III amphorae moved alongside a variety of commodities, including high-status Byzantine glazed wares.⁵⁸ The recovery of such specimens from Marseille, Otranto, Venice, Dubrovnik, Paphos, and various sites in the Levant aligns with the commercial patterns established by the Latin Kingdom (1110–1291 CE). The discovery of nearly 5,000 containers of this type in the Tartus shipwreck demonstrates the large scale of shipping.⁵⁹ This southern expansion was facilitated by legal instruments such as the *chrysobulls* – imperial golden bulls, which granted Italian merchants significant trade privileges within Byzantine territories.⁶⁰

A visual representation of Günsenin III amphorae?

In the context of connectivity across geopolitical entities, the illustration of a manuscript attributed to Baghdad, Iraq, and dated to 1224 CE [Fig. 5] is of particular interest. A folio known as 'Preparing Medicine from Honey', comes from from a dispersed manuscript of an Arabic translation of *De Materia Medica* of

56 Androshchuk 2020.

57 Korokhina et al. 2025.

58 Stern 2012, pp. 139–158.

59 Vroom 2021, p. 63.

60 Laiou 2002; Penna 2019.

Dioscorides.⁶¹ It is one of the translations of a medical treatise prepared by Dioscorides, a Greek physician from the 1st century BCE. Whilst the original text is not preserved, Arabic and Turkish translations preserved the knowledge of extensive floral and faunal medical properties, including grapes, wine, oil, and honey.⁶²

The illustration, credited to Abdullah ibn al-Fadl, presents a pharmacist's studio during the preparation of a honey-based mixture, which is shown boiling in a large vessel within the lower register. Two figures flank this central vessel; one stirring and preparing to pour the mixture into a cup, and the other drinking. The upper register features an array of five vessels with distinct morphologies; a piriform vessel with globular shoulders, elevated handles, and narrowing bases, and a central vessel with a more bulbous body. Two figurative panels flank these vessels; one panel depicts a figure drinking, whilst the other shows a figure either mixing or agitating the contents of another amphora with a rod. It is tempting to associate these forms with Late Byzantine amphorae; the more slender vessels may correspond to the Günsenin III type, whereas a larger one may align with the Günsenin IV type.⁶³ Furthermore, the black lines coming off their rims and covering necks and shoulders may represent either the contents or a resinous impregnate, a treatment attested for transport containers. Nevertheless, such iconographic comparisons and Byzantine associations demand critical caution.⁶⁴ Conversely, other illustrative elements in the manuscript, such as the figures' costumes, reliably mirror contemporary regional fashions and textile traditions. They depict traditional attire from the Abbasid period, including trousers, tunics, and head veils. This accuracy lends credence to the artist's attention to material reality.⁶⁵ There is no archaeological evidence to suggest that Günsenin III amphorae, or other Late Byzantine transport containers, penetrated deeper into the central part of the Abbasid Caliphate (750–1258 CE).⁶⁶ The transport of liquid commodities across Mesopotamia and the Gulf during the period contemporary with the occurrence of Günsenin III amphorae was dominated by the so-called 'torpedo jars'. These were manufactured primarily in present-day Iran between the 3rd and 13th centuries CE, and feature distinctive morphological traits, including cylindrical bodies, small handles below the rim, and conical bases.⁶⁷

Despite the absence of direct archaeological evidence for Late Byzantine amphorae within the Mesopotamian interior, the iconographic record suggests

61 Folios of the *De Materia Medica* manuscript are dispersed between various museums. The presented illustration is housed in the Metropolitan Museum of Art under Inv. No. 57.51.21, available as public domain at The Met, 2026, available at: <https://www.metmuseum.org/art/collection/search/451400>.

62 Riddle 1986; Sadek 1979; Yildirim 2013.

63 Günsenin 2018, pp. 102–108.

64 Thomas 2019.

65 Stillman 2003, pp. 29, 44. History of costumes in the Islamic world evidenced by textiles and iconography exemplified by representations on manuscripts and ceramics.

66 Kennet 2004.

67 Connan et al. 2025.

that the manuscript's illuminator may have utilised these vessels as formal models. Given that these amphorae were contemporary with the creation of the manuscript, it is highly probable that the artist was familiar with such containers through the vibrant Levantine trade networks linking the region to the Byzantine Empire. Of particular significance is the distribution of Günsenin III vessels within the Levant, a zone defined by the complex geopolitical intersection of the Latin Kingdom, the Abbasid Caliphate, and the Byzantine sphere, as evidenced by the finds mentioned earlier. The cross-cultural exchange of ceramic ideas between the Byzantine and Islamic worlds is further demonstrated by the integration of glazed wares traditions into Byzantine pottery production.⁶⁸

The choice of these specific shapes is particularly compelling. It is tempting to hypothesise that the inclusion of the vessels with such morphology was a deliberate semiotic choice. By utilising the distinctive profile of Byzantine transport vessels, the artist may have intended to create a symbolic link to the text's Greek origins. In this context, the amphora may serve as a visual shorthand, providing a material 'authentication' of the medicinal knowledge being transmitted from Greek past into Arabic medical tradition.

Discussion and conclusions

Although the Günsenin III amphora was a mass-produced, 'disposable' transport container, the study of this single vessel, excavated in Constantinople and brought to Warsaw in 1921, is vital for several reasons. Within the National Museum in Warsaw, this amphora acts as a bridge between the Polish tradition of grand collecting and Mediterranean archaeology. It validates the scientific rigour of Władysław Semerau-Siemianowski's approach, demonstrating that his assemblage was a deliberate historical record rather than a haphazard collection of 'souvenirs'. In this sense, the 'commonness' of the type contrasts with the documentation of its findspot and the biography of its collector. Whilst thousands of these vessels once contributed to the 12th- and 13th-century global economy, this single specimen serves as a tangible link and narrative example within the museum's space of past connectivities across regions and political entities.

Currently, museum collections housing Günsenin III amphorae are primarily concentrated in Turkey, amongst other locations. The Istanbul Archaeological Museum holds at least twenty-three specimens, including complete examples recovered from urban cisterns, such as those at Karagümrük.⁶⁹ Black Sea coastal museums also maintain significant artefacts; of fifteen documented Byzantine

68 Waksman et al. 2024.

69 Günsenin 1990, pp. 118–20, 177–87, Pl. 45, 4.

transport vessels in Trabzon, seven belong to the Günsenin III type.⁷⁰ Further examples are curated at the İzmir Archaeological Museum and the regional museums of Tekirdağ and Edirne.⁷¹

In conclusion, the Günsenin III amphora in the National Museum in Warsaw stands as far more than a solitary archaeological artefact; it is a multifaceted witness to the shifting economic landscape of the 12th and 13th centuries. By bridging the monastic, riverine networks of the Kyivan Rus' with the globalising maritime mercantilism of the Mediterranean, the vessel narrates a pivotal era of medieval global connectivity.

Its significance, however, transcends mere trade networks. As suggested by its hypothetical depiction in the 1224 CE Arabic manuscript, the Günsenin III amphorae may have served as a potent iconographic legacy, linking tangible Byzantine commerce to the intellectual heritage of the Greek world preserved by the medieval Arabic scholars. Whilst Dr. Władysław Semerau-Siemianowski may not have been fully knowledgeable of the vessel's specific typological depth or its possible semiotic resonance in Abbasid iconography, his intuition to preserve this specimen has provided a critical data point for present researchers. Today, this 'common' transport container provides a profound historical narrative, linking the Byzantine Empire's economy to the history of Polish collecting and the broader Mediterranean and beyond archaeological records.

70 Günsenin 1990, pp. 204, 212–214.

71 Günsenin 1990, pp. 151, 161.

LITERATURE:

Androschuk, F. (2020). Vikings in the East: Collective Violence and Preventive Strategies in a Comparative Perspective. In: Pedersen, A. and Sindbæk, S. M., eds., *Viking Encounters: Proceedings of the Eighteenth Viking Congress*. Aarhus: Aarhus University Press, pp. 47–60. DOI: 10.2307/j.ctv34wrmzq.7

Arthur, P. (1989). Aspects of Byzantine Economy: An Evaluation of Amphora Evidence from Italy. In: Deroche, V. and Spieser, J. M., eds., *Recherches sur la céramique byzantine. Actes du colloque organisé par l'École Française d'Athènes et l'Université de Strasbourg II (Centre de Recherches sur l'Europe Centrale et Sud-Orientale), Athènes 8–10 avril 1987*. BCH Suppl. 18. Athens: École Française d'Athènes, pp. 79–91.

Avissar, M. and Stern, E. J. (2005). *Pottery of the Crusader, Ayyubid, and Mamluk Periods in Israel*. Israel Antiquities Authority Reports 25. Jerusalem: Israel Antiquities Authority.

Bakirtzis, C. (1989). *Βυζαντινά Τσουκαλολάγνα / Byzantine Glazed Jars and Pots*. Athens: Ministry of Culture, Archaeological Receipts Fund.

Bulgakov, V. V. (2000). Византийские амфоры IX–XIV вв [Byzantine Amphorae from the 9th–14th Century]. *Vostochnoevropeyskiy arheologicheskiy zhurnal*, 4(5). Available at: <http://archaeology.kiev.ua/journal/040700/bulgakov.htm> [Accessed 4 May 2026].

Büttner, F. (2015). Tradition Along the Edge: The Land Walls of Istanbul. *Traditional Dwellings and Settlements Working Paper Series*, 255. Available at: https://www.researchgate.net/publication/333618844_TRADITION_ALONG_THE_EDGE_THE_LAND_WALLS_of_ISTANBUL [Accessed 4 May 2026].

Connan, J., Esmaei, M., Esmaeili J., Esmaeil, M., Engel, M., Zumberge, A., Azarian, M. and Nokandeh, J. (2025). Torpedo Jars of Iran: Context of Archaeological Discovery and Origin of the Bitumen Coating. *Journal of Archaeological Studies*, 16(2), pp. 269–307. DOI: 10.22059/jarcs.2025.380179.143282.

Demangel, R. and Mamboury, E. (1939). *Le quartier des Manges et la première région de Constantinople*. Recherches françaises en Turquie 2. Paris: De Boccard.

François, V. (1997). Sur la circulation des céramiques byzantines en Méditerranée orientale et occidentale. In: Démians d'Archimbaud, G., ed., *La céramique médiévale en Méditerranée. Actes du VI^e congrès de l'AIECM2, Aix-en-Provence (13–18 novembre 1995)*. Aix-en-Provence: Narration Editions, pp. 231–236. Available at: <https://shs.hal.science/halshs-00751762v1> [Accessed 4 May 2026].

Günsenin, N. (1990). *Les amphores byzantines (Xe–XIII^e siècles): typologie, production, circulation d'après les collections turques*. PhD thesis, Université Paris I (Panthéon-Sorbonne), Paris. Available at: https://www.academia.edu/32271278/Les_amphores_byzantines_Xe_XIIIe_si%C3%A8cles_typologie_production_circulation_dapr%C3%A8s_les_collections_turques_Universit%C3%A9_Paris_I_Panth%C3%A9on_Sorbonne_Paris_1990_vol_I.pdf [Accessed 5 Jan. 2026].

Günsenin, N. (2001). L'épave de Çamaltı Burnu I (île de Marmara): la campagne de fouille 2000. *Anatolia Antiqua*, 9, pp. 117–124.

Günsenin, N. (2009). Ganos Wine and its Circulation in the 11th century. In: Mundell Mango, M., ed., *Byzantine Trade, 4th–12th Centuries: The Archaeology of Local, Regional and International Exchange: Papers of the Thirty-eighth Spring Symposium of Byzantine Studies, St John's College, University of Oxford, March 2004*. Farnham: Ashgate, pp. 145–153.

Günsenin, N. (2018). La typologie des amphores Günsenin. Un mise au point nouvelle. *Anatolia Antiqua*, 26, pp. 89–124.

Günsenin, N. and Hatcher, H. (1997). Analyses chimiques comparatives des amphores de Ganos, de l'île de Marmara et de l'épave de Serçe Limanı (Glass-Wreck). *Anatolia Antiqua*, 5, pp. 249–260. DOI: 10.3406/anata.1997.877.

- Hayes, J. W. (1992). *Excavations at Saraçhane in Istanbul. Vol. 2: Pottery*. Princeton: Princeton University Press.
- Kennet, D. (2004). *Sasanian and Islamic Pottery from Ras al-Khaimah: Classification, Chronology and Analysis of Trade in the Western Indian Ocean*. Society for Arabian Studies Monographs 1. Oxford: Archaeopress.
- King, H. (2015). *Fluorescent minerals. Learn About the Minerals and Rocks That “glow” under Ultraviolet Light*. [online] <https://geology.com/articles/fluorescent-minerals/> [Accessed 23 Jan. 2024].
- Korokhina, A., Waksman, S. Y., Auch, M., Khamaiko, N. and Trzeciacki, M. (2025). The First Results of Archaeometric Characterization and Provenance Studies of Byzantine Amphorae from Poland. *Praehistorische Zeitschrift*. DOI: 10.1515/pz-2024-2058.
- Koval, V. Y. (2010). *Керамика Востока на Руси. Конец IX–XVIII век* [Oriental Ceramics in Old Rus'. End of 9th–18th Century]. Moscow: Science.
- Kralj, V. Z., Beltrame, C., Miholjek, I. and Ferri, M. (2016). A Byzantine Shipwreck from Cape Stoba, Mljet, Croatia: An Interim Report. *International Journal of Nautical Archaeology*, 45, pp. 42–58. DOI: 10.1111/1095-9270.12151.
- Laiou, A. E. (2002). Political History: An Outline. In: Laiou, A. E., ed., *The Economic History of Byzantium: From the Seventh through the Fifteenth Century*. Washington, D.C.: Dumbarton Oaks Research Library and Collection, pp. 20–26.
- Manolova-Voykova, M. (2015). Амфори от обект “Владетелската църква” във Велики Преслав [Amphorae from the “Ruler’s Church” Site in Veliki Preslav]. *Pliska–Preslav*, 11, pp. 377–388.
- Michel, M. and Rots, V. (2022). Into the Light: The Effect of UV Light on Flint Tool Surfaces, Residues and Adhesives. *Journal of Archaeological Science: Reports*, 43. DOI: 10.1016/j.jasrep.2022.103479.
- Morozova, Y. and Albertson, J. A. (2012). Byzantine Shipwrecks Explored by the Centre for Underwater Archaeology in the Black Sea. In: Morozova, Y., ed., *1000 Rokiv Vizantiyskoy Torgovli (V–XV stolitiya) / 1000 років візантійської торгівлі (V–XV століття)*. Kiev: Taras Shevchenko National University, Center for Underwater Archaeology, pp. 208–212.
- Morozova, Y., Waksman, S. and Zelenko, S. (2020). Byzantine Amphorae of the 10th–13th Centuries from the Novy Svet Shipwrecks, Crimea, the Black Sea. In: Waksman, S., ed., *Multidisciplinary Approaches to Food and Foodways in the Medieval Eastern Mediterranean*. Lyon: MOM Éditions. DOI: 10.4000/books.momeditions.10279.
- Muzeum Narodowe w Warszawie (undated). *Digital collections of the National Museum in Warsaw* [online] Available at: <https://cyfrowe.mnw.art.pl/> [Accessed 13 May 2026].
- Ožanić Roguljić, I., Zeman, M. and Šiša-Vivek, M. (2025). Medieval amphorae from Dubrovnik. In: Tkalčec, T., Ivančan, T. S. and Krznar, S., eds., *Ceramics, People and Places: The Significance of Ceramics for the Study of Social Relations in the Middle Ages. Proceedings of the 9th International Conference on Mediaeval Archaeology of the Institute of Archaeology, Zagreb, 6th–7th June 2024*. Serta Instituti Archaeologici 23. Zagreb: Institut of Archaeology, pp. 233–255. Available at: https://www.academia.edu/146216473/O%C5%BEani%C4%87_Rogulji%C4%87_Ivana_Zeman_Maja_%C5%A0i%C5%A1a_Vivek_Marija_Medieval_amphorae_from_Dubrovnik [Accessed 5 Jan. 2026].
- Pecci, A., Garnier, N. and Waksman, S. (2020). Residue analysis of medieval amphorae from the Eastern Mediterranean. In: Waksman, S., ed., *Multidisciplinary Approaches to Food and Foodways in the Medieval Eastern Mediterranean*. Lyon: MOM Éditions. DOI: 10.4000/books.momeditions.10279.

- Penna, D. (2019). Similar Problems, Similar Solutions? Byzantine Chrysobulls and Crusader Charters on Legal Issues Regarding the Italian Maritime Republics. In: Slootjes, D. and Verhoeven, M., eds., *Byzantium in Dialogue with the Mediterranean*. Leiden: Brill, pp. 162–181.
- Pieri, D. (2005). *Le commerce du vin oriental à l'époque byzantine (Ve–VIIe siècles). Le témoignage des amphores en Gaule*. Bibliothèque Archéologique et Historique 174. Beirut: Institut français du Proche-Orient.
- Riddle, J. M. (1986). *Dioscorides on Pharmacy and Medicine*. Vol. 3. Austin: University of Texas Press.
- Saccardo, F., Lazzarini, L. and Munarini, M. (2003). Ceramiche importate a Venezia e nel Veneto tra XI e XIV secolo. In: Bakirtzis, C., *VIIe congrès international sur la céramique médiévale en Méditerranée, Thessaloniki 11–16 Octobre, Athènes*. Athens: Ministry of Culture, pp. 395–420.
- Sadek, M. M. (1979). Notes on the Introduction and Colophon of the Leiden Manuscript of Dioscorides' 'De Materia Medica'. *International Journal of Middle East Studies*, 10(3), pp. 345–354. DOI: 10.1017/s0020743800000143.
- Sazanov, A. V. and Engovatova, A. V. (2024). Амфора Гюнсенин III из Ярославля: проблемы типологии и хронологии [Günsenin III Amphora from Yaroslavl: Problems of Typology and Chronology]. *Materialy spasatel'nykh arkheologicheskikh issledovaniy*, 34, pp. 249–257. DOI: 10.25681/IARAS.2024.978-5-94375-418-0.249-257.
- Simpson Grant, M. (2000a). The Use of Ultraviolet Induced Visible-Fluorescence in the Examination of Museum Objects, Part I. *Conserve-O-Gram*, 1(9). Available at: https://www.nps.gov/subjects/museums/upload/01-09_508.pdf [Accessed 23 Jan. 2024].
- Simpson Grant, M. (2000b). The Use of Ultraviolet Induced Visible-Fluorescence in the Examination of Museum Objects, Part 2. *Conserve-O-Gram*, 1(10). Available at: <https://www.pomedor.mom.fr/node/86> [Accessed 23 Jan. 2024].
- Stern, E. (2012). 'Akko I. *The Crusader-Period Pottery*. Vol. 1. Jerusalem: Israel Antiquities Authority.
- Stillman, Y. K. (2003). *Arab Dress: from the Dawn of Islam to Modern Times*. Revised Second Edition. Leiden – Boston: Brill.
- Sulikowska-Belczowska, A. (2021). Ikony i polityka. Darczyńcy sztuki wschodniochrześcijańskiej w Warszawie a sytuacja polityczna w dwudziestoleciu międzywojennym [Icons and Politics: Donors of Eastern Christian art in Warsaw and the Political Situation in the Interwar Period]. In: Białonowska, M. and Mączewska, K., eds., *Darczyńcy Polskich Muzeów. Historia i współczesność*. Warsaw: Muzeum Narodowe w Warszawie, pp. 74–84.
- Szemiothowa, A. (1938). Nekrologia – Wł. Semerau-Siemianowski [Obituary – Wł. Semerau-Siemianowski]. *Wiadomości Numizmatyczno-Archeologiczne*, 19, pp. 136–138.
- Taha, S. (2020). Frankincense: Traditions Rooted in the Sudanese DNA. *Polish Archaeology in the Mediterranean*, 29(1), pp. 219–248. DOI: 10.31338/uw.2083-537x.pam29.1.12.
- Tanabe, S. (1988). Excavations of a Sunken Ship Found off the Syrian Coast: An Interim Report. Kyoto: Syrian Coastal Archaeological Excavation Operation Committee, pp. 34–40.
- The Met (2026). *The Met Collection*. [online] Available at: <https://www.metmuseum.org/art/collection> [Accessed 13 May 2026].
- Thomas, J. J. (2019). The Illustrated Dioskourides Codices and the Transmission of Images during Antiquity. *Journal of Roman Studies*, 109, pp. 241–273. DOI: 10.1017/S007543581900090X.

- Todorova, E. (2012). *Амфорите от територията на България (VII–XIV в.)* [Byzantine Amphorae from the Present-day Bulgarian Lands (7th–14th Century AD)]. PhD Thesis, University of Sofia, Sofia. Available at: <https://academia.edu/17344373/> [Accessed: 5 Jan. 2026].
- Todorova, E. (2015). Policy and trade in the northern periphery of the Eastern Mediterranean: amphora evidence from present-day Bulgaria (7th–14th centuries). In: Gonçalves, M. J. and Gómez-Martínez, S., eds., *Proceedings of 10th International Congress on Medieval Pottery in the Mediterranean*. Silves: Câmara Municipal de Silves, pp. 638–647.
- Vallauri, L., Démians d'Archimbaud, G., Parent, F. and Richarté, C. (2003). La circulation des céramiques byzantines, chypriotes et du Levant chrétien en Provence, Languedoc et Corse du Xe au XIV^e siècle. In: Bakirtzis, C., ed., *VII^e congrès international sur la céramique médiévale en Méditerranée, Thessaloniki 11–16 octobre 1999*. Athens: Ministry of Culture, pp. 137–152.
- Vionis, A. K. (2008). Current Archaeological Research on Settlement and Provincial Life in the Byzantine and Ottoman Aegean: A Case-study from Boeotia, Greece. *Medieval Settlement Research*, 23, pp. 28–41.
- Volkov, I. V. (2006). Amphorae from Novgorod the Great and Comments on the Wine Trade Between Byzantium and Medieval Russia. In: Orton, C., ed., *The Pottery from Medieval Novgorod and its Region*. New York: University College London Institute of Archaeology Publications, pp. 145–159.
- Vroom, J. (2014). *Byzantine to Modern Pottery in the Aegean: An Introduction and Field Guide*, 2nd edition. Turnhout: Brepols.
- Vroom, J. (2021). Thinking of Linking: Pottery Connections, Southern Adriatic, Butrint and Beyond. In: Skoblar, M., ed., *Byzantium, Venice and the Medieval Adriatic: Spheres of Maritime Power and Influence, c. 700–1453*. Cambridge: Cambridge University Press, pp. 45–82.
- Waksman, S. Y. (2017). *Studies of Byzantine amphorae highlight the role of Chalcis again - view and download the 3D model of a Günsenin 3 amphora!* [online] POMEDOR. Available at: https://www.nps.gov/subjects/museums/upload/01-10_508.pdf [Accessed 31 Mar. 2021].
- Waksman, S. Y., Skartsis, S. S., Kontogiannis, N. D., Todorova, E. P. and Vaxevanis, G. (2018). Investigating the Origins of Two Main Types of Middle and Late Byzantine Amphorae. *Journal of Archaeological Science: Reports*, 21, pp. 1111–1121. DOI: 10.1016/j.jasrep.2016.12.008.
- Waksman, S. Y., Bouquillon, A., Burlot, J., Doublet, C., Amprazogoula, K. and Tsanana, A. (2024). Between the Byzantine and the Islamic Worlds? Byzantine Polychrome White Ware. *Journal of Archaeological Science: Reports*, 56. DOI: 10.1016/j.jasrep.2024.104536.
- Wiercińska, J. (2014). Kolekcja numizmatyczna dr. Władysława Semerau-Siemianowskiego w Muzeum Narodowym w Warszawie [The Numismatic Collection of Dr Władysław Semerau-Siemianowski in the National Museum in Warsaw]. *Rocznik Muzeum Narodowego w Warszawie*, 3(39), pp. 111–136.
- Yakobson, A. L. (1979). *Керамика и керамическое производство средневековой Таврики* [Ceramics and Ceramic Production of Medieval Taurica]. Leningrad: Nauka.
- Yildirim, R. V. 2013. Studies on *De Materia Medica* of Dioscorides in the Islamic Era. *Asclepio*, 65(1). DOI: 10.3989/asclepio.2013.07.
- Zelenko, S. (2009). Shipwrecks of the 9th–11th Centuries in the Black Sea near Soldaya. In: Hervás Herrera, M. A., Retuerce Velasco, M., de Juan García, A. and Stabel-Hansen, J. Z., eds., *Actas del VIII Congreso Internacional de Cerámica Medieval en el Mediterraneo, Ciudad Real-Almagro, 27 de febrero a 3 de marzo de 2006*. Vol. 1. Ciudad Real: Asociacion Espanola de Arqueologia Medieval, pp. 235–244.

Zelenko, S. and Morozova, Y. (2010). Amphorae Assemblage from the 13th Century Shipwreck in the Black Sea, near Sudak. In: Kassab Tezgör, D. and Inaishvili, N., eds., *Pataks I. Production and Trade of Amphorae in the Black Sea. Actes de la Table Ronde internationale de Batumi et Trabzon, 27–29 Avril 2006*. Istanbul: Institut Français d’Études Anatoliennes, pp. 81–84.

Zmaić, V. (2013). Late Byzantine Amphorae from the Eastern Adriatic Underwater Sites. *Skyllis*, 1, pp. 81–88.