

## COME AND DINE WITH ME... EARLY ROMAN LUXURY GLASS TABLEWARE FROM BERENIKE — NEW EVIDENCE FROM THE HARBOR AREA AND TRASH DUMPS

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**Abstract:** The harbor of Berenike on the Red Sea coast of Egypt was a major transit point in the long-distance trade of luxury commodities between the Roman Empire and the Indian Ocean Basin. The heyday of the commerce and the prosperity of the port lasted from the 1st to the mid-2nd century AD. A huge quantity of commodities passed through the port, imported not only for the purpose of exchange, but also for self-consumption. Glassware was among them. The high proportion of wares of high quality and exceptional esthetic value is quite extraordinary, even by modern standards. These wares highlight the position of Berenike in the trade, but they also showcase the city's wealth and the great demand for luxury glass that existed there in the first centuries of the Roman Empire.

**Keywords:** Berenike, Indo-Roman trade, *Periplus Maris Erythraei*, early Roman glass, polychrome cast glass, colorless glass

Following the annexation of Egypt by Augustus in 30 BC Rome gained not only access, but also control over the enormously profitable trade routes, connecting the Mediterranean world with the Red Sea and the Indian Ocean regions. A great deal of information about the organization and management of overseas trade and ports comes from papyrological, epigraphic and a few classical literary sources, which also and perhaps foremost, showcase the impressive array of precious luxury commodities, brought to and sold at these harbors.

According to Strabo (Strab. 2.5.12), Pliny the Elder (Plin. *Nat.* 6.101–106) and the *Periplus Maris Erythraei* (hereafter *PME*, 1–4), the anonymous mid-1st century AD coastal navigation manual and merchant's compendium, there were two ports on the Egyptian Red Sea that played a key role in the long-distance maritime trade between the Roman Empire and the Indian Ocean basin: Berenike and its sister port of Myos Hormos (modern Qusair al-Qadim). The trade passing through Berenike moved in two directions.

The long journey for a wide variety of merchandise from all the Mediterranean started from Alexandria, which was “not only the receptacle of goods, but also the main source of supply to the Roman world” (Strab. 17.1.13). Valuable cargo, together with supplies for ship crews and the local population of harbor towns, was loaded on river barges and shipped along the Nile up to Coptos, just north of modern Quft. At that time it was an important base for commercial business and the starting point of two well-established trade routes, leading from the Nile Valley across the Eastern Desert, either to Myos Hormos or Berenike. When caravans of donkeys and camels reached the ports, the goods would be off-loaded and stored in warehouses, or else directed immediately onto the ships to await favorable winds, from October to April, which would bring the vessels to India taking advantage of the monsoon winds that facilitated sailing to and from India (Strab. 2.118 and 17.798; Plin. *Nat.* 6.101; *PME* 57). On the return journey, in May and June (*PME* 14, 39, 49, 56), a wide range of precious products from India, Arabia and Africa were unloaded at the harbor. Commodities brought for local consumption were stored for the most part in warehouses in the port. The traded goods were sent to Coptos and transferred via the Nile to Alexandria, and

subsequently to Rome and other centers of consumption (for exports of ordinary and more costly items from the Roman provinces around the Mediterranean, and an impressive range of consumable imports from the Red Sea–Indian Ocean littoral into the Mediterranean world via the Red Sea ports, see *PME* 3, 4, 6–13, 17, 27, 29, 32, 36, 39, 48, 49; Plin. *Nat.* 5.11, 12.14, 37.78; Casson 1989: 39–43; Seland 2010; Sidebotham 2011: 223–245 and further references). The role of Berenike as an important administrative headquarter for the Roman authorities, as well as a consumer and distributor of a wide variety of goods, is reflected in the rich archaeological material (for information on the site and results of earlier and ongoing excavations, see Sidebotham and Wendrich 1995; 1996; 1998; 1999; 2000; 2007; Sidebotham, Hense, and Nouwens 2008: 177–185; Sidebotham and Zych 2010; 2011a; 2011b; 2017; forthcoming). It shows that the heyday of the international commerce, by the same token also the prosperity of Berenike, lasted from the 1st century AD to the mid-2nd century AD. At that time Berenike became an extremely cosmopolitan place, an international marketplace, targeted by merchants of all ranks trading in a wide variety of prestigious and exotic goods (Strab. 17.1.45; Plin. *Nat.* 6.26.103; Sidebotham 2011: 68–86).

## GLASS AND THE *PERIPLUS*

Glass was one of the regularly traded goods between the Mediterranean and the East [*Fig. 1*]. In contrast to many commodities mentioned in textual sources, which are often not present in archaeological remains, glass has survived alongside pottery, in varying quantities, on many sites along the

East African, Arabian and Indian coasts. For glass, which is referred to in the *PME* by three different phrases: “several sorts of colored glass” (6, 7, 10, 11, 17), “glass vessels” (39), and “unworked glass” (48, 49, 53, 56; see also Casson 1989: 20–23, 40–41, 111–112, 126–127; Stern 1992: 113),

the archeological evidence is the most closely compatible to the written sources.

In Egypt, quantities of early Roman glassware have turned up not only at Berenike (Hayes 1995; Nicholson 1998; 1999; 2000; Nicholson and Price 2003; 2007; Kucharczyk 2011), but also at Quseir al-Qadim (Meyer 1992: 15–42; Peacock 2011: 57–72; for information about the site and results of recent excavations, see Peacock and Blue 2006; 2011). Extensive evidence of glass material of a similar kind has been forthcoming from stations and small fortlets in the Eastern Desert: Maximianon (modern Wakalat al-Zarqâ), Krokodilô (modern al-Muwayh), Kainé Latomia (modern Umm Balad), as well as Didymoi (modern Khashm el-Minayh, see Brun 2003; 2011) and the sites at Gebel Abu Dokhan (ancient Mons Porphyrites, see Bailey 2007).

Beyond the Roman imperial frontier, findspots of glass in East Africa include Axum (Morrison 1989: 194–197, 206) and Adulis (Zazzaro 2013: 82–87). A remarkable assemblage of early Roman mosaic glass was excavated at Heïs (ancient Moundou) in the Horn of Africa (*PME* 6,9; Casson 1989: 126–127; Stern 1993). Many of the glass types mentioned in the *PME* have been reported from excavations in the Arabian Peninsula (De Maigret and Antonini 2005: 71, Fig. 51:11–12; Nehmé, al-Talhi, and Villeneuve 2010: 215–216; Al-Ansary 1981: 80–81), including the extensively excavated Qané (Qani<sup>3</sup>), an important Indian Ocean emporium on the southern coast of Arabia (modern Yemen, see Salles and Sedov 2010: 305, Pl. 124:730) and the Omani port of Khor Rori (*PME* describes is as the ancient Moscha Limên, see Lombardi 2008: 404–406).

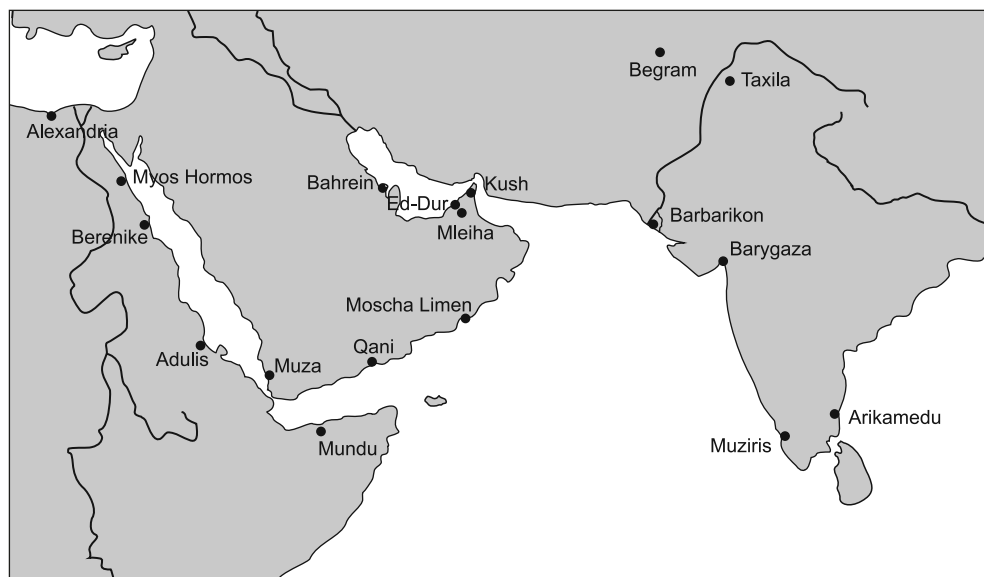


Fig. 1. Map of the Indian Ocean in Roman times showing major sites which have yielded early Roman glass (Drawing and digitizing G. Majcherek)

A wealth of early Roman glass comes from important findspots bordering the Gulf: el-Dûr (Emirate of Umm al-Qaiwain, UAE, frequently, but not securely identified with the Parthian Gulf emporium of Omana, mentioned in *PME* [36], see Whitehouse 1998; 2000), Kush (modern Ras al-Khaimah, UAE, see Price and Worrell 2003: 153–154, Fig. 2:1–6), Bidya (Al Tikriti 1989: 108, Pl. 82) and the inland sites of Mleiha (Emirate of Sharjah, UAE, see Potts 1990: 264–271; Jasim 1999: 79–80, 83, Fig. 20), and a tomb at Dibba al-Hisn (Jasim 2006: 221–223). First-century Roman glass was found also on the island of Bahrain (Boucharlat and Salles 1989: 110–122; Nenna 1999b; Andersen 2007: 22–84).

Archaeological evidence from India, substantiating the *PME* statement, comes mostly from Arikamedu (ancient Podoukê; *PME* 60), which has yielded abundant glass remains, including finished glass objects, but first of all the raw glass ingots,

beads and waste from bead-making (Sen and Chaudhuri 1985: 151–164; Stern 1991; Francis 2004: 448–530). The second most important Indian site to evidence early Roman glass material in the material, including mosaic glass, is Pattanam (generally identified with the ancient port of Muziris; *PME* 49, 54, 56; Cherian and Menon 2014: 66–71, 82–84). The *PME* lists raw materials and glass vessels among the Roman goods imported to Barygaza (modern Broach, *PME* 49, 56.19) and Barbarikon (*PME* 39.9) in the Indus delta. It is not possible to omit the evidence from Taxila (Marshall 1951/II: 683–690; 1951/III: Pl. 209:i,j,k,l,n and Pl. 210; Sen and Chaudhuri 1985: 156, 162–163, 183–184, Fig. 19), as well as the spectacular glass vessels discovered in a cache at Begram (Cambon 2010; Whitehouse 2012: 54–55). Early Roman luxury glassware even ended up in China (Taniichi 1983: 83–85, 102–105; Laing 1991: 109–112; Borell 2010: 127–129).

## EARLY ROMAN LUXURY GLASS TABLEWARE FROM BERENIKE

The exceptionally large glass assemblage of early Roman date from Berenike, representing a wide variety of vessel types, shapes, manufacture and decorative techniques and colors, not only provides the most vivid picture of glass exported from the Roman world, but above all testifies to the emporium's wealth and highlights its position in the "global" trade of its day. Its volume reflects a huge demand for luxurious and highly decorated wares, not only by the elite consumers — a small segment of the port's affluent residents, but also by a much wider clientele, certainly constituting the largest market for these goods. Buyers

obviously appreciated the spectacular quality and esthetic value of glass vessels, their sophisticated decoration and resemblance to precious and semiprecious colored and naturally veined stones, such as banded agates (onyx and sardonyx), and crystal, rare and valuable materials coming chiefly from India, from which expensive and ostentatious vessels were carved in the Imperial period (*PME* 49, 56; Stern 1997; Sidebotham, Hense, and Nouwens 2008: 181; Sidebotham 2011: 238).

The collected archaeological evidence offers a glimpse into the dinnerware sets in use in the houses of the well-to-do

residents of Berenike, who even though living on the fringes of the Empire, craved for a substitute of the luxury enjoyed by the Roman aristocracy. However, not all the high-status glass vessels that reached the site were used routinely for everyday dining. They could have acted as showpieces, a symbol of political prestige to be displayed on official occasions and during informal dinners, the objective being to show off the host's wealth and to impress guests.

Glass excavated at Berenike was manufactured in the glasshouses of Italy and the Eastern Mediterranean. In the case of mosaic and colorless glass, Alexandria famous for its glasshouses is a prime candidate, although surprisingly small numbers of luxury glass of

late Hellenistic and early Roman date have been reported from regular excavations in the city. The evidence for this production in Alexandria is still vague (for a list of finds, see Kucharczyk 2014: 29, Note 2). It is related in particular to the colorless tableware, characteristic of the Flavian–Trajanic period. The common opinion among researchers that they were produced in Alexandrian workshops does not find confirmation in already published material from the city. This category of glass is still a “big absentee” in assemblages, at least from Kom el-Dikka, the biggest archeological site in Alexandria (for the most recent discovery of the first fragment of rim with an overhang at the edge, coming from a bowl, see Kucharczyk 2016: 96, Fig. 6:2).

## NEW EVIDENCE OF LUXURY GLASS TABLEWARE FROM THE HARBOR AREA OF BERENIKE

Recent archaeological investigations in the southwestern bay of Berenike recorded essential, if somewhat sketchy, evidence of the early Roman harbor and docking facilities, where the actual customs house and warehouses for incoming and outgoing goods may well have been located (BE09-54 and BE09-55) [Fig. 2] (Sidebotham and Zych 2011b; see also Zych 2017, in this volume). Public buildings and offices of high-ranking officials: the military commander, harbor stewards etc. may have been situated on the high ridge surrounding the bay, even more likely the premises of Roman *naukleroi* and *emporoi*.

They were poorly constructed of local materials, like almost everything in Berenike, mainly of fossil coral heads, cut blocks of rock gypsum and sun-dried mud bricks. A sizeable quantity of *lapis specularis* (a kind of transparent gypsum that forms

crystal sheets, which split appropriately can be fitted as window panes) and some flat panes, apparently produced in the cast or roller-molded technique characteristic of the early Roman period, excavated in this area, will argue in favor of the existence of this architecture. Windowpanes were likely to have been set in wooden frames, which are now lost, and mounted in small openings. In the dry desert conditions at Berenike, window glass would have been used generally to let in light and to provide essential protection against strong winds, prevent draft and keep out the rain (Kucharczyk 2011: 88–89, Fig. 9-1). In Egypt, evidence of the use of *lapis specularis* in an early Roman context came from a funerary hypogeum in Marina el-Alamein, where a glass panel of considerable size may have closed off one of the main burial niches, Zych 2010: 335, Note 3, Fig. 4).



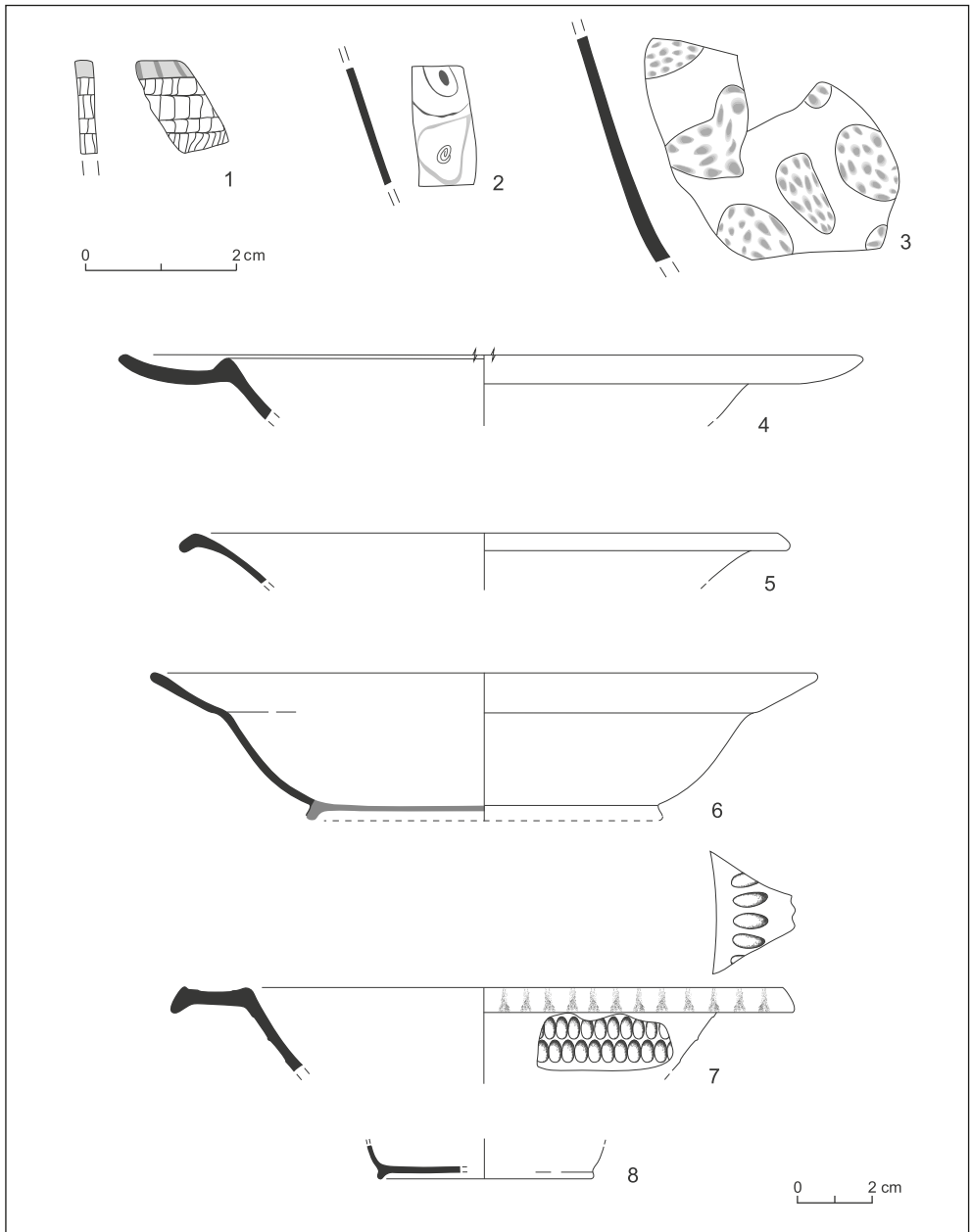


Fig. 3. Selection of early Roman glass from the harbor area: 1–3 – mosaic glass; 4–8 – cast colorless vessels (PCMA Berenike Project/drawing R. Kucharczyk; digitizing E. Czyżewska-Zalewska, M. Momot)

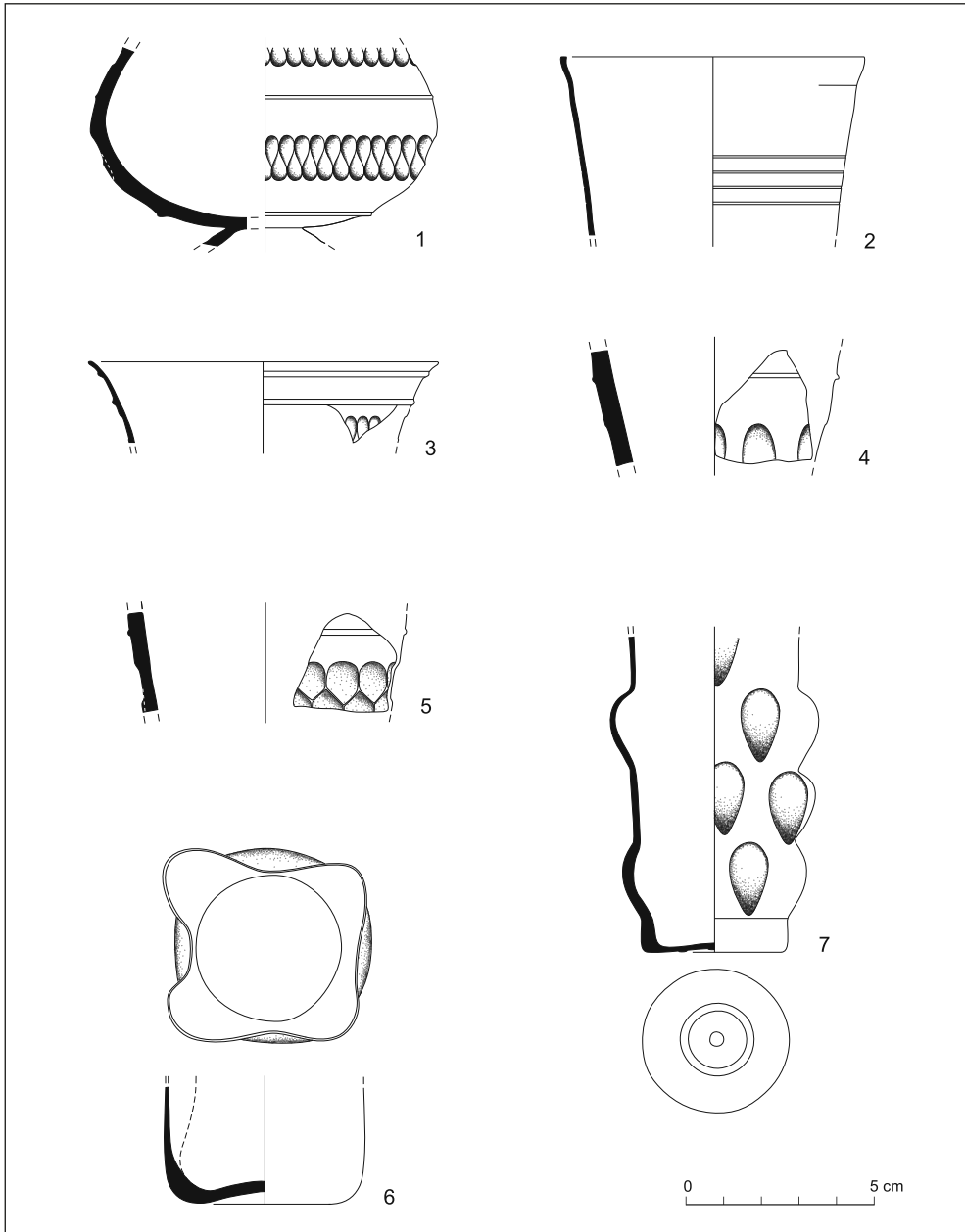


Fig. 4. Selection of early Roman glass from the harbor area: 1 – footed bowl; 2–7 – variously shaped and decorated beakers (PCMA Berenike Project/drawing R. Kucharczyk; digitizing E. Czyżewska-Zalewska)

considered as a substitute for vessels made of rock crystal, which became the most fashionable of hardstones among Rome's wealthy at that time. Pliny was thinking of these glasses when he wrote that "the most highly valued glass is colorless and transparent, as closely as possible resembling rock-crystal" (Plin. *Nat.* 36.199, 200 and 37.9; see Strab. 16.2.25, where he describes such vessels as: "crystal look-alikes"). The high proportion of such glass at Berenike is quite extraordinary (Hayes 1995: 37–38; Nicholson 1998: 282–285; 1999: 238; 2000: 151–152; Kucharczyk 2011: 85–87, 90–91). It is embodied principally by drinking vessels, and vessels for serving and consuming food and liquids. Next to polychrome glass, they are emblematic of Berenike.

Plentiful in this collection are deep and shallow dishes and bowls of varying sizes, on a high or low base ring, made both with and without an overhung edge [Fig. 3:4–6]. They often received a high-quality, elaborate facet-cutting, either covering the entire exterior or confined to the edge of the rim and base (Kucharczyk 2011: 86–87, 96–97, Cat. Nos 15–17, Fig. 9-9:15–17) [Fig. 3:7]. Of particular interest is a hemispherical footed bowl, decorated with fine cut decoration, a shape with no parallels in the published glass material from Egypt [Fig. 4:1].

Included in this category are also truncated conical beakers and cups, either tall and narrow, or short and wide, with several schemes of facet-cut decoration above and below the zone of faceting [Fig. 4:3–5].

Other types of drinking vessels encompass, apart from numerous conical and cylindrical beakers with cut-off rims and indents, simple horizontal lines or grooves [Fig. 4:2,6], also a mold-blown truncated conical specimen with almond-shaped bosses. Such vessels rose to popularity during the Flavian period (Kucharczyk 2011: 87, 98–99, Cat. Nos 20, 24, 25, Fig. 9-12:20, 24, 25; Cat. No. 20: Isings 1957: Form 31) [Fig. 4:7]. It is significant that this type of decorated tableware, attested in many parts of the Roman world, is almost non-existent in Egypt. Similar fragments have been published only from Medinet Madi (Silvano 2012: 63, Pl. XLI:849–850; for a detailed discussion of this type and its distribution, see Stern 1995: 103–108; Whitehouse 2001: 13–14).

Colorless drinking vessels are supplemented by bottles and flasks for holding and serving beverages, often graced with cut decoration [Fig. 5:1–2]. The red wine and transparent colorless glass created a particularly elegant effect (Kucharczyk 2011: 87, 98–97, Cat. Nos 18, 19, Fig. 9-12:18,19).

## LUXURY GLASS TABLEWARE FROM THE EARLY ROMAN AND LATE TRASH DUMPS

The early Roman luxury glass excavated in the harbor area is but a minute fraction of the glass excavated in various parts of the site. Their significant presence has been observed in the early and late Roman trash

dumps located in the northwestern part of the residential quarter of the late period.

In the early Roman trash dump (BE11-76) one cannot disregard the existence of a considerable quantity of both

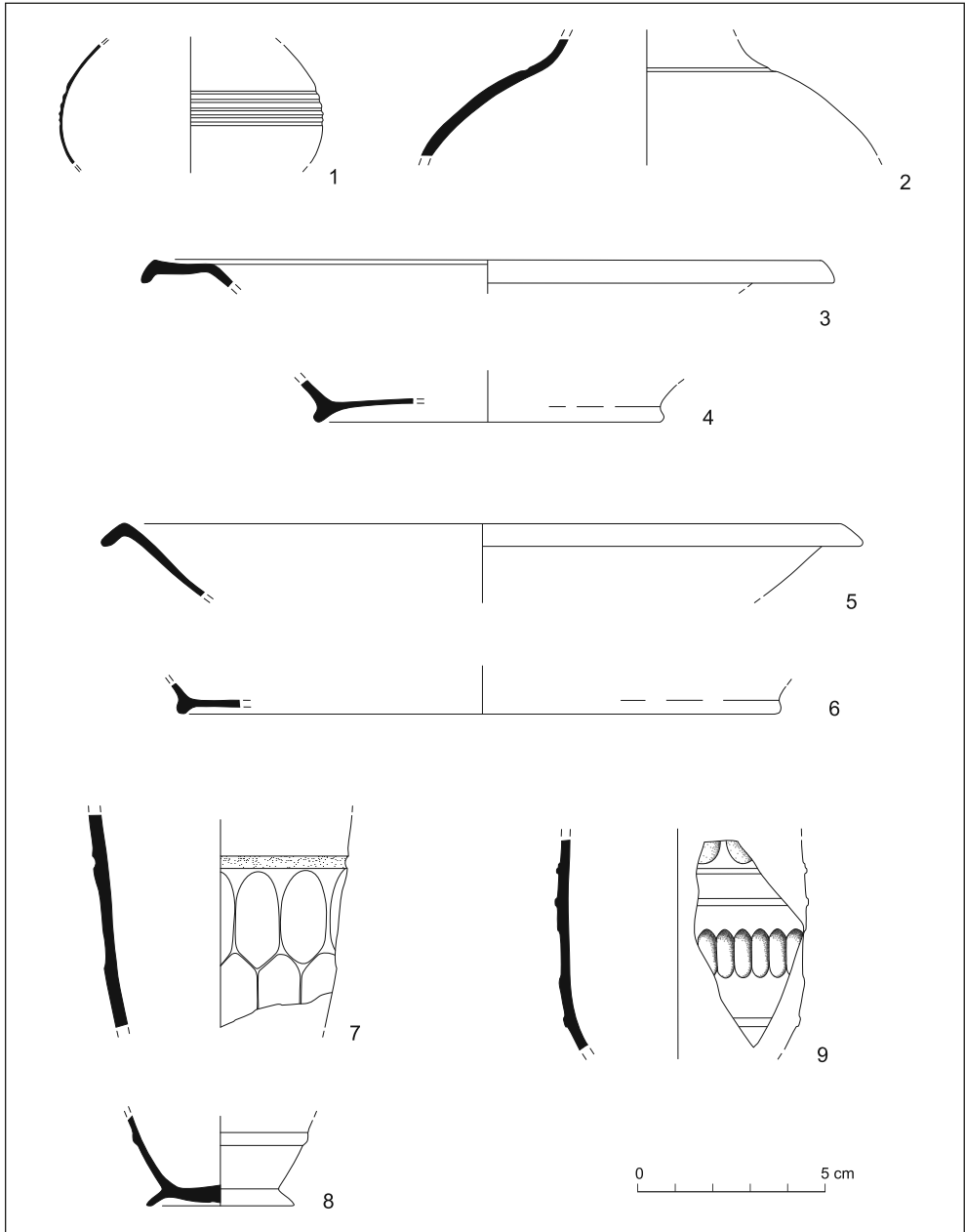


Fig. 5. Selection of early Roman glass: 1–2 – bottles, finds from the harbor area; 3–6 – cast colorless bowls; 7–9 – beakers with cut decoration, the bowls and beakers from the early Roman trash dump (PCMA Berenike Project/drawing R. Kucharczyk; digitizing E. Czyżewska-Zalewska)

cast and blown colorless glass. This group contains a wide range of bowls and plates with an overhung edge [Fig. 5:3–6], conical beakers [Fig. 5:7–9] and bottles [Fig. 6:1–4], either plain or with a wide variety of cut decoration, ranging from simple grooves and finely abraded lines to a complex and elaborate network of facets (Kucharczyk 2011: 104–105, Cat. Nos 47–50, Fig. 9-22:47–50).

Beside the colorless specimens there are some brilliantly colored vessels. Among them is a small fragment of a ribbed bowl made of amber glass (not illustrated). Its occurrence is particularly striking, as such vessels, thought of as a typical Italian product of the Augustan period, are very rare in the eastern Mediterranean. The number of this type of bowls, made of strongly colored and polychrome glass,

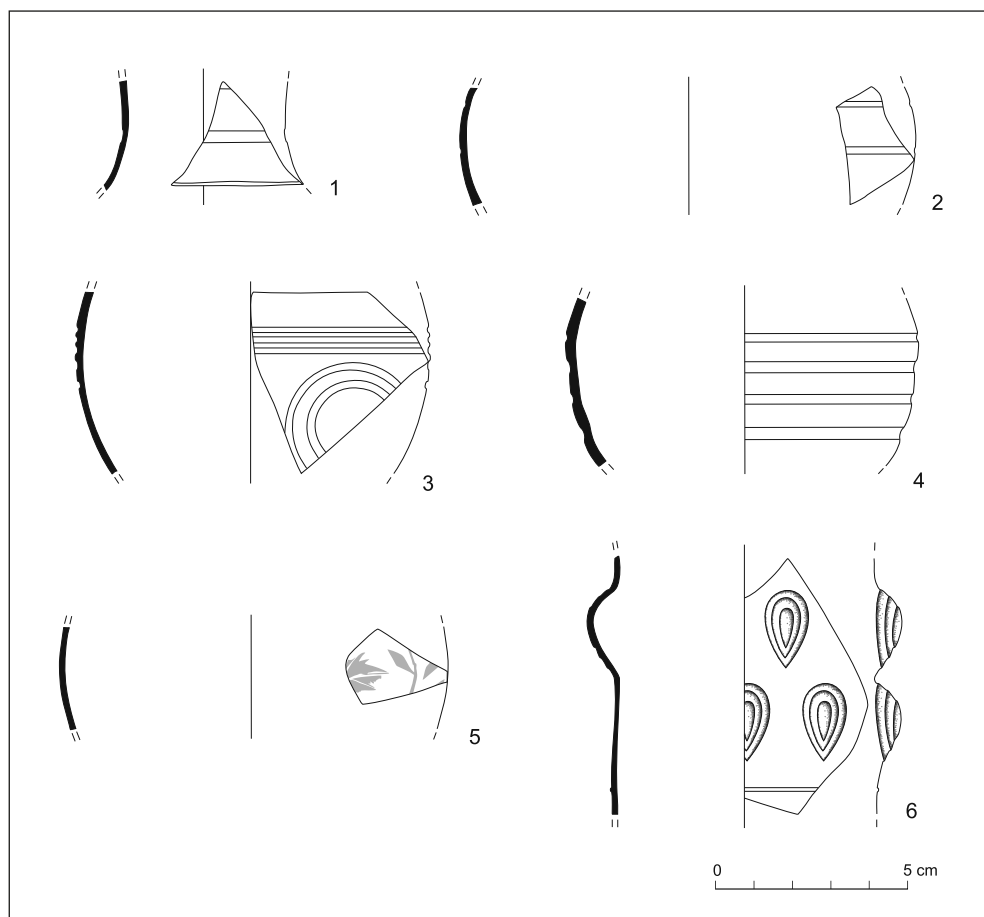


Fig. 6. Selection of early Roman glass from the early Roman trash dump: 1–5 – bottles with cut and gilded (5) decoration; 6 – almond-shaped beaker (PCMA Berenike Project/drawing R. Kucharczyk; digitizing E. Czyżewska-Zalewska)

remains in stark contrast to the naturally colored monochrome examples, representing one of the commonest glass vessel finds on the site. Further pieces in this collection belong to a cobalt blue bottle, remarkable for its floral gilded decoration, which is not sandwiched between two

fused layers of glass. It features a large multi-pointed (vine?) leaf and a stem, with opposed pairs of lozenge-shaped leaves [Fig. 6:5]. The brilliance of the gold leaf, contrasting boldly with the dark color of the vessel, produces an eye-catching effect (Kucharczyk 2011: 89–90, 102–103,

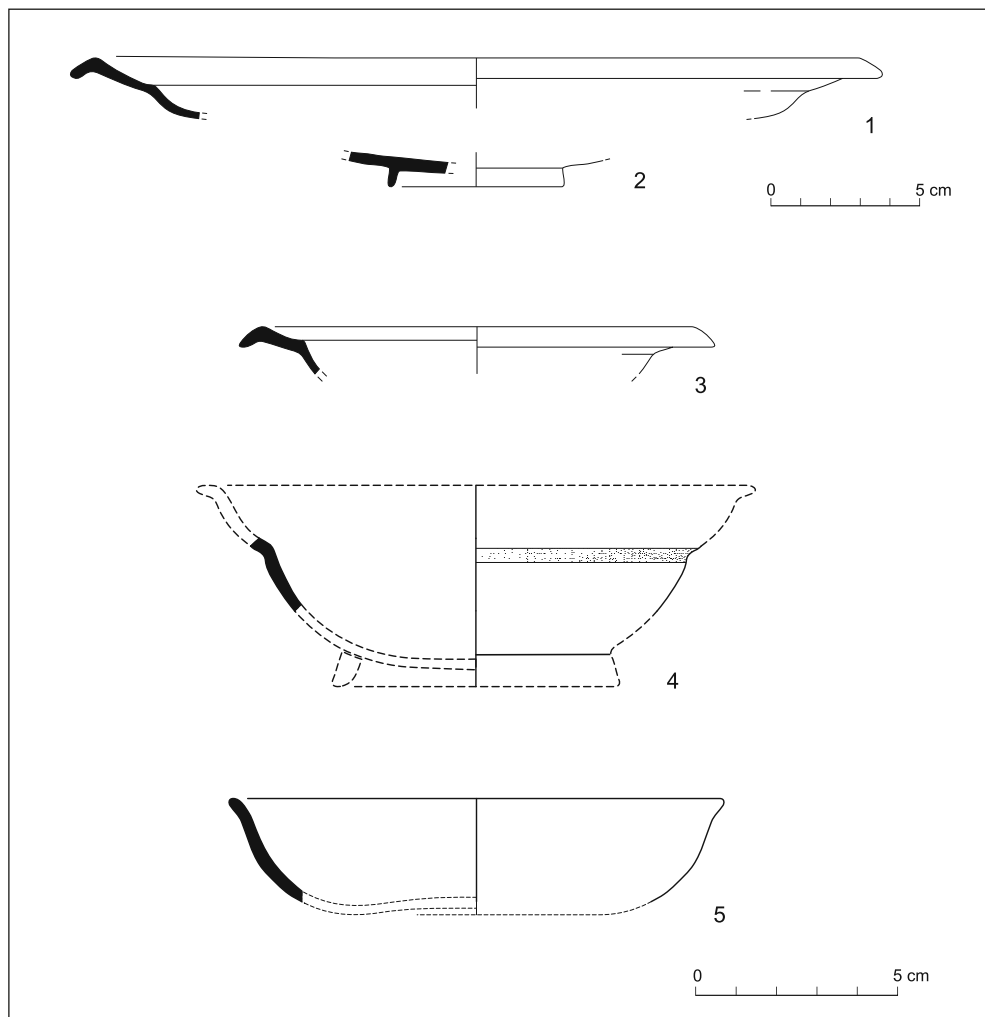
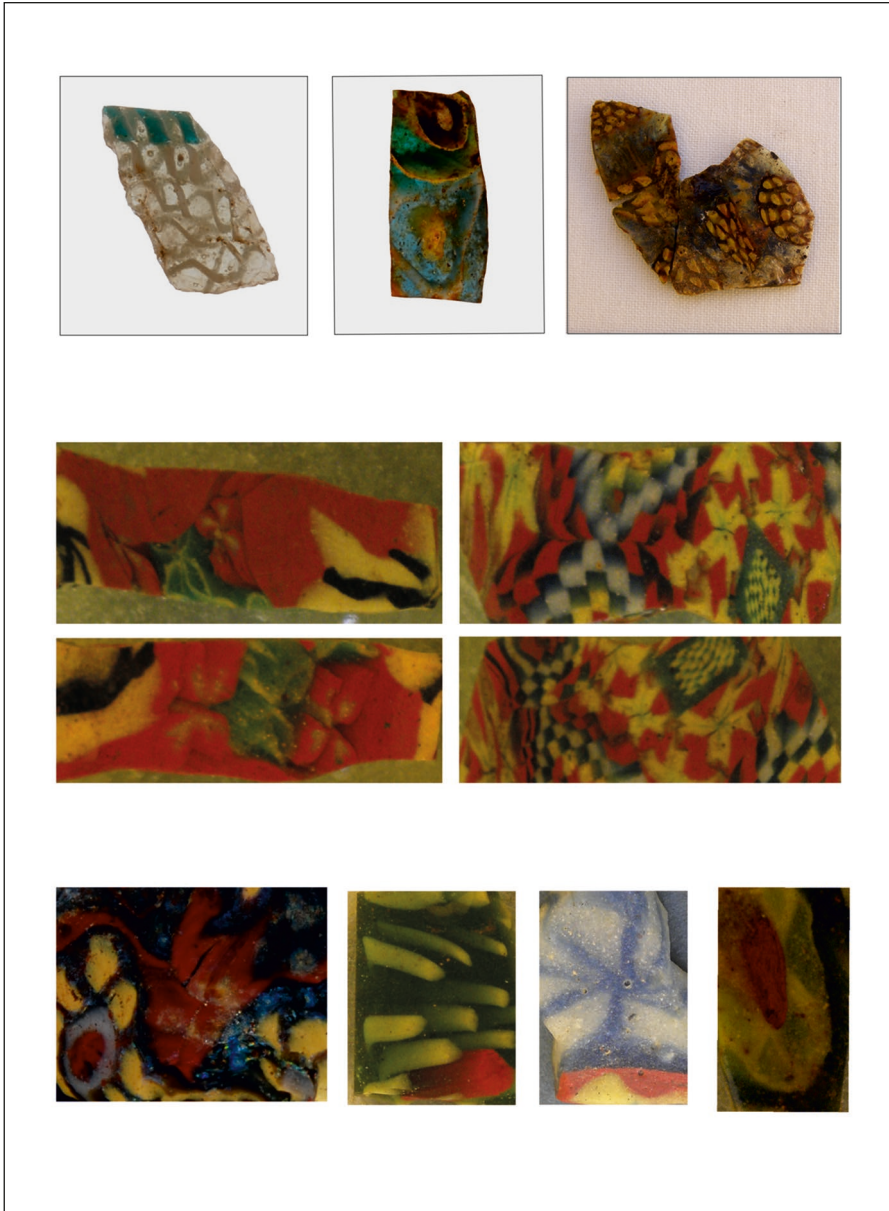


Fig. 7. Selection of early Roman glass from the late period trash dump: 1–2 – mosaic glass bowl and patella cup (reconstructed shapes); 3–5 – colorless cast bowls (PCMA Berenike Project/drawing R. Kucharczyk; digitizing E. Czyżewska-Zalewska, M. Momot)



*Fig. 8. Selection of early Roman mosaic glass fragments: top row, glass from the harbor area; middle and bottom rows, glass from the late 4th–6th century trash dump (PCMA Berenike Project/photos R. Kucharczyk, digitizing E. Czyżewska-Zalewska, M. Puszkariski)*

Cat. No. 39, Fig. 9-18:39). Luxury gold-leaf glass is nothing unusual at Berenike. The list also includes “roundels” (medallions?), gold-glass tiles, but foremost drawn beads (Nicholson 2000: 153; Then-Obluska 2015: 753–755, Fig. 4:23–29). An important component of this set is yet another molded-blown beaker with large, three-stepped almond-shaped bosses in high relief [Fig. 6:6]. One should also add a few very small fragments with enamel painting, a category of glass already attested at the site. The most spectacular examples that ever reached Berenike include cups decorated with vine-ivy-bird motifs, garlands and stars/or rosettes, and a unique bowl adorned with very vivid marine life, interspersed with vegetation and shells (Nicholson and Price 2007).

The late trash dump (BE10-59), dated to the late 4th through 6th century AD, encompassed a great variety of finds. One of the most surprising aspects of this material is the presence of a significant number of mosaic and colorless glass fragments (for the occurrence of the early and late Roman glass in a late trash

dump, see Kucharczyk and Zych in press). Polychrome finds, undoubtedly especially treasured and long cherished as heirlooms, include either inlays/plaques or small hemispherical bowls and a *patella* cup [Fig. 7:1–2] (for mosaic glass excavated at Berenike in the 2009–2011 seasons, see Kucharczyk 2017; also Nicholson 1998: 285–286, Fig. 14-6). Fragments exhibit a noticeable variety of decorative patterns, either simple or more complex with various color schemes, in many cases highly skilled and elaborate. They include: a network of quatrefoils, minute tiny heart-shaped quatrefoils and flowers composed of eight triangular petals, simple spirals, vibrant polychrome checkerboards comprised of very tiny squares, heart-shaped quatrefoils, wheel-like and flower rosettes, and imitation of *serpentino verde* [Fig. 8 middle and bottom rows]. In this set of finds, the most common, however, is colorless cast tableware. The predominant vessel types are deep bowls and large shallow dishes with broad outspayed rim, often with an overhanging edge, on low ring-bases [Fig. 7:3–5].

## CONCLUDING REMARKS

The glass discussed in this paper, representing only a very small fraction of all the early Roman glass already found at Berenike, contributes to the study of already existing material from the site. It confirms, not unexpectedly, that the emporium was a substantial consumer of glass, of which a large amount can be described as luxury tableware. It was the most fashionable glass of its time, encompassing principally drinking vessels and vessels for serving foods and liquids.

The brilliantly colored specimens, either monochrome or polychrome, as well as the colorless ones, often with elaborate facet-cut decoration, taken together with mold-blown vessels, combined with fine-quality pottery and copper-alloy tableware (fragments of handles and rims suggest the existence of these; M. Hense, personal communication), made up a quality dinnerware set for both formal and more private dinners and gatherings, which were the ideal occasion to show

off wealth and the owner's tastes. So far, none of this evidence can be tied in with specific, individual users, but it will not be a great leap of imagination to think that the members of the Roman imperial court known to have resided in Berenike, as well as representatives of Roman governance in Egypt, responsible for the smooth operation of this major harbor of the early

Imperial period, would have not only expected, but also taken the necessary steps to furnish their table with the kind of dinnerware that they were used to at home. And they would have enjoyed just as much showing off the centerpieces of their table, to be viewed and admired by guests, friends and business associates, while highlighting their affluence and social standing.

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## REFERENCES

### PRIMARY SOURCES

Plin. *Nat.* Pliny the Elder, *Natural History in ten volumes* [=Loeb Classical Library], transl. by H. Rackham, Cambridge, MA: Harvard University Press, 1969

*PME* *The Periplus Maris Erythraei: Text with introduction, translation, and commentary*, transl. by L. Casson, Princeton, NJ: Princeton University Press, 1989

Strab. Strabo, *Geography I–VIII* [=Loeb Classical Library], transl. by H.L. Jones, Cambridge, MA: Harvard University Press, 1969

### SECONDARY SOURCES

Al-Ansary, A.R. (1981). *Qaryat al-Fau: A portrait of pre-Islamic civilisation in Saudi-Arabia*. London: Croom Helm

Al Tikriti, W.Y. (1989). The excavations at Bidya, Fujairah: the 3rd and 2nd millennia BC culture. *Archaeology in the United Arab Emirates*, 5, 101–114

Andersen, S.F. (2007). Glass vessels. In S.F. Andersen, *The Tylos period burials in Bahrain I. The glass and pottery vessels* (pp. 17–97). Bahrain: Culture & National Heritage, Kingdom of Bahrain

Bailey, D.M. (2007). Glass. In D. Peacock and V.A. Maxfield, *The Roman imperial quarries: Survey and excavation at Mons Porphyrites, 1994–1998*, II. *The excavations* [=EES Excavation Memoirs 82] (pp. 233–266). London: Egypt Exploration Society

Borell, B. (2010). Trade and glass vessels along the Maritime Silk Road. In B. Zorn and A. Hilgner (eds), *Glass along the Silk Road: From 200 BC to AD 1000. International conference within the scope of the “Sino-German Project on Cultural Heritage Preservation” of the RGZM and the Shaanxi Provincial Institute of Archaeology, December 11th–12th 2008* (pp. 127–142). Mainz: Verlag des Römisch-Germanischen Zentralmuseums

- Boucharlat, R. and Salles, J.-F. (1989). The Tylos period. In P. Lombard and M. Kervran (eds), *Bahrain National Museum, Archaeological Collections I. A selection of pre-Islamic antiquities* (pp. 83–134). Bahrain: Directorate of Museum and Heritage, Ministry of Information, State of Bahrain
- Brun, J.-P. (2003). Le verre dans le désert Oriental d'Égypte: contextes datés. In D. Foy and M.-D. Nenna (eds), *Échanges et commerce du verre dans le monde antique: actes du colloque de l'Association française pour l'archéologie du verre Aix-en-Provence et Marseille 7–9 juin 2001* [=Monographies Instrumentum 24] (pp. 377–387). Montagnac: Éditions Monique Mergoïl
- Brun, J.-P. (2011). Les objets en verre. In H. Cuvigny (ed.), *Praesidia du désert de Bérénice IV.1. Didymoi: une garnison romaine dans le désert oriental d'Égypte* [=FIFAO 64] (pp. 215–241). Cairo: Institut français d'archéologie orientale
- Cambon, P. (2010). The Begram glasses from Afghanistan. In B. Zorn and A. Hilgner (eds), *Glass along the Silk Road: From 200 BC to AD 1000. International conference within the scope of the "Sino-German Project on Cultural Heritage Preservation" of the RGZM and the Shaanxi Provincial Institute of Archaeology, December 11th–12th 2008* (pp. 81–91). Mainz: Verlag des Römisch-Germanischen Zentralmuseums
- Casson, L. (1989). *The Periplus Maris Erythraei: Text with introduction, translation, and commentary*. Princeton, NJ: Princeton University Press
- Cherian, P.J. and Menon, J. (2014). *Unearthing Pattanam: Histories, cultures, crossings* [exhibition catalogue]. New Delhi: National Museum
- De Maigret, A. and Antonini, S. (2005). *South Arabian necropolises: Italian excavations at Al-Makhdarah and Kharibat al-Ahjur (Republic of Yemen)*. Rome: Istituto italiano per l'Africa e l'Oriente
- Francis Jr., P. (2004). Beads and selected small finds from the 1989–92 excavations. In V. Begley (ed.), *The ancient port of Arikamedu: New excavations and researches, 1989–1992*, II [=Mémoires archéologiques 22/2] (pp. 447–604). Paris: École française d'Extrême-Orient
- Hayes, J.W. (1995). Summary of pottery and glass finds. In S.E. Sidebotham and W.Z. Wendrich (eds), *Berenike 1994: Preliminary report of the 1994 excavations at Berenike (Egyptian Red Sea coast) and the survey of the Eastern Desert* (pp. 33–40). Leiden: Research School CNWS
- Isings, C. (1957). *Roman glass from dated finds* [=Archaeologica Traiectina 2]. Groningen: J.B. Wolters
- Jasim, S.A. (1999). The excavation of a camel cemetery at Mleiha, Sharjah, U.A.E. *Arabian Archaeology and Epigraphy*, 10(1), 69–101
- Jasim, S.A. (2006). Trade centres and commercial routes in the Arabian Gulf: Post-Hellenistic discoveries at Dibba, Sharjah, United Arab Emirates. *Arabian Archaeology and Epigraphy*, 17(2), 214–237
- Kucharczyk, R. (2011). Glass. In S.E. Sidebotham and I. Zych (eds), *Berenike 2008–2009: Report on the excavations at Berenike, including a survey in the Eastern Desert* [=PCMA Excavation Series 1] (pp. 83–111). Warsaw: PCMA UW
- Kucharczyk, R. (2014). A fragment of dichroic glass from Alexandria. *JGS*, 56, 29–35
- Kucharczyk, R. (2016). Glass finds from Areas U and G at the Kom el-Dikka site in Alexandria (excavations in 2012 and 2013). *PAM*, 25, 87–103

- Kucharczyk, R. (2017). Mosaic glass from Berenike (2010–2011). In S.E. Sidebotham and I. Zych (eds), *Berenike 2010–2011. Report on two seasons of excavations at Berenike, including survey in the Eastern Desert and reports on earlier work* [=PCMA Excavation Series 4] (pp. 329–350). Warsaw: PCMA UW
- Kucharczyk, R. and Zych, I. (in press). Traps of residuality: what is early Roman glass doing in a late Roman household rubbish dump? The case of trench BE10-59 from Berenike on the Red Sea. In P. Ballet, S. Lemaître, and I. Bertrand (eds), *De la Gaule à l'Orient méditerranéen. Fonctions et statuts des mobiliers archéologiques dans leur contexte*
- Laing, E.J. (1991). A report on Western Asian glassware in the Far East. *Bulletin of the Asia Institute*, 5, 109–121
- Lombardi, A. (2008). Glass objects. In A. Avanzini (ed.), *A port in Arabia between Rome and the Indian Ocean, 3rd C.BC–5th C.AD. Khor Rori report 2* [=Arabia antica 5] (pp. 404–406). Rome: L'Erma di Bretschneider
- Marshall, J. (1951). *Taxila: An illustrated account of archaeological excavations carried out at Taxila under the orders of the Government of India between the years 1913 and 1934 I–III*. Cambridge: Cambridge University Press
- Meyer, C. (1992). *Glass from Quseir al-Qadim and the Indian Ocean trade* [=SAOC 53]. Chicago: Oriental Institute of the University of Chicago
- Morrison, H.M. (1989). The glass. In S.C. Munro-Hay, *Excavations at Aksum: An account of research at the ancient Ethiopian capital directed in 1972–4 by the late Dr. Neville Chittick* [=British Institute in Eastern Africa Memoir 10] (pp. 188–209). London: British Institute in Eastern Africa
- Nehmé, L., al-Talhi, D., and Villeneuve, F. (2010). *Report on the first excavation season at Madā'in Sālih 2008, Saudi Arabia* [=Hegra 1]. Riyadh: Saudi Commission for Tourism and Antiquities
- Nenna, M.-D. (1999a). *Exploration archéologique de Délos XXXVII. Les verres*. Athens: École française d'Athènes
- Nenna, M.-D. (1999b). Glassware. In *Bahrain: The civilization of the two seas. From Dilmun to Tylos. Exhibition presented at the Institut du Monde Arabe from 18 May to 29 August 1999* (pp. 181–191). Paris: Institut du Monde Arabe
- Nicholson, P.T. (1998). The glass. In S.E. Sidebotham and W.Z. Wendrich (eds), *Berenike 1996: Report of the 1996 excavations at Berenike (Egyptian Red Sea Coast) and the survey of the Eastern Desert* (pp. 279–288). Leiden: CNWS
- Nicholson, P.T. (1999). The glass. In S.E. Sidebotham and W.Z. Wendrich (eds), *Berenike 1997: Report of the 1997 excavations at Berenike and the survey of the Egyptian Eastern Desert, including excavations at Shenshef* (pp. 231–242). Leiden: Research School of Asian, African, and Amerindian Studies (CNWS), Universiteit Leiden
- Nicholson, P.T. (2000). Roman glass from Berenike (Egypt): some new work. In *Annales du 14<sup>e</sup> congrès de l'Association internationale pour l'histoire du verre: Italia/Venezia-Milano 1998* (pp. 151–155). Lochem: AIHV
- Nicholson, P.T. and Price, J. (2003). Glass from the port of Berenike, Red Sea Coast, Egypt. In D. Foy and M.-D. Nenna (eds), *Échanges et commerce du verre dans le monde antique: actes du colloque de l'Association française pour l'archéologie du verre Aix-en-Provence et Marseille 7–9*

- juin 2001 [= *Monographies Instrumentum* 24] (pp. 389–394). Montagnac: Éditions Monique Mergoil
- Nicholson, P.T. and Price, J. (2007). Glass fish vessel. In S.E. Sidebotham and W.Z. Wendrich (eds), *Berenike 1999/2000: Report on the excavations at Berenike, including excavations in Wadi Kalalat and Siket, and the survey of the Mons Smaragdus Region* (pp. 220–224). Los Angeles, CA: Cotsen Institute of Archaeology, University of California, Los Angeles
- Peacock, D. (2011). Glass. In D. Peacock and L. Blue (eds), *Myos Hormos – Quseir al-Qadim: Roman and Islamic ports on the Red Sea II. Finds from the excavations 1999–2003* [= *BAR IS* 2286] (pp. 57–78). Oxford: Archaeopress
- Peacock, D. and Blue, L. (eds). (2006). *Myos Hormos – Quseir al-Qadim: Roman and Islamic ports on the Red Sea I. Survey and excavations 1999–2003*. Oxford: Oxbow Books
- Peacock, D. and Blue, L. (eds). (2011). *Myos Hormos – Quseir al-Qadim: Roman and Islamic ports on the Red Sea II. Finds from the excavations 1999–2003* [= *BAR IS* 2286]. Oxford: Archaeopress
- Potts, D.T. (1990). *The Arabian Gulf in antiquity II. From Alexander the Great to the coming of Islam*. Oxford: Clarendon Press
- Price, J. and Worrell, S. (2003). Roman, Sasanian, and Islamic glass from Kush, Ras al-Khaimah, United Arab Emirates: a preliminary survey. In *Annales du 15<sup>e</sup> congrès de l'Association internationale pour l'histoire du verre: New York–Corning 2001* (pp. 153–157). Nottingham: AIHV
- Salles, J.-F. and Sedov, A.V. (eds). (2010). *Qāni': le port antique du Haḍramawt entre la Méditerranée, l'Afrique et l'Inde. Fouilles russes 1972, 1985–89, 1991, 1993–94* [= *Indicopleustoi* 6]. Turnhout: Brepols
- Seland, E.H. (2010). *Ports and political power in the Periplus: Complex societies and maritime trade on the Indian Ocean in the first century AD* [= *BAR IS* 2102]. Oxford: Archaeopress
- Sen, S.N. and Chaudhuri, M. (1985). *Ancient glass and India*. New Delhi: Indian National Science Academy
- Sidebotham, S.E. (2011). *Berenike and the ancient maritime Spice Route*. Berkeley: University of California Press
- Sidebotham, S.E., Hense, M., and Nouwens, H.M. (2008). *The Red Land: The illustrated archaeology of Egypt's Eastern Desert*. Cairo: American University in Cairo Press
- Sidebotham, S.E. and Wendrich, W.Z. (eds). (1995). *Berenike 1994: Preliminary report of the 1994 excavations at Berenike (Egyptian Red Sea coast) and the survey of the Eastern Desert*. Leiden: Research School CNWS
- Sidebotham, S.E. and Wendrich, W.Z. (eds). (1996). *Berenike 1995: Preliminary report of the 1995 excavations at Berenike (Egyptian Red Sea Coast) and the survey of the Eastern Desert*. Leiden: Research School CNWS, School of Asian, African, and Amerindian Studies
- Sidebotham, S.E. and Wendrich, W.Z. (eds). (1998). *Berenike 1996: Report of the 1996 excavations at Berenike (Egyptian Red Sea Coast) and the survey of the Eastern Desert*. Leiden: CNWS
- Sidebotham, S.E. and Wendrich, W.Z. (eds). (1999). *Berenike 1997: Report of the 1997 excavations at Berenike and the survey of the Egyptian Eastern Desert, including excavations at Shenshef*. Leiden: Research School of Asian, African, and Amerindian Studies (CNWS), Universiteit Leiden

- Sidebotham, S.E. and Wendrich, W.Z. (eds). (2000). *Berenike 1998: Report of the 1998 excavations at Berenike and the survey of the Egyptian Eastern Desert, including excavations at Wadi Kalalat*. Leiden: Research School of Asian, African, and Amerindian Studies (CNWS)
- Sidebotham, S.E. and Wendrich, W.Z. (eds). (2007). *Berenike 1999/2000: Report on the excavations at Berenike, including excavations in Wadi Kalalat and Siket, and the survey of the Mons Smaragdus Region*. Los Angeles, CA: Cotsen Institute of Archaeology, University of California, Los Angeles
- Sidebotham, S.E. and Zych, I. (2010). Berenike: Archaeological fieldwork at a Ptolemaic–Roman port on the Red Sea coast of Egypt 2008–2010. *Sahara*, 21, 7–25
- Sidebotham, S.E. and Zych, I. (2011a). Berenike: Egypt’s Red Sea gateway to the east. *Egyptian Archaeology*, 39, 18–20
- Sidebotham, S.E. and Zych, I. (2011b). Excavations. In S.E. Sidebotham and I. Zych (eds), *Berenike 2008–2009: Report on the excavations at Berenike, including a survey in the Eastern Desert* [=PCMA Excavation Series 1] (pp. 25–57). Warsaw: PCMA UW
- Sidebotham, S.E. and Zych, I. (eds). (2017). *Berenike 2010–2011. Report on two seasons of excavations at Berenike, including survey in the Eastern Desert and reports on earlier work* [=PCMA Excavation Series 4]. Warsaw: PCMA
- Sidebotham, S.E. and Zych, I. (eds). (forthcoming). *Berenike 2012–2015. Report on fieldwork and studies at Berenike, including survey in the Eastern Desert, excavation at Wadi Khashab and reports on earlier work* [=PCMA Excavation Series 6]. Warsaw: PCMA
- Silvano, F. (2012). *I vetri di epoca romana dagli scavi di Medinet Madi (1998–2004): l’area del tempio C* [=Monografie di “Egitto e Vicino Oriente” 5]. Pisa: PLUS-Pisa University Press
- Stern, E.M. (1991). Early export beyond the Empire. In M. Newby and K.S. Painter (eds), *Roman glass: Two centuries of art and invention* [=Society of Antiquaries of London Occasional Papers 13] (pp. 141–154). London: Society of Antiquaries of London
- Stern, E.M. (1992). Early Roman export glass in India. In V. Begley and R.D. De Puma (eds), *Rome and India: The ancient sea trade* (pp. 113–124). Delhi: Oxford University Press
- Stern, E.M. (1993). The glass from Heïs. In J. Desanges, E.M. Stern, and P. Ballet, *Sur les routes antiques de l’Azanie et de l’Inde: le fonds Révoil du Musée de l’homme (Heïs et Damo, en Somalie)* [=Mémoires de l’Académie des inscriptions et belles-lettres 13] (pp. 21–61). Paris: de Boccard
- Stern, E.M. (1995). *Roman mold-blown glass: the first through sixth centuries*. Rome: “L’Erma” di Bretschneider
- Stern, E.M. (1997). Glass and rock crystal: a multifaceted relationship. *JRA*, 10, 192–206
- Taniichi, T. (1983). Pre-Roman and Roman glass recently excavated in China. *Bulletin of the Okayama Orient Museum*, 3, 83–105
- Then-Obłuska, J. (2015). Cross-cultural bead encounters at the Red Sea port site of Berenike, Egypt. Preliminary assessment (seasons 2009–2012). *PAM*, 24/1, 735–777
- Whitehouse, D. (1998). *Excavations at ed-Dur (Umm al-Qaiwain, United Arab Emirates) I. The glass vessels*. Leuven: Peeters
- Whitehouse, D. (2000). Ancient glass from ed-Dur (Umm al-Qaiwain, U.A.E.) 2. Glass excavated by the Danish expedition. *Arabian Archaeology and Epigraphy*, 11(1), 87–128

- Whitehouse, D. (2001). *Roman glass in the Corning Museum of Glass II*. Corning: Corning Museum of Glass
- Whitehouse, D. (2012). The glass from Begram. In J. Aruz and E. Valtz Fino (eds), *Afghanistan: Forging civilizations along the Silk Road* (pp. 54–63). New York: Metropolitan Museum of Art
- Zazzaro, C. (2013). *The ancient Red Sea port of Adulis and the Eritrean coastal region: Previous investigations and museum collections* [=BAR IS 2569]. Oxford: Archaeopress
- Zych, I. (2010). Tomb T13 in the ancient Roman harbor town of Marina el-Alamein – a special burial place. In J. Kościuk (ed.), *Non solum villae: księga jubileuszowa ofiarowana profesorowi Stanisławowi Medekszy* (pp. 329–343). Wrocław: Oficyna Wydawnicza Politechniki Wrocławskiej
- Zych, I. (2017). The harbor of early Roman “Imperial” Berenike: overview of excavations from 2009 to 2015, *PAM*, 26/2, 93–132