CROSS-CULTURAL BEAD ENCOUNTERS AT THE RED SEA PORT SITE OF BERENIKE, EGYPT. PRELIMINARY ASSESSMENT (SEASONS 2009–2012)

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Abstract: A macroscopic analysis of the bead and pendant assemblage from Berenike (excavated in seasons 2009–2012) provides not only a preliminary bead typology and chronology, but contributes to the study of the multicultural character of the Red Sea port of Berenike from the Ptolemaic through the early Byzantine period. The presence of diverse marine and terrestrial organics, semi-precious stones and manmade materials used in crafting beads indicates a substantial supply from coastal and inland desert dwellers, as well as from overland and overseas traders. Part of the products found at Berenike must have been designated for permanent and temporary residents of the town. Other objects originated from, or were destined for African, Arabian or Asian markets.

Keywords: beads, pendants, Ptolemaic, early/late Roman, Berenike, glass, multiculturalism

As a port where people of many ethnicities, religions and cultures met and lived in close proximity, Berenike is an excellent example of a cosmopolitan harbor. In his characteristic of the urban population of the port, the excavator Steven E. Sidebotham wrote: “Those who dwelt in Berenike, either briefly or as more or less permanent settlers, came from throughout the ancient world, including Egypt, the Mediterranean, Axum, sub-Saharan Africa, and the kingdoms of southern Arabia, Nabataea, and Palmyra. Indian sailors or merchants, and likely their Sinhalese contemporaries, visited Berenike and either stayed for a few months, arriving in early summer and catching the monsoon back to India in August, or resided there on a more permanent basis” (Sidebotham 2011: 69). Multicultural contacts would involve both elites and non-elites, e.g. crews of merchant ships, teams passing through the desert,1 craftsmen, and nearby dwellers providing supplies and services to residents of this cosmopolitan port, which lay at the edge of the desert.

1 For evidence of relatively small groups of travelers and animals moving back and forth throughout the year, and for the operations of the Nikanor family business of medium-scale private transport, see Adams 2007: 221–234.
The cosmopolitan nature of this port site is attested by the archaeological remains of personal adornment, namely, beads and pendants which were made, owned, traded, and lost here.

About 2000 beads and pendants were excavated during the field seasons in Berenike in 2009–2012. They came from contexts attributed to the early and late phases of the occupation of the site.

The early phase covers the Ptolemaic and early to mid-Roman periods in Egypt, from the 3rd century BC to the 3rd century AD, and it is contemporary to the Meroitic period in Nubia. Trench BE11-77 at Berenike was a Ptolemaic/early Roman rubbish dump with plenty of beads, and seems to have contained successive loads of waste from a workspace producing, among other things, personal adornments (Zych and Sidebotham 2011). Beads were found in the disturbed late Roman fill of the “Square Feature” (BE10/11-70), in an area outside the northwestern corner of the 5th century AD “Lotus Temple” (BE12-87) and behind its back wall (BE12-81) (for recent archaeological reports on these features, see Rądkowska, Sidebotham and Zych 2013; Zych et al. 2014; Sidebotham et al. 2015, in this volume). The rest of the material was recorded from a number of other Ptolemaic and early Roman trenches, both in the harbor bay (BE09/10-54, BE10-63–65, BE10-67, BE10-69, BE11-71, BE11-78) and in the rubbish dump (BE09-56, BE09-57, BE10-58, BE10-60, BE11-74, BE11-76).

The late-phase occupation covers the late Roman and early Byzantine periods in Egypt and the post-Meroitic period in Nubia (4th–beginning of 6th century AD). Most of the beads and pendants, and materials used in their production came from a rubbish dump (BE10-59) located in a late Roman commercial-residential area and contained Sasanian glass as well as pottery of Egyptian, Roman, Mesopotamian, Aksumite, and Eastern Desert Blemmyan origin (Zych and Sidebotham 2010). Many beads were picked up from the “Lotus Temple” (BE10/12-61).

The variety of materials found is very meaningful. Small, perforated beads and pendants were made of organics of both marine (e.g., seashell, coral) and terrestrial origin (e.g., ostrich eggshell), stones (e.g., quartz, chalcedony, carnelian), and man-made materials (clay, glazed composition/faience, glass), and varied in percentage by place of excavation or date.

An overview of the raw materials used in their manufacture, and the techniques used to make them, should allow for a broader view discussing their provenance and circulation. It is a glimpse of the tastes of the Berenike market, both of the customers and their providers.

OVERVIEW OF RAW MATERIALS

MARINE MOLLUSK SHELL

Some simply perforated Red Sea Engina mendicaria shells were recorded from Ptolemaic and early Roman Berenike contexts [Fig. 1:2]. Such shells, with punched and pierced or parasite holes,

2 For details concerning the contexts and their dating and for a more comprehensive bead material study, see Zych 2011 (season 2009) and Then-Obłuska forthcoming a (seasons 2010–2011).
were recorded from Mons Porphyrites (Hamilton-Dyer 2007: 348–349, Fig. 14.8, Cat. 50, 54, 55) and Mons Claudianus (Hamilton-Dyer 2001: 363, Cat. 98).

Perforated short, truncated barrels\(^3\) (BE11-77/002/009) and short cones cut from *Conus* sp. shell apexes \([\text{Fig. 1:1}]\) are the most characteristic feature in early Roman Berenike.\(^4\) Since *Conus* sp. with their apexes removed have not been noted from early Roman Berenike contexts to date, it might be that worked apexes were brought in from elsewhere. Interestingly, short truncated cones or barrels of seashell are very rare finds in the Nile Valley (The Museum of Archaeology University of Stavanger, SJE 25/70:3, personal observation; Petrie, Brunton, and Murray 1923: Pl. lxix:24). Some examples were found at Adulis (Zazzaro 2013: 96, Fig. 17.3 on the right), at Marsa Nakari (MN01-099#112/0011, personal observation), and at early Roman Quseir, port trench 14 (Hamilton-Dyer 2011a: 166, Cat. 231, 1st–2nd century AD\(^5\)). They were noticed at late Iron Age Nush-i Jan in Iran (Curtis 1984: Fig. 19:482–483). However, they are very common finds at sites along the South Arabian peninsula in Yemen and Oman (Beck 1944: Pl. XL1 Hadramaut; Corboud et al. 1996: Pl. 28 Bithnah; Morrison 1991: 384 Shabwa; Lisci and Pavan 2012: Figs 1–2 Khor Rori; Potts 1991: 121, Figs 213–214 Tell Abraq; De Waele 2007: 304 Ed-Dur; Yule 2001: Fig. 5.8.1 Samad al Shan; Mouton 2008: Fig. 100:13 Mleiha).

Objects made of seashells representing a broad variety of Gastropoda came from contexts attributed to the late Roman phase in Berenike. They were perforated by cutting off or grinding the spire, or by punching or drilling through a body whorl. Some of them were preserved threaded on either string (also of palm fiber) or knotted leather thong fragments.

Red Sea/Arabian Sea mollusk shells

Most of the shells found are identified as Red Sea species (Rusmore-Villaume 2008). *Engina mendicaria* have either the whorl body perforated or the spire removed \([\text{Fig. 1:5}]\). Gastropoda with the apex removed are represented by: *Conus tenatiatus* \([\text{Fig. 1:13}]\), *Conus* sp. \([\text{Fig. 1:7}]\), and *Pyrene flava* \([\text{Fig. 1:9}]\). Small *Marginella* \([\text{Fig. 1:6}]\) and *Ancilla* sp. \([\text{Fig. 1:3}]\) shells are most commonly worked into beads. Much larger are the single specimens of *Conomurex fasciatus* \([\text{Fig. 1:11}]\), and *Oliva* \([\text{Fig. 1:10}]\). *Oliva* sp. examples have been found at the port of Adulis (Zazzaro 2013: 96, Fig. 17.2 middle row).

Seashells with perforated body whorls represent the following Red Sea species: *Planaxis savignyi* \([\text{Fig. 1:8}]\) and *Nerita sanguinolenta* \([\text{Fig. 1:4}]\). A large shell from the *Cypraeidae* family has two perforations on one side \([\text{Fig. 1:12}]\).

A cowry of the *Erosaria* (*Cyprea*) sp. \([\text{Fig. 1:14}]\) has the lateral back removed. Similar objects were found at Bir Umm Fawakhir (Meyer 2014: 20, Pl. 18a) and at Adulis (Zazzaro 2013: 96, Fig. 17.2 lower row).

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\(^3\) Bead shapes follow a classification published by H. Beck (1928).

\(^4\) For worked seashell beads from a previous Berenike season, see Francis 2000: 211.


\(^6\) These little seashells were found threaded on leather thong fragments at Quseir (RN 180), Chicago, Oriental Institute Museum, personal observation.
List of beads illustrated in *Fig. 1*, giving context, material and dimensions in mm

Abbreviations: W – width, L – length, T – thickness, D – diameter, HD – hole diameter

### Red Sea/Arabian Sea shells and nacre
1. **BE12-84/007/PB047** *Conus* sp.
   
   W16, HD2
2. **BE10-59/001/PB001** *Engina mendicaria*
   
   W9.6, T8.4, L16.4, HD1.7–2.4
3. **BE10-59/004/PB032** *Ancilla* sp.
   
   W4.2, T3.7, L7.5, HD1.5
4. **BE10-59/001/PB014** *Nerita sanguinolenta*
   
   W12.2, T8.8, L14.9, HD1.8
5. **BE10-59/001/PB002** *Engina mendicaria*
   
   W8.8, T7.7, L11.5, HD3.3
6. **BE10-59/004/PB032** *Marginella* sp.
   
   W6, T5, L10, HD0.8–2.5
7. **BE10-59/999/PB012** *Conus* sp.
   
   W5.7, T5.5, L7.1, HD1.4
8. **BE10-59/004/PB032** *Planaxis savignyi*
   
   W5.9, T5, L9, HD2.5
9. **BE10-59/004A/PB035** *Pyrene flava*
   
   W7.7, T7, L12, HD3.4
10. **BE10-59/001/PB006** *Oliva* sp.
    
    W10.2, T8, L19.5, HD1.6
11. **BE10-59/002B/PB022** *Conomurex fasciatus*
    
    W20.9, T18.5, L36.5, HD7.8
12. **BE10-59/001/PB006** *Cypreaeidae*
    
    W26.2, T21.5, L45, HD6.7–11.2
13. **BE10-59/004/PB032** *Conus taeniatus*
    
    W6.4, T5.7, L9.7, HD1.7
14. **BE10-59/001/PB001** *Cyprea annulus*
    
    W12.4, T7.5, L17.2, HD5.4–7.9
15. **BE10-59/001/PB002** *Pteria macroptera*
    
    W13.5, T1.2, L22.1

### Red Sea/Gulf pearl
16. **BE10-59/004/PB032** *Pearl*
    
    D1.9, L1.8, HD0.5

### Mediterranean Sea shell
17. **BE10-59/001/PB002** *Nassarius gibbosulus*
    
    W7.7, T6.1, L12, HD2.8–3.7
Fig. 1. Beads: 1–15 – Red Sea/Arabian Sea shells and nacre; 16 – Red Sea/Gulf pearl; 17 – Mediterranean Sea shell (Photos J. Then-Obłuska)
Mediterranean Sea mollusk shells

*Nassarius gibbosulus* [Fig. 1:17] is the only definite shell species of Mediterranean Sea provenience, although some of these species may well occur in other sea basins as well. Considering their presence in 4th century AD Nile Valley Blemmyan graves (Then-Obłuska forthcoming b), their appearance in contemporary Berenike contexts is hardly a surprise.

**Nacre**

Nacre, also known as mother-of-pearl, is an organic–inorganic composite material produced by some mollusks as an inner shell layer; *Pteria macroptera* is the Red Sea species used most probably for pendant-making at Berenike. Two partly perforated fragments were preserved at the late Roman Berenike site [Fig. 1:15].

**Pearl**

One tiny pearl was recorded from a late Roman context at the site [Fig. 1:16]. The costliness of pearls is brought home by the famous dinner given by Cleopatra, during which, to impress Marc Antony, the queen dissolved a pearl in vinegar and then drank it. Pliny reported that pearls were among the most valued gemstones in both India and Arabia (Pliny, *NH* 9.54). In the Roman period, pearls are believed to have come from the Persian Gulf (Dubin 2009: 55). This statement is supported by a Talmudic reference to the “bringing up” of pearls at the Persian port of Mashmahij, usually identified with one of the Bahrain islands (Simpson 2003: 67). They were said to be destined for the North Indian market. *Periplus Maris Erythraei* (36) spoke of pearls being exported from Oman and Kane in Arabia to Barygaza in India.

According to Giorgius Cedrenus, a Greek monk and annalist, India was a source of pearls in the 4th century AD (Simpson 2003: 67). Although the Persian Gulf, or the Gulf of Mannar between India and Sri Lanka, seems to be the most probable source of the Berenike pearls (Francis 2000: 223), the Red Sea is also a known source and the tiny seed pearl found at the late Roman Berenike could reflect local activity. Three species were gathered for pearls and mother-of-pearl: *Pinctada radiata*, *Pteria macroptera* and *Pinctada margaritifera* (Carter 2005: 140). Nacre of the latter was also recorded from Berenike (compare Fig. 1:15).

**Coral**

Two unusual solitary coral items made of *Heteropsammania cochlea* (Spengler) might have been used for pendants in early Roman Berenike [Fig. 2:1]. The spiral grooves are made by the sipunculid worm that lives within the shell, and probably helps move the coral around on the sea floor (M. Richmond, personal communication). Its natural perforation allows the commensal sipunculid worm to move in and out of the calyx. They are quite common on sandy or sea-grass reef beds, at 7–10 m depth and in clear water. Their distribution includes the West Indian Ocean, Red Sea, and West Pacific Ocean (Richmond 2011: 162). *Heteropsammania* corals are illustrated among early Roman organics from Quseir (Hamilton-Dyer 2011a: 162, Fig. 13.5 No. 140).

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For mother-of-pearl inlay pieces and a pendant found in Late Sasanian Qasr-i Abu Nasr, or Old Shiraz fortress, see Whitcomb 1985: 209, Pls 53, 54, Fig. 70.f.
Beads made of *Corallium* were recorded from late Roman and early Byzantine contexts [Fig. 2:2, 3]. They were found at contemporary inland sites along the Egyptian (Boston, Museum of Fine Arts, Inv. 04.1960; 04.1963 from Akhmim) and Nubian Nile Valley (Emery and Kirwan 1938: Pls 43–44 from royal Qustul and Ballaňa), and in the Western Desert at Kharga Oasis (New York, Metropolitan Museum of Art, accession numbers 31.8.32, 4th century; 25.10.20.95, 25.10.20.96; 31.8.4; 31.8.6; 31.8.7, 4th–7th century). They were also recognized in one of the hoards of necklaces from Yemeni Qane (AD 100–300) (Pickworth 2010: 293–297, Pl. 116).

Coral beads were one of the main Mediterranean products (*Corallium rubrum* sp.) imported into Roman and Coptic Egypt and, according to the *Periplus Maris Erythraei* (28), coral was exported through Roman Egypt to Kane (in Arabia), and also to India (Barygaza, Muziris, and Nelkynda) (Francis 2002a: 156). They were also known at the Chinese court from that same time period.

Documentary sources reveal the use of coral in amulets and as a fertility symbol in ancient Rome. It was also worn as a talisman around the neck, particularly by children (Ward 2008: 145). Coral seems to have attributions of special powers in preventing hazards at sea (Evans 1922: 24). According to Pliny and to bishop of Seville St. Isidore, quoting the Roman writer, “magicians stated that coral resists thunderbolts, if it is to be believed.”

A few fossilized coral beads are quite large, of irregular flattened cylinder shape and grayish color. Their perforations may have been made by parasites. The beads measure 5.9–10.1 mm in thickness and 5.8–6.6 mm in length. At Berenike, they were found in both early and late Roman contexts [Fig. 2:11].

**FISH TOOTH**

Many fish teeth were found in late Roman contexts. Three perforated objects possibly derive from the Red Sea wrasse or seabream fish [Fig. 2:4]. Teeth of the latter are the most abundant remains at Berenike and Quseir (Hamilton-Dyer 2011b: 264). Fish tooth beads are almost absent from Nile Valley sites and seem to be limited to Berenike and the coast.

**TURTLE SHELL**

Turtle shell is mentioned many times in the *Periplus Maris Erythraei*, both as an exported and imported product in many Red Sea and Indian ports. Turtle shell was associated in textual sources with the activity of the Red Sea coastal group, the Ichthyophagoi (*Peripl. M. Eryth*. 4), who brought it to Adulis, a principal market for the Troglohyes (Pliny, *NH* 6.34). The 1st century AD *Periplus* (30) mentioned the Romans using the shells of several varieties of turtle for different functions. Above all, turtle shell was used to decorate large objects, veneering beds, sideboards, dining couches, and doors. It has been noted that turtle shell “of which the parts over the belly, whichever are useful, do

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8 According to the Greek *Nautical Lapidary* ascribed to Astrampsychus, coral wrapped around the masthead of a ship with the skin of a seal counteracted wind and waves, and all sea disturbances.

9 Chalcedony worn by a child would also prevent their being shipwrecked in the deep, and a crystal was supposed to protect against large waves and storms (Evans 1922: 31).
List of beads illustrated in Fig. 2, giving context, material and dimensions in mm
Abbreviations: W – width, L – length, T – thickness, D – diameter, HD – hole diameter

Red Sea and Mediterranean Sea organics
1. *BE12-84/004/PB012* Heteropsammia coral
   W11.6, T4.6, H14.9, HD2.0
2. *BE10-59/001/PB007* Corallium coral
   D3.8, L3.7, HD0.9
3. *BE12-61/059/PB038* Corallium coral
   D4.3, L7.3, HD1.1
4. *BE10-59-004/030* fish tooth
   D3.8, T2.9, HD1.2
5. *BE11-76/004/PB013* turtle shell
   W8, T6.8, L13.9, HD3.2–3.5
   D3.8, T2.9, HD1.2
5. *BE11-76/004/PB013* turtle shell
   W8, T6.8, L13.9, HD3.2–3.5
   D3.8, T2.9, HD1.2
5. *BE11-76/004/PB013* turtle shell
   W8, T6.8, L13.9, HD3.2–3.5

East African organics
7. *BE11-74/004/PB006* ostrich eggshell
   D7.3, L1.8, HD2.1
8. *BE10-59-004/PB030* ivory
   D9.1, L10.7, HD1.6; 2.2

Eastern Desert(?) stones:
9. *BE11-77/999/PB014* agate
   D5.9, L2.9, HD0.8; 1.4
10. *BE10-70/030/PB037* agate
    D5, L6.9, HD1.2
11. *BE10-59/001/PB002* fossilized coral
    D7.9–10, L5.8, HD1.9; 1.5
12. *BE10-59/001/PB002* gypsum selenite
    W24.8x40, T2.3, HD2.5
13. *BE10-59/001/PB002* steatite
    W18, T5.9, H9.6, HD1.8
14. *BE10-59/001/PB002* carnelian
    W7.2, T6.7, L10, HD1.3; 2.7
15. *BE11-77/001/PB002* peridot
    W7.6, T5, H11.2
16. *BE11-71/014/PB026* chalcedony
    D3.1, L3.7, HD0.6

Zabargad Island stone
17. *BE11-77/001/PB004* peridot
    W7.6, T5, H11.2

Eastern Desert/Indian(?) stones:
18. *BE10-63/65/001/PB001* rock crystal
    D7.8, L7.7, HD1; 1.3
19. *BE10-64/002/PB002* garnet
    D5.2x4.2, L5.7, HD1.4
Fig. 2. Beads of organics: 1–6 – Red Sea and Mediterranean Sea, 7–8 – East African; beads of stone: 9–16 – Eastern Desert(?), 17 – Zabargad Island, 18–19 – Eastern Desert/Indian(?) (Photos J. Then-Obluska)
not take [regular] cutting; besides they are rather tawny. On the other hand, whatever can be used for small boxes, small plaques, small disks, and similar items, gets cut up completely” (Peripl. M. Eryth. 30).

An early Roman long tubular bead [Fig. 2:6] and late Roman pointy pendant fragment [Fig. 2:5] belong to the adornment category. The latter was drilled from both ends, which resulted in the double parallel shape of the perforation. A decorated dish made of turtle shell, and found in Egypt, would confirm high skills in turtle shell working in the early Roman period (London, British Museum, No. 2009, 5014.1, AD 100–200).

As evidenced by preserved semi-worked objects and waste, turtle shell\(^\text{10}\) was worked at Berenike (Gwiazda forthcoming). Perforated disks were found at both the port sites of Berenike (Gwiazda forthcoming) and Quseir.\(^\text{11}\) Although their function is uncertain, they might have been simply fishing items or waste in the production of leather items (Hamilton-Dyer 2011a: 159). Indeed, turtle shell disks might have been leftovers from the production of small rings used for personal adornment.\(^\text{12}\) Many such rings, approximately 14 mm in diameter, were found together with late Roman glass beads\(^\text{13}\) at Gurob (London, The Petrie Museum UC58113), at Byzantine Qau (London, The Petrie Museum UC74113), and in the 4th century AD Tomb XCVIII at al-Bagawat, Kharga Oasis (MET 31.8.36a–p). Whether, however, their sides were linked together into a chain or they were finger and toe rings remains unsure.

OSTRICH EGGSHELL

The Ostrich or Common Ostrich \((Struthio camelus)\) is either one or two species of large flightless birds native to Africa. Ostriches inhabit the southern desert areas of Egypt, the Sudan and the savanna south of the Sahara. However, we know that \((Struthio c. syriacus)\), the Arabian Ostrich or Middle Eastern Ostrich, was formerly very common in the Arabian Peninsula, Syria, and Iraq, although it is now extinct.

Ostrich eggshell disks [Fig. 2:7] are a very rare find in Ptolemaic and early Roman Berenike contexts. At contemporary sites, however, single ostrich eggshell beads with diameters from 10 mm to 13 mm were noticed in Yemen’s Shabwa burials (Morrison 1991: 384) and a single example comes from Aksum (Morrison 1989: 177, No. 128). They are almost absent from Meroitic burial sites in the Lower Nubian Nile Valley (Then-Obłuska 2014a), and no ostrich eggshell has been recognized from early Roman Myos Hormos (Quseir al-Qadim). Moreover, no ostrich eggshell beads have been found at Khor Rori (Sumhuram, Oman) (S. Lischi, personal communication).

\(^\text{10}\) Some of Berenike’s turtle shell disks are partly delaminated due to arid conditions. The color and flaky texture suggest these could be made of loggerhead sea turtle scutes \((Caretta caretta)\) (K.A. Björndal, personal communication). Other objects were made of hawksbill or green turtle shell.

\(^\text{11}\) Turtle shell disks cut of hawksbill turtle shell were found during Oriental Institute University of Chicago excavations in Quseir al-Qadim and they were ascribed to a late Ayubid–early Mamluk context (RN 167, 168) (Chicago, The Oriental Institute Museum, personal observation).

\(^\text{12}\) For Roman turtle shell bangles from Egypt, see London, The Petrie Museum UC74054, UC51738 (Qau), UC73580, UC73989; for Byzantine bangles from Egypt, see London, The Petrie Museum UC51732 (Qau), UC56354-5, UC56367, UC58134.

\(^\text{13}\) Compare the late Roman rod-pierced ‘flower’ bead type: Fig. 5:37 below.
Together with perforated mollusk shell objects, disk and short cylinder ostrich eggshell beads became more common in Berenike during the late Roman period, the time of Blemmyan presence at the site. Three short disk and short cylinder beads, still on their original string, were picked up from late Roman trash (BE10-59/001/ PB001). The beads were a characteristic type in the Lower Nubian Nile Valley from the 4th century AD. Together with larger retouched disks, they are also found on burial sites associated with the Fourth Cataract graves of the Early Makurians (Then-Obłuska 2014a: Pl. 2; forthcoming b). Ostrich eggshell beads can be associated with a long-lived Nubian tradition.

**BONE**

Three bone beads were barrel-shaped [Fig. 2:8] and drilled from both ends. Two of these, from a late Roman context, seem to be made of ivory.

**STONE**

Stone beads from Berenike were made of raw materials, which include both macro-crystalline (amethyst, quartz) and micro-crystalline stone (agate, carnelian), as well as garnets.

Written sources point to India as a source of semiprecious stone and many beads found at Berenike were made of imported stones. Contrary to the opinion on the Eastern Desert origin of carnelian, this stone is found in the Nile terrace gravels of the Fourth Cataract region in northern Sudan. Similar deposits have also been reported along the Nile in Nubia near Wadi Halfa (Harrell 2010: 72–74; 2012: 13). Although amethyst beads are said to derive from India, sources are known from the Eastern Desert’s Wadi el-Hudi, 35 km to the southeast of Aswan and 230 km west of Berenike (Shaw 2007), and Wadi Abu Diyeiba, near Quseir (Wendrich et al. 2003: 57; Harrell et al. 2006). Lustrous flakes of gypsum selenite can be found locally (Harrell 1996: 107; 2007: 173). Rock crystal deposits occur across the Eastern Desert (Harrell 2012: 4). Remains of rock crystal processing in workshops from the 5th to 7th centuries AD have been attested for Alexandria (Roddewicz 1984: 243, Fig. 71,353). Controlled by the Blemmyes, Mons Smaragdus (the Sikait-Zabara mining district) with its green beryl mines is situated not far from the main track between Koptos and Berenike (Harrell 1996: 112; 1998: 142–143; 2007: 170). Hexagonal rock crystal and greenish beryl fragments represent raw materials most probably worked in Berenike (Then-Obłuska forthcoming a). The peridot crystal from a Ptolemaic context [Fig. 2:17] is evidence of contacts with the Red Sea island of Zabargad, which was an exclusive source of peridot in antiquity (Harrell and Bloxam 2010; Finlay 2006: 160–163). Pliny connects the discovery of peridots with Troglydyte pirates (Pliny, HN 37.32). Garnets are found in many parts of Egypt, but they are especially common in deposits of mica schist in the Gebel Mitiq and Wadi Gimal in the Eastern Desert, as well as in the muscovite-granite at Sikait, just to the south of the beryl mines. However, their quality is rather poor and there is no gem-quality garnet known in Egypt.

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14 Many amethyst chunks were found in early Roman context at Quseir al-Qadim (Myos Hormos) (Chicago, The Oriental Institute Museum, personal observation).
Perforated gypsum selenite plaques were found at Quseir al-Qadim (Chicago, The Oriental Institute Museum, personal observation). Deposits with good quality almandine garnet are found in northern Sudan’s Fourth Nile Cataract region (Harrell 2012: 3).

On the other hand, stone imports from Iran and especially India were known in Roman times. Barygaza markets offered, among other things available in that region, agate and carnelian destined for export to Egypt (Peripl. M. Eryth. 48–49 and 51; Harrell 1998: 143). Almandine-pyrope-rich garnet beads from Ed-Dur and Samad al Shan in Oman are confirmed by laboratory results as imports from Sri Lanka/India or Tanzania (Rösch et al. 1997: 763–783). Also, chemical analyses connect the 5th and 6th centuries Merovingian garnets with sources in Sri Lanka (Francis 2000: 213, 222; Drauschke 2010: 51, notes 36, 37).

Independent of the provenance of the materials used, the stone beads were perforated using different tool materials depending on the region or tradition of production. They can be drilled using stone drills, a copper/bronze rod with abrasive, as well as with diamond tipped (single- and double-diamond tipped) drills. The latter technique belongs to the Indo-Pacific tradition. More sophisticated methods of examination were not available at the site, hence the following simplified division, either drilled from one end or from two, can be made within the two general periods.

**Stone beads drilled from one end**

Most of the stone beads from the Ptolemaic and early Roman Berenike were perforated using the Egyptian and Nubian technique. They were drilled from one end, which resulted in a truncated shape of the perforation.

Sawing traces next to the larger hole opening, seen on many beads, attest to a technique using a saw to facilitate drilling of a bead. The process of perforating was hastened by pecking a small depression on the surface at the other end of a bead. In Berenike the saw traces can be observed on unburnished short and standard barrels made of agate [Fig. 2:9].

A few small highly polished beads were made of amethyst [Fig. 2:15], carnelian (BE11-77/999/PB011) and chalcedony. A tiny, highly polished irregular barrel bead [Fig. 2:16], drilled from one end, was a common type in Nubian Meroitic contexts, although made of carnelian (Then-Obłuska 2015: 33). This type was also observed at the early Roman port site of Quseir (Chicago, The Oriental Institute Museum, personal observation).

Among standard and long barrels, made of agate, one was found unfinished, partly perforated from one end [Fig. 2:10].

The tradition of drilling beads from one end was carried over into the late Roman period, and is commonly found in post-Meroitic Nubia. The presence of a drop-shaped carnelian pendant [Fig. 2:14], a type common in the Nubian repertoire (Then-Obłuska 2014a: Pl. 2), is quite remarkable in a late Berenike context. It was found together with a triangular incised bead, probably made of black steatite [Fig. 2:13].

The technique of drilling from one end could be employed also for stones of lesser hardness, such as steatite and gypsum selenite15 [Fig. 2:12].

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15 Perforated gypsum selenite plaques were found at Quseir al-Qadim (Chicago, The Oriental Institute Museum, personal observation).
Stone beads drilled from both ends
A few stones from early Roman Berenike were drilled from both ends. The perforation in these cases has a double cylindrical shape. This technique can be observed in a rock crystal globular bead [Fig. 2:18].

An early Roman garnet lens-shaped bead was drilled from both ends over the edge of the bead end [Fig. 2:19]. Although it was recorded in both early and late contexts in Berenike, similar stone beads, identified as carnelian, were found in 2nd century BC–1st century AD Wadi al-Makhdarah in Yemen (De Maigret and Antonini 2005: Fig. 40d, object Y.87. MNQ.T1/8). Wadi al-Makhdarah also produced lens-shaped beads identified as amethyst (Haerinck 2001: Pl. G2, Object 153); the same can be said for Ed-Dur (Haerinck 1998: 296–297).

At late Roman Berenike, most stone beads were found drilled from both ends [Fig. 3:1–10], the perforation taking on a double parallel or hourglass shape. The stones have been identified as carnelian, rock crystal, green beryl and garnet.

Carnelian dominated the bead assemblage from late Berenike. Light and dark red, yellow-orange to reddish-orange, and colored by the presence of iron oxide, it can be found roughly formed into many different shapes: long cylinder [Fig. 3:8], bicone [Fig. 3:10], facetted square bicone [Fig. 3:6, 7], irregularly facetted [Fig. 3:9], and facetted hexagonal bicone [Fig. 3:5]. Long facetted bicones are also found in contemporary post-Meroitic graves (Then-Obluska 2014a: Pl. 2:215–216).

The emerald crystal bead from Berenike appeared in its natural hexagonal shape [Fig. 3:4]. Many of the Berenike stone beads are made of garnet used, for example, for biconical beads [Fig. 3:3].

Other garnet beads are distinguished by their elongated tabular shape and exceptional polishing. They were probably tumble-polished [Fig. 3:1, 2] (Petrie 1927: 3, Fig. I.5 London, Petrie Museum, Inv. UC40653b). One of them seems to be made of almandine, typically red with a brownish tint, resembling the color of a ruby. A similar bead, identified as amethyst, was found at Ed-Dur (Haerinck 2001: Fig. G2, Object 153).

CLAY
One bead found in early Roman Berenike was made of red clay [Fig. 3:12]. Pink clay beads were recorded from early Roman Elephantine (Rodziewicz 2005: 35) and in Meroitic graves on Sai Island and at Sedeinga (Then-Obluska 2015: 33).

A clay plumb-bob pendant probably from late Roman Berenike [Fig. 3:13] is an outstanding find. It can be compared with the “terracotta” pendants known from Rajghat, Kausambi and Arikamedu in India (Jyotsna 2000: 68).

GLAZED STEATITE
Half of a scarab found in a Ptolemaic context was made of green-glazed steatite [Fig. 3:11]. The double parallel shape of the perforation of this soft stone is clearly visible in its section. The Berenike example bears a hieroglyphic text with the coronation name of the Twenty-first Dynasty pharaoh Siamun (Sidebotham and Zych 2012: 40).

FAIENCE/GLAZED COMPOSITION
The production of faience/glazed composition objects in the Ptolemaic period, including beads, has been demonstrated at Tell Atrib (Welc 2014) and Memphis
List of beads illustrated in Fig. 3, giving context, material and dimensions in mm
Abbreviations: W – width, L – length, T – thickness, D – diameter, HD – hole diameter

Eastern Desert/Indian stones:
perforated from both ends
1. BE10-59/001/PB009 garnet
   W4.8, T3, L5.8, HD1
2. BE10-59/999/PB012 garnet
   W4.9, T3.5, L5.5, HD1.4
3. BE10-59/001/PB017 garnet
   D5.5, L5.5, HD1
4. BE10-59/002/PB019 emerald
   W3.4, T3.2, L3.8, HD1.2
5. BE12-61/071/PB076 carnelian
   D7.0, L6.0, HD1.5
6. BE10-59/004/PB034 carnelian
   W6.9, T6.2, L12, HD1.2
7. BE10-59/001/PB004 carnelian
   W8.2, L17.6, HD1.4
8. BE10-59/001/PB007 carnelian
   D4.3, L8.9, HD1.5
9. BE10-59/005/PB005 carnelian
   W3.8, T3.5, L3.6, HD0.8; 1.3
10. BE10-59/001/PB009 carnelian
    D4.5, L5.6, HD1

Egyptian glazed steatite
11. BE11-77/001/PB001
    W approx. 10, T5.6, L11.9, HD1.3

Clay
12. BE11-76/999/PB027
    D7.9, L8.9, HD1.9
13. BE10-59/001/PB008
    W8.6, L13.7, HD1

Egyptian faience
14. BE10-64/004/PB004
    D4.3, L2.6, HD2.2
15. BE11-76/999/PB022
    D5, L2.6, HD2.1
16. BE11-76/999/PB022
    D4.6, L2.7, HD2.1
17. BE10-60/001/PB002
    D3.2, L1.9, HD1.2
18. BE11-76/003/PB005
    W4.3, T2.3, L8.2, HD1.0
19. BE11-76/007/PB032
    D6.9, L3.8, HD1.9
20. BE11-77/012/PB019
    D6.2, L3.7, HD1.8
21. BE11-73/002/PB002
    D approx.10, L9.2, HD approx. 5.2
22. BE11-77/001/PB002
    W6.4, T4.5, L5.4, HD1.2
23. BE11-68/003/PB009
    W17.4, T4.5, L19.4, HD1.5
24. BE11-77/002/PB009
    D4.8, L8.5, HD1.8
Cross-cultural bead encounters at the Red Sea port site of Berenike, Egypt...

Fig. 3. Beads: 1–10 – Eastern Desert/Indian stones: perforated from both ends; 11 – Egyptian glazed steatite; 12–13 – clay; 14–24 – Egyptian faience (Photos J. Then-Obluska)
(Nicholson 2002; 2013). While faience bead production disappeared in Egypt by the late Roman period, the tradition survived in Nubia, where faience beads were produced until medieval times (Then-Obłuska 2013b; 2014a). Almost all the faience beads recorded from Berenike come from Ptolemaic and early Roman contexts; some are from the late Roman ones.

Undecorated faience
Disk and short cylinder faience beads of many colors constitute most of the bead finds from Ptolemaic and early Roman context in Berenike (trench BE11-77). As in contemporary Meroitic bead assemblages (Then-Obłuska 2015: 33), the type continued into the early Roman period (compare below) [Fig. 3:14–17].

Contrary to beads with the glaze partly worn off [Fig. 3:20], other short bicones are characterized by a very glossy blue glaze [Fig. 3:19]. They measure between 6.9–10.5 mm in diameter and 4.6–5.9 mm in length. A long rectangular tabular bead of faience [Fig. 3:18] was already noted from an early Roman context at Berenike (Zych 2011: Cat. 78b, Fig. 12-75, Phase III, late 1st to early 2nd century AD). Some standard and long tubular cores are not glazed [Fig. 3:24]. The glaze may have worn off, or else they are unfinished, indicating on site production in late Ptolemaic times.

The late Roman contexts (BE10-59/001/PB006) have yielded standard and long blue glazed tubular beads, measuring up to 5.7 mm in diameter and up to 6.7 mm in length. They recall contemporary Nubian examples (Then-Obłuska 2014a: Pl. 2:210, 211).

Decorated faience
A rectangular tabular bead from Ptolemaic and early Roman context, whitish at the core and with traces of blue/green glaze on the surface, was decorated with straight intersecting grooves on one or both sides [Fig. 3:23]. Similar examples were noted from Meroe (Dunham 1963: Fig. S-IXd; Beg. West 27, 90–10 BC; Boston, Museum of Fine Arts, Inv. No. 22-2-460m) and Tell Atrib in Egypt, where faience objects were produced (Wele 2014: Cat. 299, first half of 2nd century BC).

Two slightly flattened beads decorated with incisions were also found in Ptolemaic contexts [Fig. 3:22].

Half of a blue bead, once a grooved barrel melon type, was found in an early Roman context at Quseir [Fig. 3:21] (Meyer 1992: 41, Pl. 14, No. 370 [Chicago, The Oriental Institute Museum, personal observation]). Another example comes from Alexandria (Kucharczyk 2011a: 65, Fig. 8:3, layer dated to the 2nd–3rd century AD).

GLASS
The Wadi Natrun sites are known as the primary glass making center in Egypt (Nenna et al. 2005; Nenna 2007), but are difficult to date because of the scarcity of finds; they are considered to be of late Roman date (Henderson 2013: 231). Kilns of primary glassmaking centers were also found southwest of Alexandria (Nenna, Picon, and Vichy 2000; Rodziewicz 2009: 93–95). According to the Periplus Maris Erythraei (6), Diospolis, presumably Diospolis Magna, that is, Thebes, was a place of colorful glass ‘stone’ manufacturing. This may be a reference to production of mosaic glass or to the addition of colorants to imported ready-made glass (Henderson 2013: 230). In any case, Alexandria was apparently a source of
mosaic glass in the early and late Roman period (Kucharczyk 2011a). Moreover, the chemical composition of some mosaic glass cane sections used for beads that were found in China and Pakistan indicated their early Kushan Bara, Pakistan provenance (Dussubieux and Gratuze 2003: 318–319; Liu et al. 2012 and references). Finally, so-called Jatim beads, thought to be made in eastern Java, and found in Berenike (Francis 2002a: 190) and in the late 5th to early 6th century AD Korea, were produced using mosaic cane sections (Lankton, Lee, and Allen 2005).

Grooved stone molds for segmenting drawn tubes along with glass waste were found in early and late Roman Alexandria (Kucharczyk 2011a: 63–64, Fig. 8:1 2nd–3rd century AD; Rodziewicz 1984: 146–159, 241–242, Figs 265–266, Pl. 72, Nos 359–366, end of 5th–6th century AD). The shape of the early Roman molds suggests the production of collared beads, which were the primary shape for gold-in-glass beads from that period (compare below). Gold-in-glass beads are said to be produced in early Roman Elephantine (Rodziewicz 2005: 34–35) and at Meroe in Nubia (Markowitz 2012: 198). What is more, production of gold-in-glass beads was confirmed through laboratory analysis of glass chemical composition of some examples from Bara in Pakistan (2nd century BC–2nd century AD). They were distributed throughout the early Kushan region and on its fringes (Dussubieux and Gratuze 2003: 318–319; 2013).

Glass canes and lumps could have been brought from the secondary workshops of Byzantine Alexandria and its surroundings, and could have been worked and finished (sliced, folded, pierced, marvered) locally (Francis 2007). As experimental studies show, it is likely that the glass could be melted in a crucible or heated in an iron pan and attached to a pontil (e.g., Aschenbrenner 1997; Sablerolles, Henderson, and Dijkman 1997). Berenike produced evidence of possible glass-working and beadmaking in the form of a drawn glass lump with attached traces of a metal pontil (BE94-001-002-PB9, personal observation), a glass chunk (BE94-001-003-PB10, personal observation), a glass slab (Kucharczyk 2011b: 92, Fig. 9-2), a fragment of a long red-coated translucent drawn glass tube (Zych 2011: Cat. No. 72), and a swirled red, black and white globular glass lump (BE11/999/PB021).

A large part of the late Roman glass bead assemblage could be of Indo-Pacific origin (Francis 2002a: 48). Monochrome beads made of drawn glass and characterized by more or less rounded ends (see below) stand in support of this hypothesis.

**Drawn glass beads**

Drawn tubes could be segmented on molds or pinched into single and multiple sets according to Mediterranean traditions (Francis 2002a). Such drawn beads with constricted ends as found at Berenike were monochrome, compound or composite glass.

**Drawn and segmented glass: monochrome**

Single and multiple-segment translucent blue beads from early Roman Berenike are the most common examples in this category of glass [Fig. 4:9].

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16 For some doubts on gold-in-glass bead production on Elephantine, see Arveiller-Dulong and Nenna 2011: 175, note 28. It should be said as well that there is no evidence for gold-in-glass bead production at Meroe.
In the **late Roman** Berenike the small drawn segmented beads range from 1.6 mm to about 5.0 mm in diameter. Glass tubes in red, dark blue and yellow were found in late contexts at Alexandria. These are also the most common colors of drawn segmented beads at late Berenike [Fig. 4:4–8] and the Lower Nubian sites (Then-Obluska forthcoming b).

Possibly pinched drawn beads are characterized by small perforations and appear in larger sizes, measuring up to 8.5 mm in diameter and up to 8.4 mm in length. They are of many colors: translucent dark blue [Fig. 4:12], opaque blue, opaque dark red [Fig. 4:11], translucent purple [Fig. 4:13] and opaque yellow.

**Drawn and segmented glass: bichrome and polychrome**

Many beads segmented from compound drawn glass tubes appeared during the early phase, at Berenike as well as at many contemporary sites. A drawn translucent green layer overlies an opaque light green one [Fig. 4:16]. Translucent colorless drawn tubes can be coated with a red [Fig. 4:18] or yellow layer [Fig. 4:17]. The red-over-colorless beads at Berenike have already been mentioned (Zych 2011: Cat. No. 72, Fig. 12-69) and are found at many Nubian sites dated to the Meroitic period (Then-Obluska 2015). Other types are represented by multiple segmented drawn beads of a translucent, dark layer covered with an opaque brownish one [Fig. 4:19].

Beads with a striped pattern over a monochrome glass core were recorded at Berenike and at many locations all over the ancient world [Fig. 4:20, 21]. These are generally dated to the early Roman period, about the 1st century AD (Zych 2011: 147, Cat. No. 75, Berenike; Dunham 1957: Fig. 89: 21-12-129b-6, Fig. 67,B; Boston, Museum of Fine Arts 24.768 Meroe; Mandruzzato 2008: 159, Aquileia type IX3; Spaer 2001: 117, Cat. 198 and references; Price 1992: 457, Fig. 353:15–16, Knossos; Vila 1967: Fig. X, No. 86, Aksha; Lankton 2003: 80 for later dating in the 2nd–4th century AD).

From early Roman contexts in Berenike stems a bead that gives the false impression of containing gold foil, but the effect is actually the result of the unusual high iridescence of its blue/green bands [Fig. 4:22]. The manufacturing method of the bead with a longitudinal manipulated wave pattern is not certain. It could be a drawn cane with opaque white and iridescent green/blue stripes applied. Although made of mosaic glass, otherwise called agate or ribbon glass, similar specimens are characterized by bands of gold foil covered by colorless glass (Lankton 2003: 56, Fig. 6.4; Spaer 2001: 109; Pellicer Catalán 1963: Fig. 22.23 from a Meroitic grave at Nag Shayeg, Nubia17). A similar specimen from Taxila, Pakistan, was ascribed to the 1st century AD (Beck 1941: Pl. IX,38).

**Drawn and segmented metal-in-glass**

Metal-in-glass beads from Egypt, Nubia and elsewhere, which are referenced in detail, belong in the drawn and segmented category (Arveiller-Dulong and Nenna 2011: 176 and references; Harlow 2000: Fig. 64m,r, for large gold-in-glass beads from a 4th century burial at Aksum).

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17 Madrid, The National Archaeological Museum, Inv. 1984-79.VI-16 o 1980-102-12; the beads are displayed in the Nubian part of their exhibition, personal observation.
Gold-in-glass beads were recently found in the “Utsukushi” burial mound dating from the 5th century AD in Nagaoka near Kyoto. Tests by the Nara National Research Institute for Cultural Properties have revealed that the three glass beads were probably made in the Roman Empire sometime between the 1st and 4th century AD (Tamura 2012).

A small drawn and single-segment gold-in-glass barrel bead was recorded already in a late Ptolemaic context in Berenike (BE10-63/65/002/PB002). Early Roman examples are represented by small and larger single-segment beads [Fig. 4:29], as well as double- and triple-segment beads [Fig. 4:26]. Elongated barrel-shaped bodies could have been associated with collars [Fig. 4:25] or, additionally, be fluted [Fig. 4:23] (Thiaudière 2010: Cat. 184, Saï, 1st to 3rd century AD). A flattened tabular gold-in-glass bead body is missing one collar [Fig. 4:24] (Alekseeva 1978: Fig. 26:70, Type 25, 1st to 3rd century AD). Collared beads belong to characteristic Hellenistic and early Roman gold-in-glass types and are found in contexts dated to the 1st–3rd centuries AD (Alekseeva 1978: 32, Type 22, Fig. 26:24; Arveiller-Dulong and Nenna 2011: 154, Cat. 199). They were also recorded from Yemen (Morrison 1991: 382).

In late Roman Berenike contexts, gold-in-glass beads appear as single- [Fig. 4:28], double- and octuple-segment beads. The latter is of much smaller diameter. Some beads appear as silver-in-glass [Fig. 4:30].

Drawn and rounded glass: monochrome

In contrast to the segmented Mediterranean type drawn beads, many drawn tubes may have been cut and more or less heat-rounded. A few such beads were noted in probably Ptolemaic loci (BE11-77/001/001–003). They were mainly in translucent dark blue color. The early Roman examples were dark blue, yellow, dark purple and opaque red [Fig. 4:41].

Monochrome drawn, cut and rounded beads were the most common glass bead type in late Berenike contexts (late Roman refuse dump in trench BE10-59) explored in season 2010 (637 objects) [Fig. 4:33–40], constituting 53.7% of all glass beads and 45.5% of all beads from late Berenike contexts in 2010. Semi-translucent and translucent green, usually translucent light blue/green, semi-translucent yellow and opaque yellow dominate the color palette. Other colors include opaque orange, black, opaque dark red, white translucent dark blue, and amber. The blue/green and orange are usually very tiny beads, 2 mm or smaller in diameter. The remaining ones range from approximately 2 mm to 5 mm in diameter.

Beads with rounded ends were common finds on the Indian subcontinent (e.g., Francis 2002a; Kanungo and Brill 2009: 16–17, Fig. 8). The color palette of Sri Lankan beads has been noted in the Egyptian Nile Valley (Arveiller-Dulong and Nenna 2011: 182 Cat. 224:1, 187 Cat. 231:24, 26, 28, 30, 33, 35, 37, 39, 188 Cat. 232 described as green stone or
List of beads illustrated in Fig. 4, giving context, material and dimensions in mm
Abbreviations: W – width, L – length, T – thickness, D – diameter, HD – hole diameter

**Egyptian glass and metal-in-glass:** drawn and segmented

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<th>Dimensions (mm)</th>
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</tr>
<tr>
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<td>4. BE10-59/004/PB030</td>
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<td>5. BE10-59/001/PB003</td>
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**South Indian/Sri Lankan(?) glass:** drawn, cut and rounded

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</table>
Fig. 4. Beads: 1–30 – Egyptian glass and metal-in-glass: drawn and segmented; 31–41 – South Indian/Sri Lankan (?) glass: drawn, cut and rounded (Photos J. Then-Obluska)
glass of Egyptian production), as well as at many Nubian Nile Valley sites (Then-Obłuska forthcoming b). Indian/Sri Lankan glass beads are said to be found at 4th century Aksum and Matara (Harlow 2000: Figs 62c, 64q,t, 65a 4th century burial at Aksum). Last but not least, such beads have been confirmed by chemical laboratory analyses from Merovingian (5th–7th centuries AD) burials in France (Poulain, Scuillier, and Gratute 2013; see below for more references).

Rod-formed glass
Wound glass: monochrome
The early Roman wound glass beads are represented by spheres [Fig. 5:2] and faceted hexagonal cylinders [Fig. 5:4] (Zych 2011: 148, Cat. No. 81; Meyer 1992: Fig. 14, No. 372 Quseir). Monochrome wound biconical blue beads can be covered with silver iridescence [Fig. 5:3]. The latter kind are known from the early Roman period (Lankton 2003: Fig. 6.0: 564; Zych 2011: 146, Cat. No. 70, Fig. 12-67).

In one case a translucent light green glass was marvered on one side and shaped into a scarab with details of the beetle’s physiognomy defined, including the wing case [Fig. 5:5]. Such amulets of mosaic glass analogically shaped into scarabs were known from the Hellenistic and Roman periods (Arveiller-Dulong and Nenna 2011: 288–289; Malloy 1974: Nos 14–15 [Christie’s Lot 347]).

The layers behind the wall of the “Lotus Temple” yielded many over-fired beads (the set included already discussed early Roman collared [Fig. 4:24] and late Roman drawn and rounded glass beads), as well as pendants and their fragments. One burnt, complete example of a large glass pendant shows a spherical wound body with attached loop [Fig. 5:1]. Specimens similar in shape and size come from a Middle Imperial period Palmyrene grave (Higuchi and Izumi 1994: 91, Fig. 67, 47), from a grave in Tyre (Chéhab 1986: Fig. XXXVII, 170, beginning of 2nd–first quarter of 4th century AD), and from the late Roman and Byzantine necropolis at Khirbat Yajuz in northern Jordan (Eger and Khalil 2013: 167, Pl. 3.23). Large spherical bases with attached loops made of black glass (W. 18–24 mm, H. 23–32 mm) come from 3rd century AD Braga, Portugal (da Cruz 2009: Fig. 3: 4.1.1– 4.1.4).  

Distinctive wound dark blue single and double-coiled rings [Fig. 5:7, 9] recorded from the late Roman phase of Berenike were also found at Blemmyan, Nobadian (Chicago, The Oriental Institute Museum, Inv. OIM 42035, about AD 330/340–370/380; Strouhal 1984: Fig. 151, P 3039) and Aksumite sites (Harlow 2000: Figs 192e,d).

Among the late Roman rod-formed objects, fragments of two types of pendants can be identified. A dark blue rim

18 Different examples come from the late Roman period in Egypt (Arveiller-Dulong and Nenna 2011: 232–233, Cat. No. 314.17 black body with spotted decoration, late Roman period), the Black Sea region (Alekseeva 1978: 74, Fig. 34:33, Type 192, 4th century AD, made with the same technique, but much smaller than the Berenike examples), Palestine (California Institute of World Archaeology [CIWA] GLS.VS.00691, Palestine AD 400–500, www.virtual-egyptian-museum.org), and from Egyptian Tell Dafana (Petrie 1888: 79; British Museum No. 1887, 1220.2). Smaller in size, transparent glass pendants with conical and globular bases and attached loops were collected from various plundered tombs at the Meroitic cemetery in Karanog/Aniba (Woolley and Randall-MacIver 1910: 258, Object 7935; Silverman 1997: 302–303 and Penn Museum, Inv. E7925).
with a fragment of a handle [Fig. 5:14] was part of a rod-formed miniature juglet pendant usually dated to the 4th and the beginning of the 5th century AD (Arveiller-Dulong and Nenna 2011: 64–72; Schlick-Nolte 2002: 78, No. V-33a–f; Mandruzzato 2008: 74–75; Spaer 2001: 178). A broken-off ribbed loop, which was fused over a rod [Fig. 5:13], most probably protruded once from a disk pendant formed in a mold (Spaer 2001: 187, Cat. 424).

**Wound glass: bichrome and polychrome.**

In some wound beads from the **Ptolemaic and early Roman** period stratified eyes were inserted into the translucent [Fig. 5:17] or light blue body [Fig. 5:16]. In both examples the eyes were made with alternating, three white and two translucent layers, and a central blue translucent spot. Stratified eyes applied on blue cores, but with seven eyes, were popular in the Late Period, Ptolemaic and early Roman period in Egypt (Arveiller-Dulong and Nenna 2011: 168–169, Cat. No. 209.2 6th–3rd century BC, 220–221, Cat. Nos 299.26, 72, 74, 79, 1st century BC–1st century AD) and in the Meroitic period in Nubia (Dunham 1963: 152, Fig. S, Type Xij; W 159 (50–55)?). Examples from the Northern Black Sea region were also dated from the 1st century BC to the 1st century AD (Alekseeva 1975: Type 68, Pl. 14:21–23). Similar wound glass beads with stratified eyes were recorded from Taxila, Pakistan (Beck 1941: Pl. I:14), from Persepolis, Iran (Dubin 2009: 382, note II, Object 23, Pl. 334, Fig. 23 300 BC), from Xu Jialing, China (Gan et al. 2009: Fig. 24.1 500BC), Niya in Xinjiang, China (Lin 2010: 204, Fig. 4, 1st century BC–4th century AD), and Sen-Mu-Sai-Mu grotto site, Kuche county, China (Liu et al. 2012: Fig. 2: XJ-34, later 2nd century AD to early 3rd century AD, Eastern Han Dynasty). The latter fell in a chemical compositional group defined for Sasanian glass (Liu et al. 2012: 2137).

The eye bead in **Fig. 5:15** was made of a wound, white opaque body and decorated with three applied blue spots. A bead like it was also found at Meroitic Ballaňa, in a grave dated to the end of the 1st century AD (Chicago, The Oriental Institute Museum, personal observation).

Some elongated beads of translucent brown glass have a white central trail applied [Fig. 5:21]. Interestingly, such long beads with a central white trail are displayed in women’s necklaces on painted plaster masks from Egypt (Walker 2000: Cat. Nos 137, 141–142, about AD 100).

A late Roman cylindrical black, rod-formed, wound pendant fragment with centrally placed loop or loops, now broken off, was trail-decorated. The yellow trail was spirally applied in straight lines around the ends with a diagonal line in the center [Fig. 5:20]. It measured 6.4 mm in diameter and 17.44 mm in preserved length. Similar examples have been dated to the 4th century AD (Mandruzzato 2008: 79, No. 153; Spaer 2001: 102, Fig. 47).

Two outstanding objects are fragments of another type of ‘eye’ bead [Fig. 5:18, 19]. These are round, tabular eye beads composed of a translucent purple core, with a white round disk attached on both sides, and decorated with one large, purple glass dot in the center. Although no direct parallel has been found, the beads seem to be similar to one from Veshnaveh, Iran (Bagherpour Kashani 2014: 103, Plate 11, ChG 1847 and references) and they are an imitation.
List of beads illustrated in Fig. 5, giving context, material and dimensions in mm
Abbreviations: W – width, L – length, T – thickness, D – diameter, HD – hole diameter

Egyptian/Middle Eastern glass

Rod-formed

1. BE11-70/030/PB044
   T18.4, H24.3, HD3.5
2. BE10-65/004/PB004
   D6.7, L6.8, HD1.3
3. BE11-77/999/PB013
   D7, L6, HD2; 1.2
4. BE10-58/003/PB003
   D7, L12, HD1.5; 2.8
5. BE11-77/001/PB003
   W6.4, T4.2, L7.7, HD1.7
6. BE10-59/004/PB032
   D6.9, L6.6, HD2.5
7. BE10-59/001/PB015
   D6.6, L3, HD3.4
8. BE10-59/999/PB011
   D4.7, L14.2, HD1.7
9. BE10-59/004/PB032
   D13.2, L11, HD4.7
10. BE10-59/999/PB011
    W5.6, T4.5, L9, HD2.5; 1
11. BE10-59/001/PB008
    W6.4, T4.5, L8.5, HD1.8; 0.7
12. BE10-59/001/PB018
    W7.4, T4.6, L10.2, HD2.4; 1.3
13. BE10-59/002/PB020
    W16, T14.8, H11.7, HD6x4
14. BE10-59/001/PB014
    D10.2, HD0.9
15. BE11-73/002/PB002
    D8.6, L7.6, HD2.5
16. BE11-999
    D7, L8, HD approx. 2
17. BE11-76/999/PB021
    D7.7, L6.4, HD2.7
18. BE10-59/001/PB015
    D8, T3.4, L5.8, HD1.5; 1.3
19. BE10-59/001/PB007
    D6.6, L6.4, HD2.9
20. BE10-59/999/PB011
    D6.4–8.1, L17.4-preserved, HD3.6
21. BE11-78/003/PB004
    D6.7, L20, HD1.5
22. BE10-59/002/PB019
    D8.2, L7.7, HD2.5; 3.2
23. BE10-59/002/PB019
    D5.6, L6.3, HD1.0; 2.0
24. BE09-57/008/PB018
    D6.5, L6.8, HD2.1; 2.7
25. BE11-79/001/PB004
    D5.3, L5.1, HD0.8; 1.6
26. BE11-74/004/PB006
    D6.6, L8.3, HD1.6; 2.3
27. BE10-58/002/PB006
    D5.7, L12.2, HD1.6
28. BE10-59/001/PB009
    D5.7, L5.6, HD1.5; 1.8
29. BE12-84/008/PB020
    D5.4, L4.3, HD1.3; 1.9
30. BE10-59/001/PB017
    D3.4, L3.7, HD1.4; 1.9
31. BE10-59/001/PB001
    D5.1, L5.1, HD1.4; 2.1
32. BE10-59/001/PB008
    D3.3, L3.0, HD1.7
33. BE10-59/001/PB018
    D6.0, L6.1, HD1.8; 2.1
34. BE10-59/001/PB016
    T4.8, H6.3-preserved, HD0.9
35. BE10-59/001/PB007
    D5.6, L4.1, HD1.0; 1.5
36. BE10-59/001/PB007
    D3.8, L3.7, HD1.6; 2.0
37. BE10-59/004/PB032
    W9.0, T3.5, L7.7, HD1.7; 2.5
38. BE10-59/999/PB011
    W7.4, T4.1, L7.0, HD1.2; 2.3
39. BE10-58/002/PB002
    W9.0, T3.6, L9.0, HD1.7
40. BE12-80/006/PB018
    W11.3, T6.0, L10.1, HD1.5; 2.0
41. BE12-80/006/PB018
    W10.7, T4.3, L11.4, HD 1.2; 2.0
42. BE10-58/002/PB002
    D5.4, L8.6, HD1.8; 2.5

Rod-pierced

30. BE10-59/001/PB017
    D3.4, L3.7, HD1.4; 1.9
31. BE10-59/001/PB001
    D5.1, L5.1, HD1.4; 2.1
32. BE10-59/001/PB008
    D3.3, L3.0, HD1.7
33. BE10-59/001/PB018
    D6.0, L6.1, HD1.8; 2.1
34. BE10-59/001/PB016
    T4.8, H6.3-preserved, HD0.9
35. BE10-59/001/PB007
    D5.6, L4.1, HD1.0; 1.5
36. BE10-59/001/PB007
    D3.8, L3.7, HD1.6; 2.0
37. BE10-59/004/PB032
    W9.0, T3.5, L7.7, HD1.7; 2.5
38. BE10-59/999/PB011
    W7.4, T4.1, L7.0, HD1.2; 2.3
39. BE10-58/002/PB002
    W9.0, T3.6, L9.0, HD1.7
40. BE12-80/006/PB018
    W11.3, T6.0, L10.1, HD1.5; 2.0
41. BE12-80/006/PB018
    W10.7, T4.3, L11.4, HD 1.2; 2.0
42. BE10-58/002/PB002
    D5.4, L8.6, HD1.8; 2.5
Fig. 5. Beads of Egyptian/Middle Eastern glass: 1–29 – rod-formed; 30–42 – rod-pierced (Photos J. Then-Obłuska)
of objects known from Persian assemblages (Stöllner, Slotta, and Vatandoust 2004: 675, Cat. 291d “Parthisch/sassanidisch”).

Folded glass: monochrome
Many of the late Roman monochrome glass beads from Berenike seem to be folded and marveled into biconical shapes. Among them are short-, standard- and long bicones [Fig. 5:22, 23], as well as oblates.

Folded glass: bichrome and polychrome
Compared to their rod-pierced counterparts (compare below, Fig. 5:42), folded green-yellow ‘date beads’ [Fig. 5:26] were common finds in Egypt, including Alexandria and Berenike, as well as in Nubia, but they seldom occurred elsewhere (Lankton 2003: 58; Kucharczyk 2011a: 66, Fig. 8:9 folded ‘date bead’ from Alexandria, from a layer dated to the 2nd–3rd century AD; Francis 2002b: 15, Fig. 1; Arveiller-Dulong and Nenna 2011: 176, Cat. 224.4; Spaer 2001: 102, 111–112, Cat. 160a–c, 161, early 2nd century AD; Winter 2013: 19, Fig. 3:2 for late Roman and Byzantine period examples).

Zone beads are mosaic strips with central white bands. They were simply folded around a rod, which resulted in a visible, single longitudinal seam. A few such beads were found in early Berenike contexts [Fig. 5:24] (Zych 2011: 145, Cat. Nos 68a–e, 69). They are usually dated to the 1st–2nd century AD and can be found as far as the Black Sea (Alekseeva 1978: Fig. 27:3) and Taxila in Pakistan (Beck 1941: Fig. IX:29, 1st century AD blue and white bead).

A blue bead with central white trail was made by folding a decorated glass strip [Fig. 5:25]. From early Berenike comes a colorful striped mosaic strip folded into elongated beads [Fig. 5:27]. Similar examples were recorded from early Roman contexts (Lankton 2003: 65, Fig. 7.2; Alekseeva 1978: Fig. 27). A mosaic strip with red background and white-bordered black eyes was folded into a globular bead [Fig. 5:29]. Similar beads have been dated to the 1st–2nd century AD.

A few late Roman Berenike beads were made of folded purple strips decorated with an irregularly and deeply applied white trail [Fig. 5:28] (see Stöllner, Slotta, and Vatandoust 2004: 675, Cat. 290g for a similar bead from Parthian/Sassanid Persia).

Rod-pierced glass
Rod-pierced glass: monochrome
Oblate transparent beads, made by rod-piercing followed by folding, are found in early Berenike levels (BE11-74/004/PB006) and are a common type at Nubian Sai in the Meroitic period, the 1st–3rd century AD (personal observation).

Many glass blobs, most probably pierced and then folded around a rod, were found dating to the late Roman phase. They could be shaped into oblates [Fig. 5:31] or additionally marvered (i.e., pressed onto a flat surface) resulting in biconical, and square biconical shapes. A similar translucent, purple bicone found at Qustul was dated to the late 4th century (about AD 370/380–410) (Chicago, The Oriental Institute Museum, Inv. OIM 20257, personal observation).

19 For a Persian tabular glass eye bead, see van der Sleen 1973: 66, Pl. II, Fig. 21.
20 They look rather like lotus buds as observed on New Kingdom faience objects (e.g., Friedman 1998: 86).
Cross-cultural bead encounters at the Red Sea port site of Berenike, Egypt...

Among faceted glass beads at Berenike, the ‘cornerless cube’ (a shape made up of four faceted lozenges and eight triangles) is the most common [Fig. 5:30, 32]. Cornerless cube beads were made using many techniques (they could be wound or rod-pierced, folded and marvered) and in a variety of colors, mostly in dark blue, purple, and green. They have been found in deep blue or green colors at numerous excavations, obviously imitating precious stone. Many are found interspersed on gold chains (Spaer 2001: 74, Cat. 48–49). In Lower Nubia, glass ‘cornerless cubes’ appeared in the Meroitic period (Williams 1991a: Fig. 47c,f; Part 2, Fig. 63 b,s; Dunham 1963: Fig. 5-VIIIe) and their use continued into the next few centuries (Brunton 1930: Fig. 40:50; Arveiller-Dulong and Nenna 2011: Cat. Nos. 224:15, 230:4, 244–245, 246–247; Woolley and Randall-Maclver 1910: Fig. 40:8010, 7837, 7868, 7826B, 7766, Boston, Museum of Fine Arts, Inv. 42.14). Opaque red “rectangular beads with a square cross-section and chamfered corners” were found with a 4th century AD Axum burial (Harlow 2000: Fig. 64k,l).

Among rod-pierced pendants, a fragment of one blue glass tear-drop was preserved [Fig. 5:34]. Such rod-pierced glass pendants can be observed in the post-Meroitic Nobadian repertoire (Then-Obluska forthcoming b).

Rod-pierced glass: bichrome and polychrome

The term ‘flower’ bead represents rod-pierced and marvered mosaic cane sections.21 They are tabular and rounded or heart-shaped, slightly compressed at the point of perforation. One with a red center and irregular radial, crowded white and blue petals has been found in an early Berenike context [Fig. 5:39].22

Face beads, which are mosaic beads with a human portrait,23 are represented by two tabular24 rod-pierced mosaic cane sections [Fig. 5:40, 41]. Many beads with face25 designs are found throughout the ancient world and they are usually dated to about the 1st century AD (e.g., Alekseeva 1982: Pl. 48; Arveiller-Dulong and Nenna 2011: 177 and references; Bianchi and Schlick-Nolte 2002: 149–150, EG-34-bis a–h; Spaer 2001: 124 and references; Dunham 1957: Beg. N.XV, Fig. 89, 21-12-130d, MFA 21.12473.4; Beg. N.XV, Fig. 89, 21-12-129b-2, MFA 24.764; 1963: Tomb Beg. W 165b, 23.788; Woolley and Randall-Maclver 1910: 75; Lankton 2003: 57, Fig. 6.7 and references; Stern and Schlick-Nolte 1994: 414–415, No. 155-6; Goldstein 1979: 274, No. 820; Cooney 1976: 138, Cat. 1711; Haerinck 2001: Pl. 116:212; Nenna 1999: 186; Antonini 1999: 64, Fig. 19; Antonini de Magret 2012: Fig. 98 Barâqish, Yemen, temple of Nakrah; Dubin 2009: 60–61; Witecka 1994: 80–81, Pls II:12, V:1; Manzo 2005: 54, Fig. 8; Säve-Söderbergh 1981: Pl. 97:4; Buljević 2002: 318, Cat. 7, tabular face bead found in one of the few not looted graves in the Western necropolis in Split, Archaeological Museum in Split, No. 19).

A necklace made from rod-pierced tabular mosaic face beads was found with

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21 For the difference in the terms mosaic and millefiori glass, see Spaer 2001: 312–313.
22 For other early Roman patterns of so-called flower beads, see Then-Obluska 2014b.
23 For different ‘theater mask’ glass, see Mahnke 2008 and, e.g., Antonaras 2012: Cat. 472–474.
24 For spherical beads with mosaic face strips, see, e.g., Arveiller-Dulong and Nenna 2011: 177 and references.
25 For interpretation of face beads, including a Medusa head, see, e.g., Lankton 2003: 57; Liu 2014.
The rich bead assemblage that was excavated at Berenike in the 2009–2012 seasons demonstrates not only a wide range of short- and long-distance contacts, but also confirms the diversity of a cosmopolitan port society, and the intense inter-
actions of Berenike with her neighbors in the early and late periods.

Preliminary results suggest that the patterns from the Ptolemaic period may be slightly different, comprising overwhelming quantities of faience beads, some Egyptian and a few Indo-Pacific glass beads. Moreover, Eastern Desert agate beads with sawing traces, an ostrich eggshell disk, the Red Sea worked shell, and the Zabargad peridot were also recorded. The presence of assorted marine and terrestrial organics, stones and semi-precious stones in the bead assemblage points to the substantial influence of the Red Sea and the Arabian Sea coastal and inland desert dwellers in all periods of Berenike occupation. Agatharchides of Cnidus, writing in the 2nd century AD, mentioned Ichthyophagoi, Elephanto-phagoi, Kreophagoi, Rhizophagoi, Spermaphagoi, Strouthophagoi and Troglo-dytes as Eastern Desert dwellers (Burstein 1989). Their contacts with port communities sites are confirmed not only in the written sources (Tomber 2005; Thomas 2007; Nalesini 2012), but also in the dispersion of their regional products. Taking under consideration their names, they must have had access to diverse natural resources and geographic spaces, which they most probably shared (Nalesini 2012: 77). Interestingly, Troglo-dytes were associated in the sources with the discovery of peridot at Zabargad Island (Pliny, NH 37.32). Troglo-dytes traded gems and carbuncles or carnelian were traded by the Garamantes (Wilson 2012: 416). Turtle shell was associated in textual sources with the activity of a Red Sea littoral society, the Ichthyophagoi (Peripl. M. Eryth. 4), who brought it to Adulis, a principal mart for the Troglo-dytes (Pliny, NH 6.34). Moreover, the Ichthyophagoi provided fish to inland Roman desert sites (Thomas 2007: 151) and most probably also seashells, which were worn as amulets by Troglo-dytes women (Nalesini 2012: 77). It might have been both the coastal Ichthyophagoi and Troglo-dytes middlemen who were responsible for providing the ports in Adulis, Berenike and Quseir with live turtles or turtle shells.

This maritime-derived material culture is shared not only by the Red Sea (Hamilton-Dyer 2011a; Thomas 2007), but also by Arabian Sea coastal sites. Worked seashell disks, short cylinders and cones from the early Roman bead assemblages in the Red Sea ports are almost lacking in those recorded from the Nile Valley, but they are especially characteristic along the South Arabian Peninsula in Yemen and Oman, at sites which have attested maritime contacts with Indians, Parthians, and Romans during the period we are concerned with here. In addition lens-shaped garnet beads have been recognized at Berenike and in Yemen, and pearls are said to have come from the Persian Gulf (Casson 1989: 85). On the other hand, many of the Eastern Mediterranean/Egyptian glass beads can be recognized from Arabian sites (e.g., De Maigret and Antonini 2005; De Waele 2007; Corboud et al. 1996; Morrison 1991; Jasim 2006). Last but not least, the presence of South Arabian pottery at Berenike (Tomber 2008; 2011; 2012), and a papyrus letter to a mother at Berenike from her son who was returning from Arabia, would confirm the on-going contacts between Arabia and Berenike (Sidebotham and Wendrich 2002: 41).

There is only one mention in literary sources indicating that glass beads were
most probably part of an overseas trade at this time, and that they were destined for local inhabitants. According to the *Periplus Maris Erythraei* (6), Adulis was a market for articles destined not only for the local dwellers (called Barbaroi) and the resident foreign merchants, but also for the king. “...numerous types of glass stones [probably beads?] and also of glass in many colors of the kind produced in Diospolis...; copper honey pans for ... cutting up into armlets and anklets for certain of the women...” seem to be intended for the local dwellers. According to Eivind Heldaas Seland (2010: 36), this text attests to a lively Adulis trade in everyday articles such as glass beads and inexpensive jewelry. However, “glass stones” could be interpreted as glass canes and ingots which would pass through Berenike’s port before reaching overseas marts. Although Alexandria is reputedly a source of mosaic glass in the early Roman period, Diospolis Magna was another possible candidate. These early Roman mosaic glass beads have been found throughout the Roman world and far beyond (e.g., Then-Obłuska 2014b). While early Kushan Bara glass beads and other (Dussubieux and Gratuze 2003; Liu et al. 2012; Lin 2010: 209) could not be confirmed from Berenike simply by macroscopic study, the Sri Lankan/ South Asian monochrome drawn bead has been laboratory-evidenced at Red Sea Quseir (Then-Obłuska and Dussubieux forthcoming).

According to Appian of Alexandria (2nd century AD), Palmyrene traders brought Indian and Arabian goods from the Persians and distributed them in Roman territory (Parker 2008: 182). Parallels for glass pendants, similar to the over-fired remains found at Berenike, come from Roman and early Byzantine Palestinian and Syrian burial sites, including Palmyra. There is evidence of Palmyrene activity at the Berenike site at the beginning of the 3rd century AD (Sidebotham, Hense, and Nouwens 2008: 137–139, 354; Sidebotham 2011: 74).

The distribution of Sasanian objects in the late Roman period might have been partly in Arabian hands (Power 2012). Although no direct parallel has been found for glass tabular white and purple “eye” beads, they seem to be imitations of objects known from Iranian bead assemblages (Stöllner, Slotta, and Vatandoust 2004: 675, Cat. 291d, “Parthisch/sassanidisch”). Similar stone “cat’s eye” onyx inlays were used as eyes in the gold terminal of a bull’s head (H. 6 cm, W. 4.1 cm, Th. 2.7 cm) and in gold roundels as seen in the British Museum’s Yemeni collection (Simpson 2002: 122, Cat. 137). Nevertheless, similar glass beads were found from Veshnaveh, Iran (Bagherpour Kashani 2014: Pl. 11, ChG 1847). While pottery and a few cut glass fragments found at Berenike indicate the presence of Sasanian objects (R. Tomber, personal communication; Kucharczyk 2011b: 110, Cat. Nos 69, 70, Figs 9–31, 32), the Sasanian provenance of the above-mentioned glass beads should be treated with caution. Nevertheless, the bead made of Sasanian glass as found at Quseir (Then-Obłuska and Dussubieux forthcoming) and the find of an ‘etched’ carnelian bead in a late 4th–5th century burial in the Nubian Fourth Cataract region provide some evidence of contacts between Northeast Africa and Iran (Then-Obłuska 2013a).

Many types of beads and pendants found at Berenike would support the idea of close contacts between the Nubian Nile
Valley and Berenike during the late period. Finds of ostrich eggshell beads as well as Red Sea mollusk shells and coral beads and pendants in late Roman Berenike contexts can be associated with the activity of Eastern Desert dwellers between the Nile and the Red Sea coast. At this time the high percentage of ostrich eggshell beads and seashell pendants at Berenike is comparable with Nubian Nile Valley assemblages (Then-Obłuska 2014a). Ostrich eggshell beads are especially common in burials ascribed to Nobadians and Blemmyes (Then-Obłuska forthcoming b). Textual sources attest to intensive diplomatic contacts between the Blemmyes and their neighbors (e.g., Updegraff 1988; Dijkstra 2005; Obluski 2013; 2014). The Blemmyan Eastern Desert dwellers seem to have been excellent at playing the role of middlemen between the Nobadian Nile Valley and cosmopolitan Berenike. Their pottery, the so-called Eastern Desert Ware, is recorded in all the strategic regions: the Red Sea ports, the Eastern Desert and the Nile Valley up to the Fourth Cataract region (Barnard 2008). They played an important role in the Red Sea trade centered on the harbor of Berenike (Dijkstra 2005: 48). For example, their association with an Alexandrian merchant is recorded in the Historia Augusta (Firmus, 3.3), which recounts that in the second half of the 3rd century AD, Firmus, a wealthy merchant from Alexandria, made his money in the Red Sea ‘Indian trade’ and was rumored to have contacts among the Blemmyes (Power 2012: 24). According to Olympiodorus of Thebes, they controlled the emerald mines at Mons Smaragdus, and later on they provided the ‘Ethiopians’ with emeralds for their trade with India. The Blemmyes served as guides for those passing from Nobadia through Makuria’s dessert terrains (Then-Obluska 2013a). Therefore, the presence of some stone and glass bead types, seashell pendants and ostrich eggshell beads at late Berenike and at Nubian sites is not surprising, and most probably was a result of Blemmyan activity between the Red Sea coastline and the Nile Valley. The Blemmyes may also be responsible for providing the Nubian Nile Valley dwellers with stone and glass beads which are said to be of Asian provenance.

Stone beads drilled from both ends became more common in late Roman Berenike and Nubia. They might have been perforated with diamond chip drills, a technology of Indian origin (Kenoyer 2003). Indo-Pacific drawn glass beads have been recognized at many sites on the maritime routes along the African and Arabian coastlines to India and far beyond (e.g., Francis 2002a; Lischi and Pavan 2012; Jiayao 2000; Lin 2010: 208; Brabänder 2010 and references). Judging from the Nile Valley and Eastern Desert bead assemblages, there must have been a great demand for glass beads in the late Roman period (Francis 2000; 2002a; 2007; Then-Obluska 2014a). Although glass bead workshops are known from late Roman Alexandria, some glass fragments and manufacturing debris suggest local bead production at Berenike. Nevertheless, late Roman and early Byzantine glass bead assemblages in Berenike and late Roman Marsa Nakari are dominated by possible Indo-Pacific beads. At Berenike some of them were found originally strung as uniform necklaces and their fragments. They might also have been imported and distributed in this way.

It has been recognized that Indian craft techniques were used on both
locally available and Indian materials at Berenike and Myos Hormos (Sidebotham 2011: 261–262). As literary sources and archaeological remains prove, ports were the place for many types of foreign trade diasporas with residents marrying abroad or settling to carry on trade or work in the crafts (Tomber 2008: 223; Seland 2010; 2012; 2013; 2014). The transfer of craftsmen has been suggested for specializations like elephant trainers or iron smelters (Haaland 2013: 152; 2014). Indian craftsmen and influences seem to be involved in the building projects of Meroitic Nubia, where reliefs of Indian-inspired, hybrid depictions of the local Meroitic lion god, Apedemak, can be observed (Haaland 2013: 152; 2014). According to Peter Francis (2002a; Howard 2012), glass bead makers from Arikamedu moved along the Indo-Pacific maritime routes. The question is if they could have been present at Berenike and involved with the production of monochrome drawn and rounded glass beads. No evidence for this has yet been found so it appears likely that these beads were imported.

ACKNOWLEDGMENTS

I would like to thank Iwona Zych and Professor Steven E. Sidebotham, co-directors of the Polish Centre of Mediterranean Archaeology, University of Warsaw/University of Delaware Berenike Project, for making the study possible. I am particularly grateful to Dr. Sheila Hamilton-Dyer (organics), Artur Buczkowski and Dr. Sławomir Boroń (mollusk shells), Professor Karen A. Björndal (turtle shell), Dr. Henk K. Mienis, Dr. Matthew Richmond (coral) and Dr. Anthony Rouphael for their help in species identification. I would like to express my great gratitude to Dr. Roberta Tomber, Dr. Marilee Wood, and Prof. James A. Harrell for their valuable comments, suggestions and discussions. Many thanks go to Dr. Carol Meyer for sharing chapters of her publication of the Bir Umm Fawakhir small finds, as well as to Renata Kucharczyk and Dr. Bruce B. Williams for their support in literature collection. I am especially indebted to Dr. Lisa A. Heidorn for editing the English text of my article. The vast comparative study was possible thanks to the National Science Center grant DEC-2013/09/D/HS3/04508.

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Cross-cultural bead encounters at the Red Sea port site of Berenike, Egypt...


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