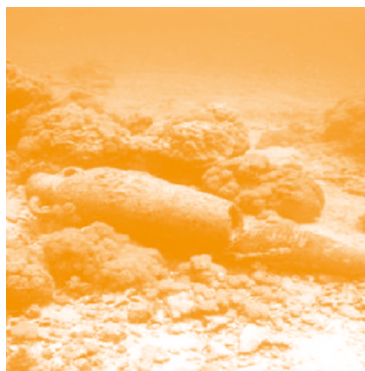


# Roads of Arabia: New finds of Aqaba amphorae in the Red Sea from a newly discovered wreck site at Jeddah/Eliza shoals



**Abstract:** This paper concerns a probable shipwreck cargo of Aqaba amphorae, which was discovered during the second season of a survey project along the Saudi Arabian coast, initiated by nautical archaeologists from Philipps-University Marburg and conducted in cooperation with members of the Saudi Commission for Tourism and Heritage in the autumn of 2013. Seafaring and sea trade was, according to the few ancient sources and the results of modern research, a hazardous endeavor in antiquity. Transport containers, like the Aqaba amphorae, played a major role in this trade—significant numbers of these vessels have been detected on various sites along the Red Sea coast and its hinterland. The chronological classification is far from complete and recent archaeometrical investigations help to clarify the logistical aspects of the production and distribution of Aqaba amphorae. Finding remains of Aqaba amphorae at a supposed shipwreck site close to Jeddah delivers new insight into the maritime routes and activities along the western coast of Saudi Arabia. The documentary material currently available is the baseline for further research in the field of maritime archaeology as it pertains to trade in the Red Sea.

**Keywords:** Red Sea, shipwreck, Jeddah/Eliza Shoals, Aqaba amphorae, maritime archaeology

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**Note**

For the Marburg–SCTH project site see <https://www.uni-marburg.de/de/fb06/archaeologie/forschung/laufende-projekte/saudi-arabien>

The second survey campaign of the Marburg–SCTH project took place off the coast of Jeddah from September 18 to October 2, 2013. The first campaign, in 2012, had been focused mainly on underwater archaeological research at selected reefs in the area of the Eliza Shoals northwest of Jeddah. The areas chosen for investigation were the reefs dependent

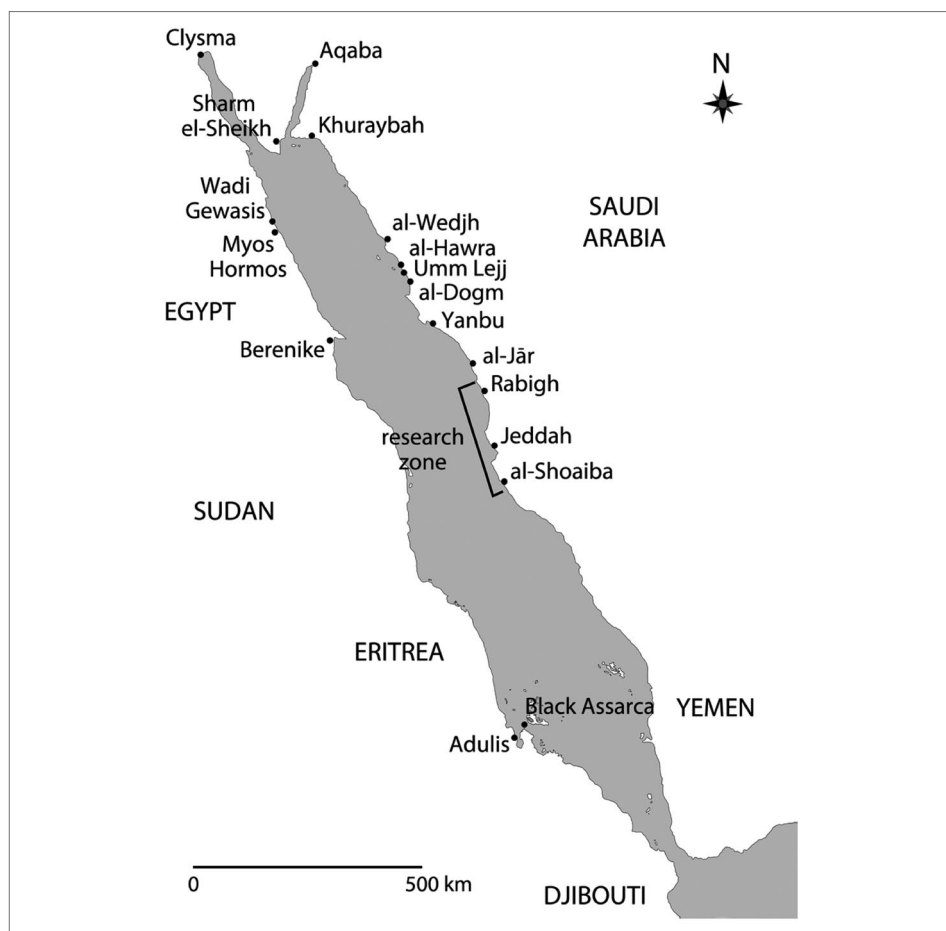
on possible sailing routes, known or otherwise hypothetical hazardous areas, and modern wreck spots. During this second campaign, a number of previously visited dive sites were further investigated, samples for examination were retrieved and treated for closer examination at the laboratories of the King Saud University in Riyadh.

## METHODOLOGY AND RESEARCH APPROACH

The program “Seafaring and trade in the Red Sea” focuses on the systematic mapping and documentation of archaeologically relevant sites in the area between Rabigh and Al-Shu’ayba, a range of approximately 120 M north to south. To cover an area of this size, several different survey techniques were applied. Preliminary work consisted of consulting written reports, both modern and historical. The historical background of seafaring activities in the area is rather limited, as has been described in other reports (see, among others, Pedersen 2015; Pedersen and Brandmeier 2016). For modern sources of information the survey team relied on reports from the professional diving community, recreational divers, Navy, Coast Guard and fishermen’s reports. The first season in March 2012 was a preliminary effort to assess the area for sites, determine the research environment, and formulate the logistics for continued investigation. Based on the British Admiralty Charts (BA 158/2659), the survey area for the second season was originally slated for the zone reaching from Sharm Abhur southward to the area of Shi’b Mismari, but for security reasons this could not

be done. Surveying was conducted over an 11-day period via scuba diving from a 25-m-dive-operation boat by visual means only, without the use of remote sensing equipment or other technologically advanced gear.

Dives lasted as long as 45 minutes, which is what single-tank diving with compressed air allows. Tow diving, also called “trawling,” in which divers are slowly towed behind a boat on lines, utilized during the first season to cover large areas, had to be abandoned due to the smaller scale of the environs in the second season. This time, because of predominantly mid-sized reefs, swimlines and circular search patterns, grid and jackstay searches were applied in the canyons and pin-needle-shaped reef structures. The dive crew was split up into groups of 2–3 divers, each group composed of an experienced archaeological research diver and a novice diver from the SCTH. Operational depth of the survey dives varied between 10 m and 30 m with an emphasis on 12 m. Initiating the individual dive from a prominent point above the waterline (mostly coral heads), the reconnaissance team scouted a certain distance under



▲ Fig. 1. Map of harbors and anchorages (After Pedersen 2015)



◀ Fig. 2. Distribution of submerged Aqaba amphorae (After Pedersen 2015)

water and—depending on air supply or nitrogen saturation—continued until a turning point, at which the divers began their way back to the dive boat, leaving positioned small colored. These colored buoys served as markers for the subsequent geo-positioning of the surveyed area via GPS. This method, low cost and relatively easy to apply even for beginners, facilitated a precise course tracking of the team in the water (accuracy of methodology, quality control and safety of dive team) and enabled a detailed and systematic scanning of the sites. The data was cartographically documented (electronically and manually for possible back-up restore scenarios) and recorded for later analysis (see detailed description in Reinfeld and Held in print).

The Red Sea has an above average salinity compared to other seas and oceans, which is due to the lack of permanent rivers, little rainfall and continual solar evaporation (Whitewright 2007). This together with constant warm-water temperatures has fostered strong coral growth over the centuries, overgrow-

ing all kinds of structures regardless of material and shape. Taking this into account, the task of recognizing subaquatic archaeological materials like cargo, ship superstructures or ballast stones in the coral reefs is challenging at best. Especially amphora and ceramic sherds tend to blend in with the coral due to color, shape, size and fabric structure. Remote sensing equipment like a magnetometer, side scan sonar or sub-bottom profiler are also of little use in a dense coral environment with solid coral heads on the surface because of their high signal reflectivity. Therefore, a thorough and accurate “manual” visual inspection was necessary to achieve the desired results.

The seabed adjacent to the reefs was a primary target for the survey. Particular attention was given to the juncture where reefs meet the seafloor as this is where wrecked watercraft usually settle. Overall, the areas surveyed were again those considered likely to contain shipwrecks of any time period, based on theorized sailing routes, known hazards, and hypothetical danger spots (Pedersen 2015: 132).

## **THE (PRESUMED) WRECK SITES**

### **JEDDAH WRECK 1 AND JEDDAH WRECK 2**

During the first season, in March 2012, a potential shipwreck site was found in the Eliza Shoals. Remains of this wreck, named JW1 (Jeddah Wreck 1) were previously unknown to the dive and research community and were investigated during a period of several consecutive days. The area stretching out from the base of a reef is a level field of dead corals and sand ex-

tending towards the open sea until meeting an area of living coral approximately 30 m distant. The dead corals extend along the entire base of the reef area until dropping off into deep water some distance away. The shipwreck remains consist of the top of a large amphora (which was raised for diagnostic purposes and conserved by colleagues from the SCTH

and is now on display at the National Museum in Riyadh), a large body sherd of an amphora concreted into the reef, a plain globular amphora cemented into the seafloor with a peculiar hole or valve (possible secondary fermentation lock) in its neck and a number of rectangular stone blocks (Pedersen 2015).

The second season brought the research team back to the JW1 site to conduct monitoring of the extant artifacts (e.g., the plain amphora and concreted sherds), take exact measurements and search for more evidence. Several more amphora fragments were found, strengthening the assumption that it was a wreck site and not an arbitrary dumping ground. Furthermore, the discovery of a possible ballast stone on top

of the reef supports the theory of a ship in distress that had ran aground on the reef and lost its cargo of clay containers, which were dispersed over the seafloor and cemented into the coral. Another amphora fragment was recovered and handed over to the SETH Department of Conservation and Restoration (Pedersen 2015).

Circumnavigating the reef, the team discovered a field of amphora remains on the eastern side of the reef. On a stretch of approximately 400 m<sup>2</sup>, at a depth range of 9–15 m, 13 different objects were counted, among them amphorae, ballast stones and a stone anchor. These were obviously not connected with the remains of the JW1 wreck site and were subsequently designated as the JW2 wreck site.

## AMPHORAE FROM JEDDAH WRECK 2 (JW2)

The stone anchor seems to be modern and possibly does not belong to the original context; it could have been dropped accidentally by local fishermen. The two objects Bo4 and Bo6 may be ballast stones. A closer investigation this season was not possible due to severe time constraints and the necessity to prioritize. The decision to focus on the amphora sherds resulted in leaving the mandatory examination and retrieval of one sample of the stones to the next season.

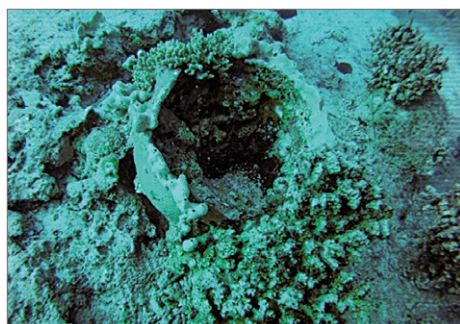
The selection of amphora sherds scattered on the seafloor poses a challenge regarding typology and classification. At first glance, there seem to be three different kinds of amphorae, but to quote Ralph Pedersen, the principal investigator: “The amphora identifications of vessels concreted into the sea floor must be taken with extreme caution due to their features

being obscured. Aside from the conical Aqaba amphora remains, which were inspected by myself and thus the identification is as accurate as can be without excavating samples for analysis, the other vessel types need to be further studied before a determination can be made” (R. Pedersen, personal communication).

The first form to be distinguished is amphora Ao1 [Fig. 3:A]. It has a globular profile with very regular horizontal ribbing, vaguely corresponding to a late type, that is, Late Roman Amphora [=LRA] 5.

A possible second form, represented by amphora A10 found in close vicinity of the reef ledge, is a heavily incrustated sherd with a smooth body [Fig. 3:B]. Only a small part is visible, the rest being buried in dead coral and concreted into the seafloor. The shape suggests an amphora,





A – amphora A01



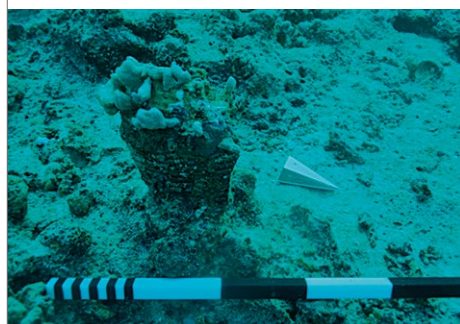
B – amphora sherd A10



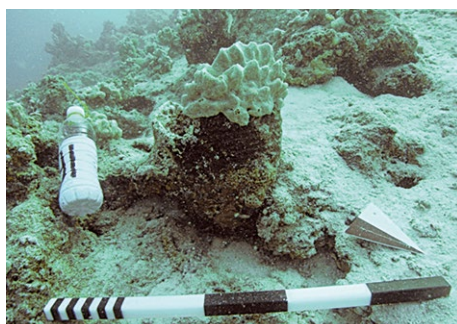
C – Aqaba amphora A13



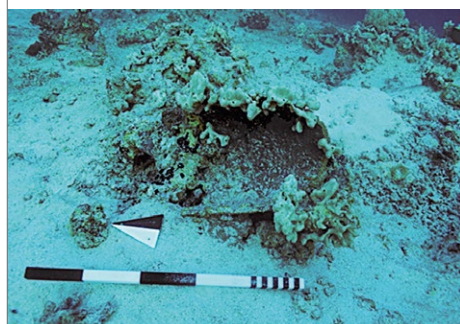
D – Aqaba amphora A09



E – Aqaba amphora A16



F – Aqaba amphora A05



G – Aqaba amphora A17



Fig. 3. Documented amphora sherds at the JW2 wreck site (Photo Marburg-Team, 2013)

the body section typical of an ancient transport container, but any typological reference for now should be treated with caution. An affiliation with the Aqaba amphora family cannot be excluded. The amphora is approximately 100 cm long and 50 cm wide; the diameter could not be evaluated.

The third form is the most frequently represented type among the remains (80% of the finds): A05, A09, A13, A16, A17 [Fig. 3:C–G]. The state of preservation allows these fragments to be placed in the Aqaba amphora family. Like the amphorae of this type discovered in the Black Assarca shipwreck near Adulis (Pedersen 2015), the amphorae are conical with ribbed bodies and no visible toe button, at least on the most exposed example. Whether this variation is an indication of workshop or temporal differences between the Black Assarca and the JW2 assemblages has not been settled for now. No necks with rims of these vessels have been found on the surface to allow for a more precise classification.

The specification of colors of underwater objects is difficult because water absorbs different wavelengths of light to different degrees. The longest wavelengths, with the lowest energy, are absorbed first. Red is the first to be absorbed, followed by orange and yellow. The colors disappear underwater in the same order as they appear in the color spectrum. Even water at 1.50 m depth will have a noticeable loss of red, orange vanishes at 7.50 m, yellow at a range of 10–14 m and green at approximately 21 m. The objects are in a depth range of 9–15 m therefore the red, orange and

yellow spectrum cannot be recognized anymore, only green and blue persist as colors. An identification according to color spectral analysis, e.g. Munsell charts, is currently impossible and can be done only after samples have been excavated for diagnostic purposes.

Visual and haptic analysis of the amphora sherds revealed a homogeneous fabric and temper, which would indicate a common source of the clay for the making of these vessels and a standardized production process. The fabric, as far as can be said after a rudimentary investigation in the water, is characterized by evenly distributed, roundish and polygonal mineral particles of varying grain size. Amphora A05 lies with its inside surface facing the open sea [Fig. 3:F]. The inner wall is smooth but not plain, covered with little bubbles or “moguls”, an indication of wheel marks. Sealants or coatings of the interior surface are not visible or palpable; again, laboratory analyses are essential. The sherd does not exhibit any shrinking cracks from the firing process or larger pores.

The fragments have generally similar dimensions, another indicator of a standardized production and quality control, using tools to control the size as individual parts are formed on the wheel.

This, in short, is the first assessment of the finds identified as Aqaba amphorae at the JW2 site in Saudi Arabia. For closer confirmation of type, provenience, material, usage and chronological classification an excavation would have to be launched and samples brought to the surface and analyzed archaeometrically (Held et al. forthcoming).



## AQABA AMPHORAE

The Aqaba amphora, or the Aila-Axum amphora as the type is also called in various publications because of its distribution (between modern Aqaba/Aila, and Axum in Eritrea), has become the focus of recent research as a result of discoveries made in excavations on land. The following is a brief review of the state of research on the typology, distribution and fabric of this type of clay container.

### DEFINITION AND TYPOLOGY

The Aqaba amphora is described as conical or carrot-shaped, sometimes cylindrical, wheel-turned, with or without a button-toe and with strong ribbing on the exterior surface. The fabric is characterized as dense, tough and with a homogenous particle distribution in the clay. Fabric color ranges from a pale yellow (Munsell 2.5Y 7/3 and 7/4) for the sherds found at Zafar, Yemen, to more brown and whitish for vessels from the Black Assarca shipwreck (Pedersen 2008; Raith et al. 2013). The fabric has inclusions: sand, crushed granite, quartz and traces of mica and chaff. The samples under examination are hard-fired with varying but solid wall thickness for usage in rough transport environments like ships. General dimensions are approximately 75–100 cm long with a loading capacity of roughly 15 liters, but again with variations in size and capacity. One example of this type of amphora from Zafar, Yemen, has a capacity of 17.25 liters. The wall thickness varies, also for a given vessel (Pedersen 2008; Raith et al. 2013). A number of vessels bear *dipinti*, that is, either sketched or painted inscriptions (Tomber 2004; Raith et al. 2013). The con-

tainers from Zafar, which were subjected to archaeometric analysis, do not have a sealed inner surface, while samples from the Black Assarca vessels are reported to have a resinous substance coating the inner surface (Pedersen 2015; Fig. 5). A few rare sherds from Zafar are reported to be glazed (Raith et al. 2013).

Aqaba amphorae belong to the family of Aqaba-ware vessels produced during the 1st millennium CE in Aqaba/Aila. Apart from a range of storage and transport containers, such as amphorae and flasks, the ware includes household vessels like jugs, casseroles and bowls, straining pitchers, lamps and loop-handled storage jars of varying dimensions and capacities (Whitcomb 2001; Raith et al. 2013).

### DISTRIBUTION

Aqaba amphorae have started to be recognized with increasing frequency over the past 20 years or so, thanks to the findings of several significant research projects concerned with the origin and distribution of this amphora type. The first to consider the matter of their origin was Roberto Paribeni, who, for lack of other evidence, assumed that the ones he had found at the Aksumite port of Adu-lis in modern Eritrea to be of Egyptian make and proof of intense trade contacts with the Roman Empire (Paribeni 1907; Pedersen 2008).

The pottery and amphorae that Alexander Flinder excavated between 1967 and 1974 at several harbor sites, anchorages and marine defense installations on the island of Jezirat Fara'un in the Gulf

of Aqaba, 250 miles off the Sinai shore and approximately 7 miles south of Eilat, was described as "... light brown clay, the types varied and included ... small slim and conical amphora types" [Fig. 4 right]. The vessels were spread over a large area at a depth of 7 m to 9 m. Flinder dated them to late Roman–Byzantine times (Flinder 1977; Pedersen and Brandmeier 2016).

Robert D. Gempeler discovered a similar type of amphora at the German excavations on Elephantine Island, a Nile isle in the vicinity of modern Aswan. This was a cylindrical form with strong ribbing on the body and a smallish toe, the handles, described as curved and strongly built,

sitting directly on the shoulder and the inner surface resinated in a few instances. Gempeler classified them as Adams Aswan Type II and noted two size variants: a smaller one, 63–70 cm long, the diameter 7–8 cm at the rim and 15–18 cm at the shoulder (capacity and weight not mentioned) and a larger model that is 70–74 cm long, with diameters of 7–8.5 cm at the rim and 18–21 cm at the shoulder. He presumed wine to have been the content of this type of amphora based on the extensive wine trade between Egypt and Nubia in the 6th and 7th centuries (Gempeler 1992; Pedersen 1995). Their Aqaba provenience is disputed (Raith et al. 2013).

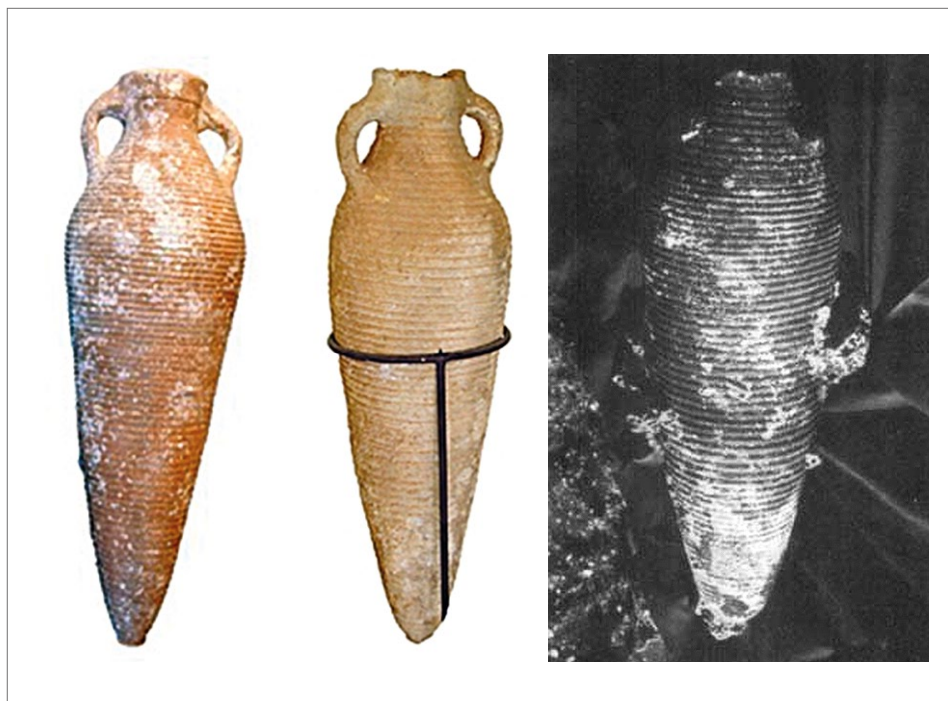


Fig. 4. Parallels: left, imported amphora from Aksum; center, Aqaba amphora, both from the Black Assarca shipwreck; right, Aqaba amphora from Jezirat Fara'un (Left and center, after Pedersen 2008; right, after Flinder 1977)

The only known example of an (intact) Aqaba amphora in the Mediterranean region was found on the Aegean coast of Turkey at Tektaş Burnu (Iskandil) in an approximately 20-m-long shipwreck. This unique example is on display at the Bodrum Museum of Underwater Archaeology (Alpözen, Berkaya, and Özdaş 1995).

Excavations at early Islamic Aila by Donald Whitcomb uncovered first some 7th-century kilns in 1987 and then, during a salvage campaign in 1993, an extensive and stratified pottery dump (wasters and repetitive forms). Two large pottery kilns, preliminarily dated to the 7th–early 8th century based on comparative material from the site (Whitcomb 2001),

presumably constituted part of a late antique–early Islamic industrial production complex. To further validate the idea that Aila was a production center of this type of amphora containers, wasters of a whole product range of Aqaba ware types were found below the kiln floors. The kilns were of the oxidizing updraft type. This firing technology was used during late antiquity into the early Islamic period throughout the Middle East. Paul Yule also reported finds of Aqaba amphorae from a nearby church, which had been destroyed in an earthquake possibly in 363 and subsequently filled with debris and windblown deposits. Aqaba amphorae from the early 5th century through

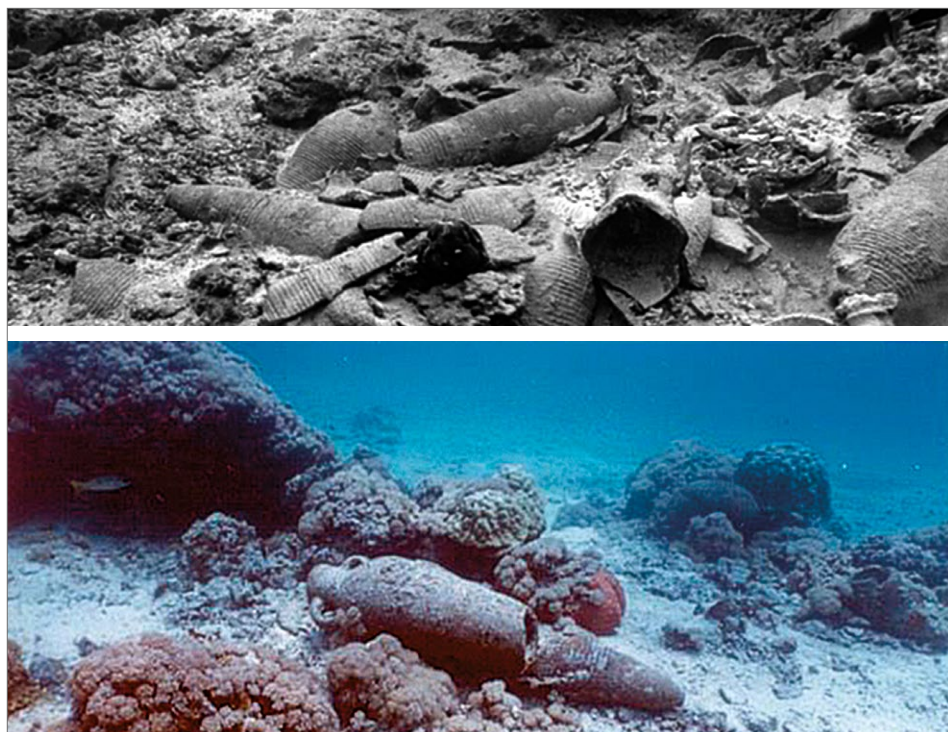


Fig. 5. Aqaba amphorae from the Black Assarca wreck site: top, view of the “Main Pile”; bottom a vessel with intact body, handles and neck (Photos R. Pedersen, 1997)

the 8th–10th centuries were found in the fill of this structure (Raith et al. 2013).

In his 1995 report from the excavations at Berenike on the Red Sea coast of Egypt, John W. Hayes described a type of pottery of non-Nile valley provenience in a floor deposit in an apparent storehouse as a “...slender bodied ribbed amphora of an unclassified type known from sites around the Red Sea” (Hayes 1996). He referred to them as the “Aila–Axum type” to indicate the wide distribution of the amphora and its presumed late Roman–Byzantine chronology (Hayes 1996). Steven E. Sidebotham and Willeke Z. Wendrich found, during the 1998 excavation campaign at Hitan Shenshef, approximately 20 km southwest of the Berenike harbor, sherds belonging to amphorae of the Aqaba type in trenches SH1, SH2, SH3, SH5 and SH7 (Sidebotham and Wendrich 1999; Cicci 2012).

David W. Phillipson, Jacke Phillips, and Michael Harlow, continuing the work done by Neville Chittick in 1972–1974 (Munro-Hay 1989), found sherds of Aqaba amphorae in the D- and K-site of Aksum, which they excavated in 1993–1997. The D-site examples is described as wheel-made with strong ribbed body, a tall neck with a sloping shoulder, two curved handles from the upper neck to the shoulder, interior rim inset and a button base, dated between the 5th and 7th centuries CE. The fabric variants and ribbing style suggest a range of provenances (Phillipson and Phillips 2000). The K-site examples are similar, the chronology matches the D-site vessels, yet the handles are described as less curved and the rim inset as less pronounced compared to the D-site containers. One amphora has been

reconstructed, missing shoulder and base, but illustrates these features and, therefore, presumably indicating an earlier date (Harlow and Phillips 2000). David F. Williams made a petrological analysis of some of these vessels but this delivered no single, clear result. Thus the provenance of the Aqaba amphora sherds cannot be identified on petrological grounds, but the fact that they are wheelmade points to production at Aqaba/Aila, this because all known local Eritrean products are handmade (Williams 2000).

Adulis on the eastern coast of Africa received significant attention because of its role as one of the most important trading entry ports of the Axumite Kingdom on this part of the African coast (Cicci 2012). During their survey and excavation, David Peacock and Lucy Blue found a number of Aqaba amphora sherds in the harbor area, together with prehistoric and Roman-age pottery fragments. The amphora sherds were distributed as surface finds in five different sites in the region of Adulis: Diodorus Island, Galala, Dese, Adulis and on the shoreline. The temper observed in the fabric of these sherds could not come from the vicinity of Adulis, therefore indicating an import, probably from Aqaba/Aila or from Axum. One ceramic sherd found at Diodorus Island is an intact rim with a ledge for a lid; another fragment is a typical Aqaba amphora toe-piece with ribbing identifying it as a wheel-made product and hence possibly from Aqaba/Aila products (Peacock and Blue 2007; Cicci 2012).

The Black Assarca shipwreck site was the most prominent find of Aqaba amphorae under water. An island in the

middle of the Massawa Channel, between the mainland of Eritrea and the Dahlak archipelago, Black Assarca came into focus through underwater investigations in 1995 after the discovery of amphora sherds by tourists. The Institute of Nautical Archaeology (INA) at Texas A&M University was contacted to investigate the site in 1995 and Ralph K. Pedersen conducted an excavation in 1997. At a depth of 4 m to 6 m, several amphorae lay scattered on the seafloor, covering an area of 7 m in perimeter. Sherds were found downslope of the site, up to a depth of 13 m, showing no signs of fresh breakage. Some were clean of marine growth on their underside, an indication that the sherds had been lying *in situ* for a long period. The mass of them belonged to a conical, ribbed type that was designated as Assarca Type I; two other types (II and III) were represented by a single sherd each. All were characterized by a dark red/brown fabric and featured a wall thickness of approximately 1.5 cm. Ribbing spaced approximately 1.2 cm apart covered the outer surfaces, while the inner surfaces exhibited marks from turning on a potter's wheel. Although all the free-lying amphorae were broken, two had intact bodies [Fig. 5]. One of these was 71 cm long, with a maximum circumference of 80 cm at the shoulder, and a neck opening of 9 cm in diameter. The second intact body measured 74 cm in length. The interior faces of many sherds and amphora bodies were coated with resin, a possible indication of usage as wine containers (wine amphorae were sealed with resin to prevent the liquid inside from leaching out). During the 1997 post-excavation analysis the con-

tents were sifted for archaeobotanical analysis but no botanical materials were found (Pedersen 2008; Raith et al. 2013).

The last known submerged find spot of presumed Aqaba amphorae is also located in Eritrea, close to an island on the far side of Dahlak Kebir. The site has not been investigated so far, except for a few documentary photographs. There is no further documentation or information available.

### CHRONOLOGY, CONTENTS, MATERIAL

The Aqaba amphora type is distributed mainly in the coastal areas of the Red Sea with clusters in areas previously inhabited by Nabataeans along the stretch between Aila (modern Aqaba) and Petra, in Eritrea in the vicinity of Adulis and Aksum, in Yemen/Oman between Zafar and Qani, and in India. Exceptionally well preserved examples were found in Iskandil Burnu, Turkey (Lloyd 1984) and Berenike (Hayes 1996).

The chronological classification is far from clear because the excavated samples cover a wide time span. The finds from the late-6th-century-CE shipwreck at Iskandil Burnu and the examples found at Berenike in a context post 400 CE, as well as stratified examples from Aksum sit in a 5th to 7th century CE horizon (Munro-Hay 1989: 314) and the finds from Matara range in date from the 3rd through the 6th century CE (Anfray 1990). Raith et al. (2013) found a number of Aqaba amphorae in a 6th-century-CE secondary context at Zafar in Yemen. Given this chronological data, a time span for the production and usage of Aqaba amphorae from the 4th century to the 7th is considered most likely but fresh insight is to be expected from a closer



analysis of JW2 and a more detailed examination of previously excavated examples like those from Jezirat Fara'un (Flinder 1977).

The usage of the Aqaba Amphora has received considerable consideration in recent years, researchers suggesting different goods as their content. The first assumption is wine, based on the sealant noted on the inside of some of the sherds from the Black Assarqa shipwreck. Pitching the inside of wine amphorae is a practice typical of the Mediterranean wine trade (Pedersen 2008; Tomber 2009). The vessels from Berenike were not pitched, but one sherd preserved the inscription “*oinos*”; at Berenike, it could have been an example of the reuse of amphorae as packing containers (Tomber 2004). The substance on the Black Assarqa sherds has not been analyzed, but the range of possibilities includes tree resin and bitumen, both substances of hydrophobic character (Hanuš and Ben-Yehoshua 2013; Raith et al. 2013; Pedersen 2015). At Zafar, Raith et al. (2013) did not find any kind of sealant on the interior side of the containers. As indicated above, sifting of the contents of

a Black Assarqa amphora did not yield any archaeobotanical material for analysis (Pedersen 2008; Raith et al. 2013, and P. Yule, personal communication, 2016). A mosaic found at Petra, depicting an elderly man drinking wine from a vessel that looks like an Aqaba amphora, supports the wine hypothesis (Cicci 2012).

Ansam Melkawi proposed that the Aqaba amphorae were used for agricultural products from the Palestinian region (Melkawi, 'Amr, and Whitcomb 1994). Recent studies have suggested *garum*, a fish sauce produced in the Red Sea region that was quite popular as a dietary supplement in antiquity, or date wine as possible contents (Cicci 2012).

Scholars have also considered the climatic and territorial situation of the region and asserted that the only possible food resource that could be transported in these vessels must have come either from the sea or from the date palm plantations around the oases (Cicci 2012). For now, the issue is still in need of further investigation to be resolved.

## CONCLUSION

The latest finds of presumed Aqaba amphorae at the JW2 shipwreck site in the Eliza Shoals near Jeddah support the assumption of trading activities in the Red Sea during the 4th through 6th centuries CE dealing with cargo and containers originating from the ancient Aila. It further supports the fact that the coastal sea route along the Arabian coast must have been used at least occasionally, if not with a certain frequency, during antiquity. What cannot be determined is the ship's sailing direction, that is, was it go-

ing north–south or making an east–west crossing taking advantage of harbors on both sides along the Arabian and African coast. It is also unknown what caused the vessel(s) to capsize and sink, scattering the cargo on the seafloor. With no ship remains recorded, it also cannot be said for now whether the finds come from one or more sunken ships, if at all. For the JW1 site, strong indications (ballast stone in the reef) exclude a dump and favor a wreck, JW2 needs to be more thoroughly examined in this respect.

Lacking any ship remains at JW2 leaves everything to the imagination. Also, the reason for the abundance of the cargo is unclear, a distress-at-sea scenario the most likely but other possibilities are open for discussion: perhaps an accident during transshipment or hauling containers from larger seagoing ships to smaller coastal watercraft, a practice mentioned by several authors (Whitewright 2007; Pedersen 2015).

The cargo of JW2 is composed of ceramic vessels and ballast stones, with an Aqaba provenance proposed for most of

the sherds. The remaining pottery artifacts cannot be determined without closer examination, that is, excavation. The purpose and contents can only be assumed based on well examined samples of Aqaba amphorae: wine from either grapes or dates and *garum* being the most likely suggestions. Production sources can also be identified once samples have been raised to the surface and analyzed archaeometrically, which with SCTH permission will be pursued in the near future.

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