"Whither Sailest Thou?" – points of origin and destinations in the archaeosphere of the Red Sea

Abstract: The Red Sea is a deep rift between Africa and Asia, yet as an aquatic "highway" it links Europe to the Indian Oceanworld. While the existence of Greco-Roman trade down the Red Sea to the wider Eastern world is relatively well known, the harbors and destinations along the shores of the Red Sea are still being investigated. Understanding the geographical, and indeed geological, aspect of the sea is a key factor in the finding of ancient harbors and anchorages. Coupled with this is the need to discern the technology of maritime tools—navigation, ship-building technology, sailing practices—of the various eras and cultures of the Red Sea. This paper explores these aspects through the growing body of evidence and theory of Red Sea maritime endeavors, as well as the author's own archaeological investigations in Eritrea and Saudi Arabia.

Keywords: Red Sea, geology, maritime tools, harbors, anchorages, destinations, sailing

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The Red Sea has been on the periphery of archaeological research throughout much of the history of the discipline, particularly missing out on the development of nautical archaeology over the past half century. This is due in part to the barren shores that offer few amenities, along with the logistical difficulties incumbent with launching archaeological investigations in the Red Sea area. As a result, only a few ancient harbors have been located and examined, and while a number of shipwrecks have been located and surveyed, only a handful have been archaeologically analyzed (Raban 1971; 1973; Pedersen 2000; 2008; 2015; Ward 2001; Braun 2005; Sidebotham 2011: 199; Blue, Hill, and Thomas 2012; Zazzaro and Loreto 2017).

Perhaps counterintuitively, Red Sea harbors are seemingly more difficult to find than shipwrecks. A number of harbors are mentioned in ancient sources such as the *Periplus of the Erythraean Sea*, and there were possibly "scores if not hundreds of emporia of various sizes and importance" around the Red Sea and beyond (Sidebotham 2011: 182). Many of their locations remain by and large speculative. While harbors such as Berenike (Sidebotham and Wendrich 1996; 2007; Sidebotham 2011; Sidebotham and Zych 2016), Quseir al-Qadim/Myos Hormos (Blue 2002; Peacock and Blue 2006), Adulis (Peacock and Blue 2007; Carannante et al. 2015), and Suakin (Salim 1997) have been found, subsequently excavated, or studied in depth, others of similar renown in ancient times remain a mystery. Ptolemais Theron, the great elephant-hunting station of the Ptolemies, remains undiscovered (Sidebotham 2011: 186–187),

as does Leuke Kome, the main port of the Nabataeans (Murray and Warmington 1967: 26; Kirwan 1984; Nappo 2010), which is now the focus of investigation at Aynunah by the University of Warsaw.

Finding harbors on the Red Sea coasts necessitates deriving a greater understanding of what constitutes a Red Sea harbor. In general, the shores of the Red Sea are flat and arid, interrupted by a limited number of sharms, lagoons and bays, along with a surfeit of coastal reefs, and island groups such as the Farasans and the Dahlaks among other smaller clusters. Our view of ancient harbors, however, relies heavily on those of the Mediterranean, ranging from the "proto-harbor" idea to the monumental harbors of the Romans and later cultures. This perspective relies on a three-tier classification system based on a chronological structural evolution proposed by Honor Frost in the early 1960s and now well-ensconced in nautical and maritime archaeology (Frost 1963: 66–67, 93; Muckelroy 1980: 166–167). The Mediterranean model is also heavily dependent on geography as the deeply crenellated coasts found around the northern Mediterranean littoral were created by post-Ice Age runoff, yielding many well-protected and useful harbors (Muckelroy 1980: 162). This geographical situation is not found in the Red Sea where geographical and cultural conditions resulted in harbors of a differing nature, although Mediterranean harbor types were introduced into the Red Sea, such as those at Berenike and Myos Hormos (Blue 2002: 145; Sidebotham 2011: 55–62) In view of the geo-environmental and cultural differences, harbors in the Red Sea need redefining.

Harbors in their simplest sense are areas of sea coast where watercraft can find safety and access the resources of the land, or as Shaw writes, "[T]he history of harbours begins when the first boatman searched for a safe, permanent moorage along the shore..." (Shaw 1972). Likewise, they are places were land dwellers can safely access sea and its resources, including trade routes, both local and long distance. The availability of potable water is naturally paramount for harbor existence, particularly in desert environments, and this can be a limiting factor on harbor location and size via population support. Factors influencing harbors can include food, materials for ship maintenance and repair, and the opportunity for rest, among other variables. Villages placed close to one another would suffer from competition for terrestrial and maritime resources. Harbors placed too far apart would, on the other hand, suffer from strained contacts and even isolation. Thus, whether consciously decided or not, harbor locations are tied to these factors. Importantly for the Red Sea, they do not necessarily have to contain an embayment or even an area in the lee of a section of land, contrary to conventional wisdom. The nature of Red Sea harbors is a response to the circumstances of the region.

Red Sea harbor placement and nature relies on at least three major factors—socio-political circumstances, geo-environmental parameters, and technological capabilities of boats. These factors can stand apart from each other or play into combinations. Importantly, they are non-chronologically linked and do not rely on manmade structures for definition, that is, they are not evolutionary like the long-standing Mediterraneo-centric model.

SOCIO-POLITICAL FACTORS

The organization of a harbor, that is, how to supply and maintain it, how to organize anchoring and admittance to harbor, and the placement of facilities requires stratification of power and work. Village harbors should tend to be mostly unregulated, that is, one puts in where one can. Harbors larger than that of a village can imply some sort of socio-political hierarchy beyond that of the village "Big Man", tending toward a structured polity or state.

The development of structured societies is based upon spatial relationships as well as economics as seen in Colin Renfrew's Early State Module theory that is used to explain the formation of early societies. Renfrew's theory concerns such criteria for trade at local levels and through capital centers that lay "the basis for larger economic unification" (Renfrew 1975; Renfrew and Bahn 2008: 386). In this, villages supply the towns with hunting and small-scale products, the towns in turn supply the main city with agricultural goods and craft products. The city in turn is the power base, where not only some form of government resides and large numbers of industries may be found, but the city also engages in commerce outside the local polity. The Early State Module can be adapted to ancient seaside settlements, e.g., harbor sites, as well. Small village harbors, simple, of-

ten without structure or organization and relying in part or in whole on the beaching of boats, can be viewed as tertiary entities, paralleling the village of the Early State Module. These produce mainly food and associated small-scale products for survivability and possibly for export either as trade items or taxation to secondary and primary harbors either overland along coastal routes or via small watercraft. Secondary harbors, the equivalent of towns in the Early State Module, would produce a greater amount of food and product, and be able to accommodate boats both larger in numbers and size. The secondary harbors would feed needs of the primary harbor, that not only contains the seat of power, at least regionally, but also engages with intercultural/international trade. Secondary harbors could of course have some international traffic but it is the primary ones that would be the goal and destination of this kind of commerce as they would have a better amount and larger variety of goods as well as be better connected with cities in the hinterland, as, for example, the connection between Berenike and the Nile valley cities.

Thus, goods are transferred up through a system linking the village harbors, the town harbors, and the city harbor, which in turn is linked via trade routes to other primary harbors either within the same cultural setting or with foreign ones. In reverse, the primary harbor, linked with other primary centers via the sea, feeds back into the system goods not locally available, some of which would find their way down to the tertiary, that is, village level. Thus, the question is one of a matter of scale, rather than development.

The Early State Module can, but not necessarily, imply a well-organized, stratified society, or its development, although there is a measure of criticism of it (Fisher 1985). In applying this to a harbor model for the Red Sea, we must ask the pertinent question of whether such socio-political hierarchies existed there and if so to what extent, and whether it is reflective of evolutionary societal development or simply the result of actions of external forces. We have in historical times major harbors, such as Myos Hormos, Leuke Kome, Adulis, Al-Jar, Aila, just to name a few that were clearly linked to an overriding culture. Egyptian civilization was certainly present along Red Sea coasts as early as the Old Kingdom (Ward and Zazzaro 2010: 27), but whether their organizational influence extended beyond the immediate vicinity to other areas and cultures is speculative at present. Ptolemaic influence is evident in Abyssinia in the use of the Greek language over the course of five centuries in inscriptions and on coinage, as well as in the use of Proconnesian marble at Adulis (Munro-Hay 1991: 73–74, 245–246; Bowersock 2013: 17, 32, 26–27). The designation of the Aksumite port as an *emporion nominom* suggests a place of Mediterranean-style authority and regulation (Bowersock 2013: 30–31), but the influence of foreign ideas on Aksumites seems more due to imitative cultural factors than political hegemony. Additionally, during the Roman Empire, there were efforts in the Red Sea to regulate and control the taxation of shipping centered on Iotabê (Nappo 2015: 165) and seemingly at the Farasan Islands (Sidebotham 2011: 188), not to mention the attempt by Gallus to absorb southern

Arabia into the Empire (Jameson 1968; Sidebotham 1986). Certainly, later in the early Islamic period, a greater socio-cultural organization began to grow in the Red Sea as the area effectively turned into an Islamic "Mare Nostrum". Yet, at the current state of research and knowledge, the societal organization and their extent in both geography and political influence remain unclear because they pertain to harbors particularly in early periods and at the indigenous level free of external influence.

THE NATURE AND CLASSIFICATION OF RED SEA HARBORS

While there is now a growing body of knowledge of primary harbors, less is known of the sea's secondary and tertiary harbors. The *Periplus of the Erythraean Sea* mentions harbor conditions at various settlements, stating that they are of poor quality and suitable only for mooring (Casson 1989: 276–277). This implies that these are structureless or nearly so, that is, they lack port architecture or facilities. As Lionel Casson states, "the ships they had to accommodate were not the big freighters of the wind-buffeted India run but the smaller, lighter craft of the African run…" (Casson 1989: 277). Nothing more than a shorefront was necessary.

Indigenous harbors on the Red Sea can thus be seen as utterly minimal. We are conditioned to thinking about harbors as basins, either natural or man-made, but with the small village harbor, and possibly some town harbors, this is not always the case. One example of this is Black Assarca Island, where foundation stones of small circular huts testify to the island's habitation at some point in an-

tiquity [*Fig. 1*]. A shallow "plastered" basin for rainwater catchment, a couple of rough-hewn stelae, and numerous pieces of obsidian chert demonstrate that this island had been used, likely repeatedly, either as a settlement or as a fishing camp. This recalls the turtle hunters inhabiting the islands of the Alalaei outside the Bay of Adulis as noted in the *Periplus* (Casson 1989: 53; Bowersock 2013: 10). Obviously, watercraft of some kind would have been needed to reach the island, but there is no harbor, no basin, no shelter. The only safe place for boats is the northern beach adjacent to the area of the huts and catchment. Onto this strand, watercraft would have been hauled for safe keeping until needed. The 1997 archaeological expedition to the island used this strand for its boats as well (Pedersen 2008). Such beaching qualifies as the simplest form of Red Sea harbor—the tertiary harbor—where local fishermen put in their boats for safety and harvested food for their village, if not to supply a larger settlement on the mainland with items such as turtle shell. Obviously, places like Black Assarca were not places where ships like the one that wrecked on the reef would have been intentionally visiting. Adulis, a primary harbor less than a day's sail away, was likely the port at which the ship was intending to make landfall.

Another example of a tertiary harbor is found at Khor al-Kharrar in Saudi Arabia, near Rabigh. There, a small coral-built jetty was found on the southern edge of the lagoon (Pedersen 2015; Pedersen and Brandmeier 2016). Long fallen into disuse, as indicated by the lack of modern detritus near it, the jetty was clearly used by boats of minimal draft.

Indications are that it was for local use, a determination that is reinforced by the presence nearby of fireplaces and small middens of mollusk shells. Nearby, across the spit of land separating the lagoon from the sea, is a modern harbor comprised of a concrete jetty and beach with fishing boats either anchored in shallow water or drawn up onto the sand. Again, this is a simple form of harbor, clearly for local use, and thus can be classified as a tertiary harbor. Given their scale and the size of the boats apparent or assumed, neither of the harbor finds at Rabighor Khor al-Kharrar would or even could operate in the international spectrum of trade. Their only apparent purpose is to access the marine resources primarily for local consumption. The geography of the sandy shoreline lends itself to the beach-

ing of watercraft for overnight use and for storing boats in the off season. The sheltered water of the lagoon provides a calmer area for small boats to fish the water of the lagoon without having to access the open sea, and thus may have been in use year-round.

We also see such minimal harbor fronts along the north and south inlet channels at al-Shu'ayba. This area is supposedly the al-Shu'ayba of late antiquity and the early Islamic era, from whence the early Muslims fled Arabia for the safety of Aksum via Adulis (Hawting 1984: 319; Bowersock 2013: 123; Pedersen 2015: 130), although there is no obvious or visible evidence as yet of the place being used as a harbor during those times. Today, fiberglass craft and a few derelict wooden boats rest on the shores of the

Fig. 1. Stone foundation on Black Assarca Island (Photo R.K. Pedersen)

inlets [*Fig. 2*]. If simply beaching boats here was norm in ancient times, there would be little evidence of such a harbor, certainly less than at the Khor al-Kharrar site with its jetty. It seems, therefore, that tertiary, secondary harbors, and even pri-mary harbors—if we consider al-Shuʾayba in this last class—were simple in form and nature, often basin-less as indicated in the *Periplus*, and perhaps only seasonal, leaving little, if anything, for archaeological investigation.

GEOGRAPHY AND ENVIRONMENT

Geography plays a major role in harbor placement. The sandy and low beaches that are ideal in many ways do not occur universally along Red Sea shores. Coral frequently runs along the shore in shallow water, such as between the inlets at al-Shuʾayba, thus preventing boats from reaching the land. Large fossil coral shelves two or more meters high are also common. While such coral shelves are older than human habitation in the region, they do have an effect on harbors as breaks in them can provide secure harbors, such as at Suakin on the African littoral, Sharm Abhur near Jeddah and further north, the sharm at Yanbu, which may be ancient Charmuthas (Diod. Sic. 3.44.7–8). Such breaks in the coral front also provide access to lagoons, such as at al-Shuʾayba and Khor al-Kharrar. Other harbors, of course, take advantage of the natural bays, such as Myos Hormos and Berenike (*PME* 1; Casson 1989: 51).

Siltation in the Red Sea plays a role in the modification of the coastline and can obscure once-existing harbors. Myos Hormos, which sent fleets of ships to India, died due to siltation and completely dis-

Fig. 2. Harbor at al-Shuʾayba (Photo R.K. Pedersen)

appeared until it was found and excavated archaeologically in a silted-up lagoon (Blue 2002; Peacock and Blue 2006). Adulis, the port of the Aksumite Kingdom is another such case. Long lost, Adulis was the subject of studies in the early 20th century (Paribeni 1907; Munro-Hay 1991: 26–27) but its postulated identification on the shores of the Bay of Zula remained in doubt as the geography of the area did not match that recorded in sources from antiquity. In particular, Adulis was supposed to be located near an island in the Bay of Zula that was reachable by horseback, but today none exists there. This led to speculation that Adulis did not lie along the bay. Indeed, Casson writes that Massawa was a better fit for the location of Adulis due to its islands just off shore (Casson 1989: 102–106; Bowersock 2013: 10, notes 4, 5). Investigations at the Zula Bay site by David Peacock and Lucy Blue have since all but proven that the Galala Hills near the ruins was in antiquity the island mentioned in the *Periplus* and now is part of the mainland due to siltation (Peacock and Blue 2007: 43–47, 128; Bowersock 2013: 12). This place was apparently Gabaza, a custom station located a short distance from Adulis, and was "the actual harbor for Adulis as the port city" (Bowersock 2013: 12).

TECHNOLOGICAL FACTORS OF WATERCRAFT

The capabilities of watercraft at any given time can influence the placement and nature of harbors. Hull form and size, sail and rigging, and the skill of mariners all are factors. As secondary and tertiary harbors exist to take advantage of local trade, both small and large, their conscious or unconscious creation is therefore dependent on the capabilities of local watercraft in addition to geo-environmental considerations. Cabotage, the low-level trade carried on between villages and towns was a major part of commerce in the Mediterranean (Hohlfelder and Vann 2000: 126), and it may be safe to assume the same scenario for the Red Sea at any given period of seafaring despite the region's apparent lower population.

The influence of the technical capabilities of watercraft on harbors should not be ignored. Rafts surely had limited function compared to a boat of skin or wood, which are noted in the *Periplus* (Casson 1989: 117), and such craft require little in the way of a harbor. Boat size, which is related to carrying capacity, affects their speed, which, in turn, affects how far a boat could sail over the course of a day. It is logical to assume that coastal watercraft would not ordinarily stay overnight under sail, particularly in areas of reefs as is found along both shores of much of the Red Sea. Thus, it would be desirable to put in at the setting of the sun, preferably at an established harbor, both for safety and supply, or at a minimum in the lee of a reef or island as even knowledgeable pilots were wont to do (Hansen 1962: 200–201).

A study by Julian Whitewright has determined that the average speed for square-rigged vessels in optimal weather was 4.4 knots, with a speed of only 1.8 knots in unfavorable conditions (Whitewright 2011: Tables 4 and 5). This is in correspondence to the data derived from the

reconstruction of the Hellenistic ship-wreck from Kyrenia, Cyprus. The *Kyrenia II*, a replica of the Hellenistic ship wrecked off Cyprus, demonstrated that the sailing speed clocked over 19 days was an average 2.85 knots with speeds "down-hill", that is with wind full astern, nearly 12 knots (Katzev 1990: 255; Cariolou 1997: 94). Thus, over a sailing day, one could expect to cover at the average 30 to 50 km ideally. Whitewright recognizes that "understanding of the relationship between environmental conditions and ancient ship technology as a way of elucidating the maritime routes of the Red Sea..." (Whitewright 2007: 77). Consequently, knowledge of ancient ship capabilities may then begin to predict, or delineate better, the locations of possible harbors not yet known or located.

For an example of this we can look at the Levantine coast. From Gaza north into Syria, the coast is mostly uniform— there is a steady current from the south, there are few mountains, cliffs, islands, or reefs, the coastline is low and overall straight, and there are ample enough re-sources along the entire way. An analysis of the seaside settlements, ranging from village harbors to major cities reveals that many of these harbors are spaced 10 to 30 km apart [*Fig. 3*]. Given the speed of nearly 3 knots clocked by *Kyrenia II*, all these harbors are reachable in the space of one sailing day as ten hours at sea dur-ing the optimal sailing summer season is wholly reasonable. Thus, the spacing of Levantine harbors appears to have been, in part, a function of the seafaring capa-bilities of boats. Of course, one may look
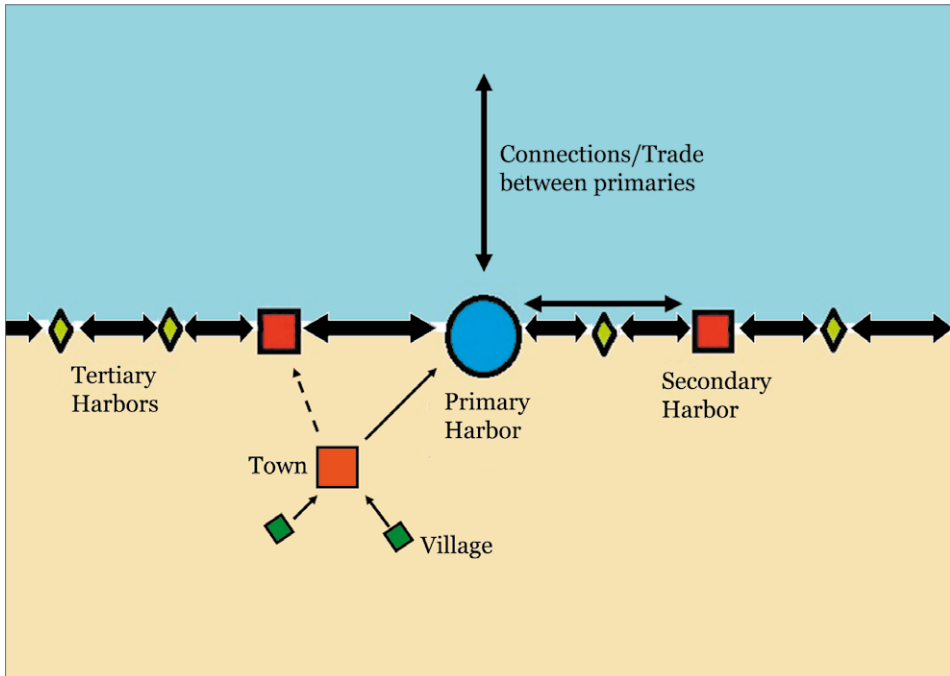

Fig. Levantine Harbor Placement Model (Processing R.K. Pedersen)

at this from the reverse view in which the spacing of harbors influences the technology of boats in that their development was limited to what was needed and not much more particularly where cabotage was concerned. Such stymieing of technology may be reflected in the supposed conservatism of boat builders. After all, there was no incentive to build a larger boat when all that was needed was a small one to haul foodstuffs and the like to the next harbor or town along the coast, thus saving time, labor, and expenses.

Can this Levantine Harbor Placement Model be applied or adapted to the Red Sea where the environmental situation is more complex and the geophysical characteristics are different? While the coast is overall a low-lying desert for the most part, and there are numerous reefs and some islands, resources, particularly water, are scarce. These factors, along with the coral shelves found along areas of the coasts, limit where a harbor can be placed, and these concerns are possibly a larger factor than watercraft capabilities. The wind regime, of course, needs consideration. The prevailing northerly winds make sailing south in the sea's northern sector "relatively simple", while in the southern part of the sea with its seasonally changing winds sailing is more complicated, forcing ships to sail when conditions "were at their most favourable" (Whitewright 2007: 78).

Whitewright analyzed sailing times in relation to speeds for the primary harbors of Berenike and Myos Hormos, challenging "a previous reliance on the Red Sea wind regime as a mean of explaining the location of port sites" with

a reassessment of the capabilities of Mediterranean style watercraft on the Red Sea (Whitewright 2007: 86). His study, however, does not address secondary or tertiary harbor sites, which surely existed, but remain elusive, particularly secondary ones. After all, how large in space and population does a secondary harbor need to be to delineate it from a tertiary one, or a primary harbor? While primary harbors are easy to identify, and it is perhaps somewhat clear to define what constitutes a tertiary harbor as they will be minimal, it is the secondary harbors, that will be more difficult to define. Ancient literature, such as the *Periplus* contains accounts of seaside inhabitants accessing the sea for food—the "Ichthyophagoi", or Fish-eaters come most readily to mind. These peoples lived by the sea and procured a large part of their diet from it. Their small villages would seemingly qualify as tertiary harbors from which they would launch small rafts and skin boats as there is nothing in the literature to suggest they were part of a wider economy, existing only at a subsistence level. In modern times, as an example, on the tip of the Buri Peninsula on the mainland across from Black Assarca, the village Inghel ekes out an existence that, except for modern materials and wooden or fiberglass watercraft, probably differs little in function and purpose from those noted in the *Periplus*. Without clear and regular connections to the nearest primary harbor, Massawa, over 50 km away, the place should be considered a tertiary harbor, although modern boats equipped with outboard engines can make the 50 km journey in under several hours.

As for shipwrecks, these can help in delineating sailing routes and may help point to yet undiscovered harbors. A shipwreck is an artifact, however, and not a feature in a site, and it is thus not necessarily connected to its find spot as would be a house or a temple. Watercraft get blown off course, drift with tides, and can wreck anywhere. Yet, the presence of one can indicate at the minimum a sailing route. The wrecks JW1 and JW2 are two wrecks, Roman and Byzantine periods respectively, found at opposite ends of the same reef near Jeddah (Pedersen 2015; see also Brandmeier 2020, in this volume). This area, part of the dangerous, barren coasts known as early as Strabo (16.4.2), is mentioned in the *Periplus* as being inhabited by vicious sea marauders called "Kanraitai" (Casson 1989: 63). Later, these seemingly same people are called "Kanaidocolpitai", indicating that they were inhabitants of a bay on the central Arabian coast (Bowersock 2013: 47, 52). This suggests the Jeddah area as it is the only bay-like feature in the immediate central area. The harbor at Jeddah was created in the early Islamic period when al-Shu'ayba was abandoned, and the Jeddah harbor does not seem to have been in use previously (Hawting 1984). There is now, however, evidence of extensive and perhaps long-lasting habitation in the general area of Jeddah (Kennedy and Bishop 2011), possibly confirming the existence of the Kanraitai and Kanaidocolpitai or similar groups. Whether either of the Jeddah wrecks were heading toward or leaving landfall at what

was to be Jeddah, or perhaps heading to shelter in nearby Sharm Abhur is, and will probably remain, unknown without further investigation. What they may indicate, however, is the existence of sea routes in an area pronounced to be too dangerous. It should not be forgotten that there was indeed some kind of maritime activity along the central Arabian coast in pre-Islamic times as the Quran (6:97; 10:22; 23:22) states that boats were launched from these shores, even undertaking night sailing, which is no small feat given the reefs of the area. Thus, even these pieces of evidence can lead us toward finding harbors.

In summation, locating harbors along the Red Sea is a challenge not only due to the environment but also to our mindset concerning what constitutes a harbor. Red Sea harbors, particularly those not arising by the influence of Mediterranean cultures, have characteristics that are divergent from long-standing harbor models. These differences were recognized in antiquity, as seen in the *Periplus*, and these should be recognized now as well to locate harbors both as points of origin and as destinations. We should look at Red Sea harbors for what they were and not through an alien Mediterranean model. The Red Sea peoples developed their own harbor forms that were simple, functional, and adapted to their own environment. If we are to locate these places, we need to adapt our own thinking to Red Sea models. Certainly, more fieldwork on both shores of the sea is needed and will be most rewarding.

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