Migration, Trade and Peoples

Part 1: Indian Ocean Commerce and the Archaeology of Western India

Edited by Roberta TOMBER, Lucy BLUE
and Shinu ABRAHAM

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Issues in Indian Ocean Commerce and the Archaeology of Western India

PREFACE

This half-day session at the London EASAA conference in July 2005 was the result of our overlapping interest in Indian Ocean commerce during the Early Historic period. This shared interest grew out of our distinct backgrounds of Classical (RT), Maritime (LB) and Indian (SA) archaeology. Despite these differences our archaeological experience was unified as we had all excavated at ports on the Egyptian Red Sea – at either Quseir al-Qadim (ancient Myos Hormos) and/or Berenike, sites critical to the context of Indo-Roman trade.

Here the intention was to focus not on the Red Sea but on peninsular India, drawing on the relationship with the West through the phenomenon labelled 'Indo-Roman' trade. Our aims for this session were to present new findings related to this trade, particularly from South Asia, and to promote further communication between scholars throughout the Indian Ocean. From this we hoped to encourage a synthetic perspective, to evaluate better the nature and extent of contacts and to reconstruct the settings in which they occurred.

Seven papers were presented in our session, four of which are published here, essentially as given on the day and submitted for printed publication in February 2007 with only minor updating. The focus of these papers ranges from the mechanisms of Indo-Roman trade from a maritime perspective outlined by Lucy Blue to the ports themselves, which were emphasised with detailed accounts of exciting new findings from Pattanam by Shinu Abraham, V Selvakumar, KP Shajan and Roberta Tomber. Unfortunately Sunil Gupta's paper on the role of Kamrej and Elephanta in the shifting patterns of Indian Ocean trade (1st – 7th century AD), and Vishwas Gogte and Rukshana Nanji's on Chaul and Sanjan, were not available for publication. The sixth paper, Pia Brancaccio's on art and craftsmen particularly of the Deccan region and the influence of Western models is also not included due to the delay in publication, but will appear as 'Terracottas from Western Deccan: an exploration of sources and transmission of models in the Early Historic period', in P. Granoff (ed), *Changing Perceptions of Early Historic India*. Oxford: Delhi (forthcoming). Finally, Roberta Tomber spoke on the variety of imported amphora finds from the West found in India and this is published here.

Over four years have now passed since the London EASAA conference; a session on Indo-Roman trade was held at EASAA Ravenna 2007 and preparations are underway for EASAA Vienna 2010. The field remains very active and research into all the areas reported on here has moved forward in terms of new evidence and new interpretations. Although only very minor changes have been made to these papers, they nevertheless still contribute to the on-going and fascinating subject of exchange within the Indian Ocean.

Roberta Tomber, London
Lucy Blue, Southampton
Shinu Abraham, Canton
October 2009

Boats, Routes and Sailing Conditions of Indo-Roman Trade

LUCY BLUE

This paper addresses particular aspects of the mechanics of trade between Rome and India, briefly discussing the context, but focusing predominantly on a vital but little known element of this trade, that is the vessel of trade – the boat.

ROUTES, TIMINGS AND HARBOURS

The direction and duration of winds in both the Red Sea and the Indian Ocean were so influential that they determined the sailing season and routes of merchant ships voyaging between the Egyptian Red Sea and the coast of India (Said 1991: 89–92). The key Egyptian Red Sea ports that were involved in eastern trade were Myos Hormos and Berenike (Peacock and Blue 2006; Sidebotham 1986: 48–71). From these ports of departure, the outwards journey traditionally commenced midsummer when the south-west monsoons would drive the ships across the Gulf of Aden and the Indian Ocean (Casson 1989: 13–21, 1980, 1984; Figure 1). Roman ships going to India either went to the north-west coast, where the major ports were Barbarikon and Barygaza (Casson 1989: 75–6), or they took a more direct route across the Indian Ocean to the Malabar Coast, south-west India, to ports such as Muziris and Nelkynda (Charlesworth 1974: 68; Casson 1989: 83; Young 2001: 30).

The voyage to India took about two months, resulting in ships reaching the Indian coast by September (Casson 1984: 190–1). However, the north-east monsoons on the west coast of India did not begin until late November (Casson 1984; McGrail 2001: 258), therefore, Roman merchants and seamen had about two months in India to accomplish their trade business and maintain their vessels before they started their return trip. According to Pliny (NH 6.26.106), ships set sail back from India in December or early January utilizing the north-east monsoons, arriving in Egypt in March or April. Accordingly, a return voyage to and from India could by accomplished in less than a year (Casson 1984: 190–1; McGrail 2001: 258).

Thus, the trade routes and timing of the voyages were largely dictated by the wind, and on a local level by access to appropriate anchorages, that would not only have provided shelter and water, but also access to inland trade routes and in many cases and most importantly, products of trade.

THE BOATS

The context of Indo-Roman trade is widely published (Sidebotham 1986; Young 2001) but evidence for the vessels of transportation of this trade – the boats – is not so forthcoming. What

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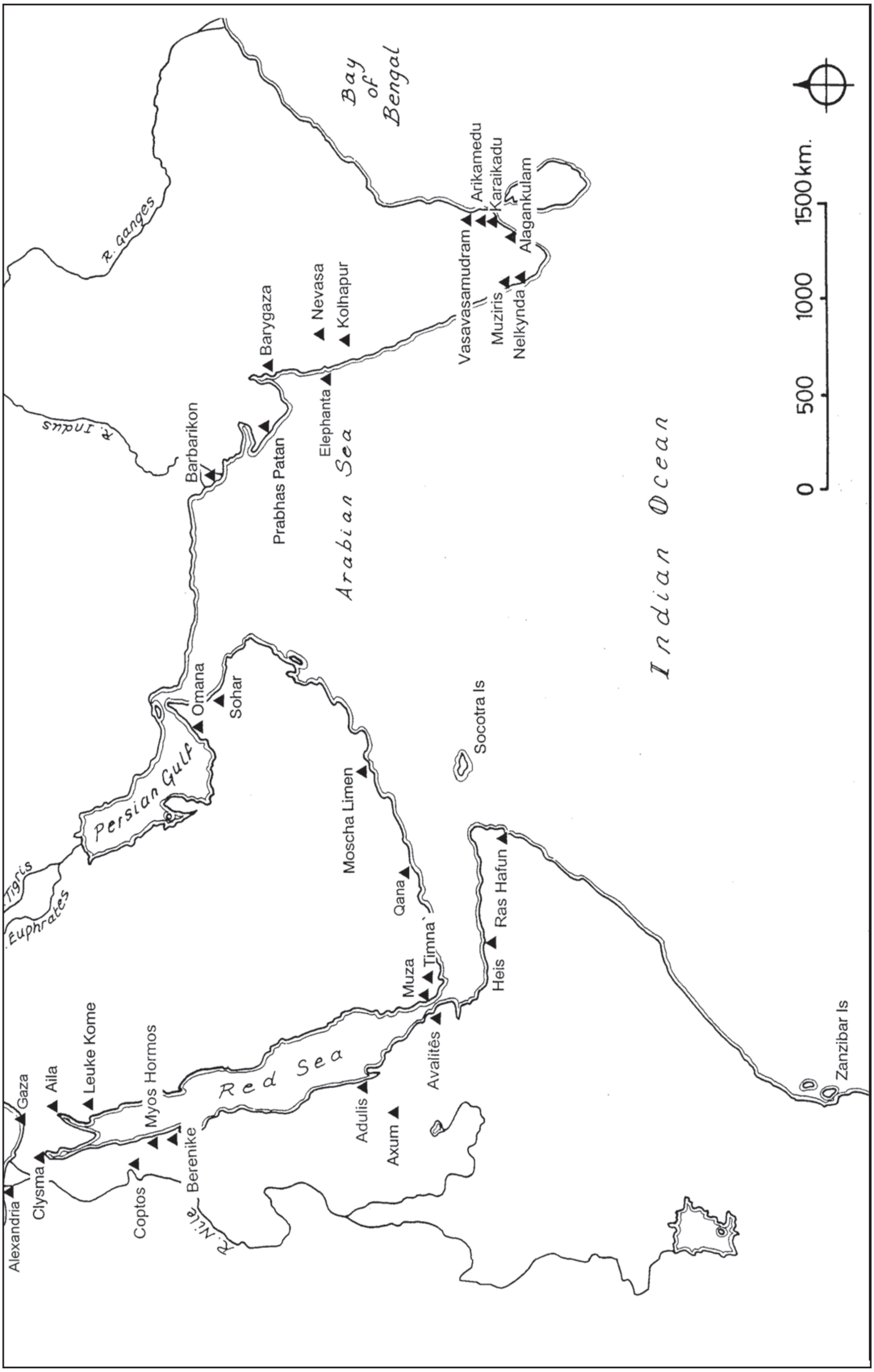

FIGURE 1: MAP OF THE INDIAN OCEAN - RED SEA REGION LOCATING KEY SITES REFERRED TO IN THE TEXT (TOMBER 2000)

type of vessels did they use? How were they built? Who built them? Where were they built? Where were they repaired? In short we have many questions and very few answers.

General assumptions have been made about the nature of vessels that were conducting trade in the Red Sea and Indian Ocean region. They are assumed to have been similar in type, shape and building tradition to Mediterranean Roman merchant vessels, that is vessel whose hulls were constructed shell-first and whose planks were secured in place by a series of pegged mortise and tenons, and propelled by a square sail (Casson 1971: 169–216; McGrail 2001: 256). However, not a single ship has been excavated to provide direct evidence for the types of vessels of this period. In fact, we have very limited evidence for vessels in the Indian Ocean–Red Sea region in general for all periods and as a consequence we rely almost entirely on iconography (see below). Evidence for the nature of traditional indigenous vessels of the region for the subsequent two millennia is also scant although they are generally described as being of sewn construction (Procopius 1.19.23–6; PME 36; Hourani 1995: 92).

In India, for example, archaeological finds are very rare and amount to a 6th century BC century log boat from Sri Lanka, the recent and exciting discovery of a Medieval boat from Taikkal-Kadakkarapally, Kerala (Tomalin *et al* 2004), and some 17th century, presumed to be European, timbers from Orissa (McGrail 2001: 249–78; Blue *et al* 1997). Depictions of boats in the Indian sub-continent have survived in the iconographic record from as early as Mesolithic rock art (Tripathi 2006: figure 3, plate 6), on seals, amulets and pots and in model form, and subsequently as reliefs on religious buildings (Sanchi 1st century BC) and 2nd century AD coins (Mookerji 1912; McGrail 2001: 253–5; Tripathi 1997). Ships are also depicted in the 4–6th century Ajanta caves. However, all these images provide very schematic clues that offer limited detail and it is often not clear whether the vessels are indigenous or belong to the Yavanas (foreigners) (Sidebotham 1986: 23). A recent graffito on a 1st–2nd century AD pot from the port of Alagankulam in Tamil Nadu provides more detail of a Roman trading vessel, with twin steering oars and two or three masts, however, again the detail pertaining to the specific construction is absent (Sridhar 2005: 67–73, figure 7).

Evidence from the Red Sea is equally sparse. Some rock art depictions of boats have been identified in the Eastern Desert, particularly at Wadi Hammamat, and display many different types of vessels but the dating of these images is problematic. A single graffito of a sailing vessel was also found on a sherd in a 1st century AD context, at the Red Sea port of Berenike (Sidebotham 1996: 315; Peacock and Maxfield 2001: 54–5).

The textual record is also very limited with respect to detailed descriptions of vessels involved in trade. References, particularly in the PME, are made to the different types of indigenous vessels observed en route and include rafts, dugouts, canoes and sewn boats, but not seagoing vessels:

> At this place there is a small port of trade, namely Avalites, where rafts and small craft put in (PME 7)
>
> They are the home ports for local boats that sail along the coast as far as Limyrike and others, called *sangara*, that are very big dugout canoes held together by a yoke, as well as for the very big *kolandiophonta* that sail across to Chryse and the Ganges region (PME 60)
>
> The island has sewn boats and dugout canoes that are used for fishing and for catching turtles (PME 15)

> The island [Socotra] has good supplies of fine-quality tortoise shell. The merchants of Kane customarily fit out small sailing vessels to trade with it (PME 33)

Intriguingly many of these vessels are still operating in the Indian Ocean today – although limited direct evidence has survived to support their continuity of use, ethnographic accounts, drawings and photographs, help breach the gap. In the 17th century a proto-ethnographer Bowrey (1905) provided illustrations of the 'primitive log rafts' referred to in the PME (60) and by Pliny (NH 6.26 and 6.105) as *kolandio phonta*, still known today as *kolamaram* or *kattumaram*, log rafts, as well as the *sangara* or log boats. Likewise, Bowrey also details sewn vessels (1905), the traditional craft of the Indian Ocean, referred to in the PME (15) and subsequently by Arab geographers and Europeans travellers, including Marco Polo who described the use of 'wretched' boats stitched together with twine made from the husks of Indian nut [coconut] (Johnstone 1988: 178). These vessels also still survive today and are known as *marsula* and *odam* (Procopius 1.19.23–6; PME 36; Hourani 1995: 92; Hornell 1920: 215; Varadarajan 1998). However, the ethnographic and more so the proto-ethnographic record whilst of value, varies widely in the quantity and quality of the technical information provided. The descriptions of the boats are limited, providing little detail of construction and technical information. The boat names, although often similar, cannot necessarily be ascribed to the same boat over the centuries, and a particular boat is frequently referred to by a number of names and different boats by the same name making identification and interpretation extremely problematic. However, this information is of value as it provides clues towards appreciating a complex subject.

Boats – the archaeological evidence

As previously indicated the archaeological record is very poor and provides limited insight other than through comparison with the rich Greco-Roman ship finds from the Mediterranean (Parker 1992). However, recent archaeological evidence from terrestrial contexts in the Red Sea ports of Quseir al-Qadim, ancient Myos Hormos and its sister port Berenike some 320 km to the south, is beginning to shed some light on this issue (Peacock and Blue 2006; Sidebotham 1996; Figure 2). Particularly interesting are the elements of ships rigging and boat hull fragments that have been recovered that give an indication of the construction, size and origin of the vessels presumably involved in trade with India.

The site of Quseir al-Qadim was been excavated by the University of Southampton between 1999–2003 (Peacock and Blue 2006). Various elements of ship structure have been uncovered, including two fragments of hull planking in a reused context. Both planks display mortise and tenon joints with a number of tenons and pegs still extant (Blue *et al* in press). The characteristics of these planks thus provide an indication of the method of construction, specifically that they were fragments of planking from a ship that was built in the Greco-Roman shipbuilding tradition (Casson 1971: 201–6) and as such may provide direct evidence for Classical influences upon the vessels that were being used for Roman trade in the Indian Ocean.

Recent excavations have also greatly increased the physical record of ships rigging (Blue *et al* in press; Whitewright 2007). Over 160 brail rings, both wooden and horn, have been recorded from late 1st and early 2nd century contexts. Brail rings were attached to square sails and served as a guide to ropes that ran up the face of the sail in order to facilitate the furling of the sail. All the complete examples of brail rings that have been recovered have one, and in some cases two, pairs of small holes pierced through their edges for the purpose of attaching them to the sail. Besides the brail rings, a number of sheaves from rigging blocks and a dead-eye, have also been

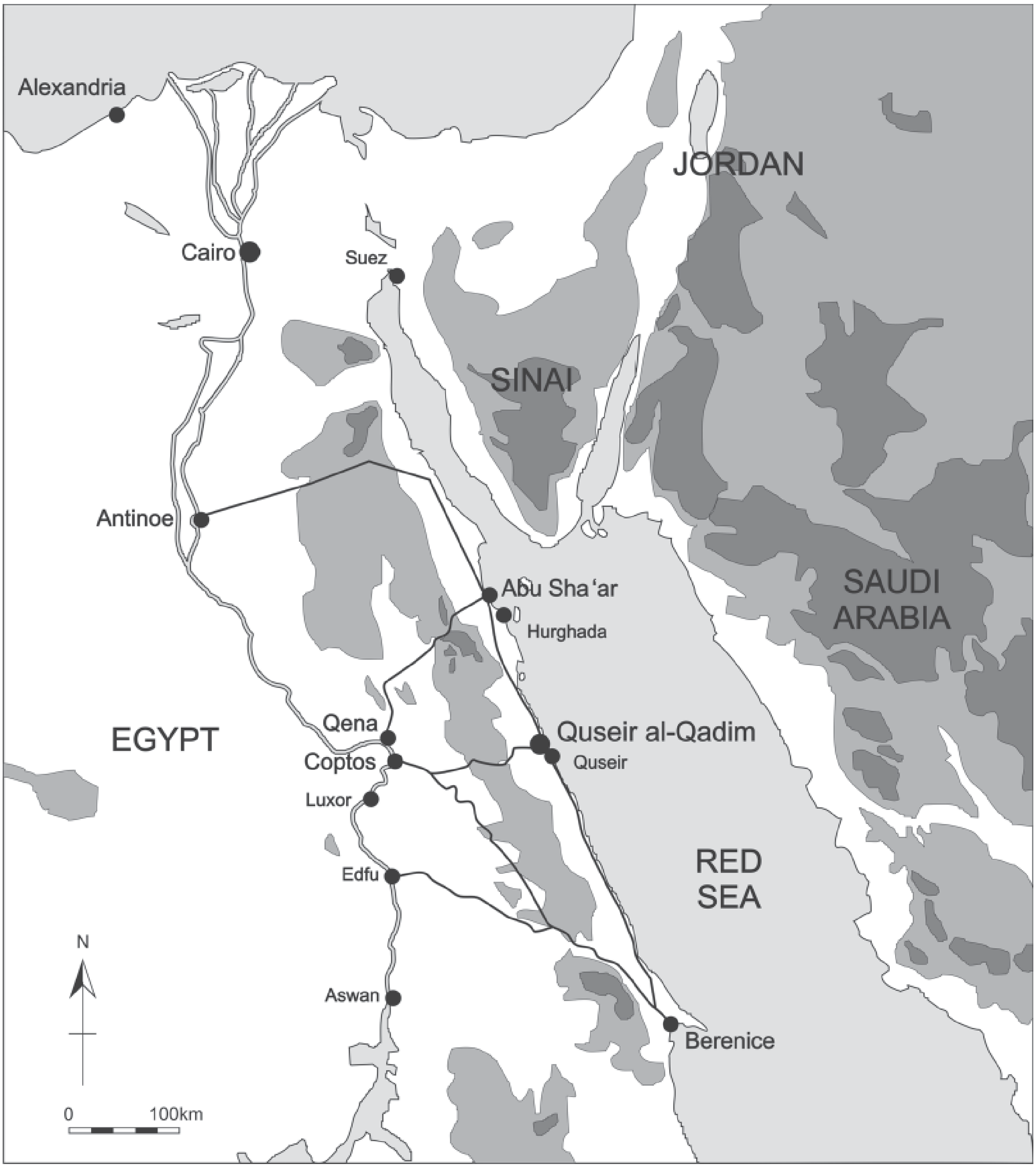

FIGURE 2: LOCATION OF QUSEIR AL-QADIM AND BERENIKE (PENNY COPELAND)

recovered, which indicate that the vessels were rigged by the traditional Roman Mediterranean square sail method. One brail ring was able to provide further clues as to the nature of the rig as uniquely it had a piece of cotton sail cloth still attached (Figure 3).

Comparable material including a number of brail rings (Wild and Wild 2001: figure 5) and reused planks (Vermeeren 1999: 316) have also been found at Berenike. Cotton fragments of the Z-spun variety, with a regular grid-pattern of cotton strips or reinforcing strips (Casson 1971: 234), were also recovered in a 1st century AD midden deposit (Wild and Wild 2001). The cotton textile fragments have been interpreted as the remains of a sail (ibid: 211–20, figures 2 and 3) and again have close parallels with finds from Myos Hormos (Handley 2003).

Direct evidence for sails used on Roman vessels is virtually non-existent. Prior to the dis-

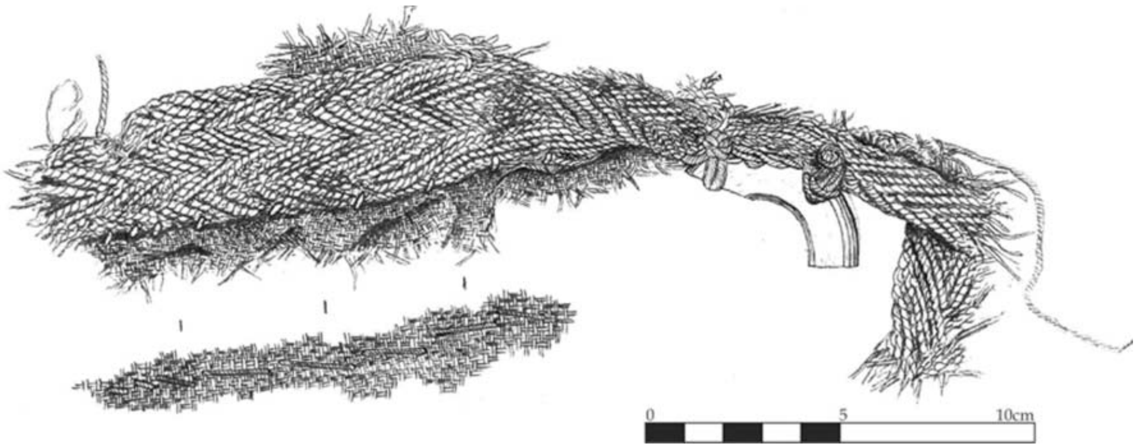

FIGURE 3: SAIL CLOTH WITH BRAIL RING ATTACHED, MYOS HORMOS, RED SEA COAST (JULIAN WHITEWRIGHT)

covery of the fragments of sail cotton from Berenike and Myos Hormos, the only other sail fragments of similar date found in an archaeological context, were discovered reused in a grave from Thebes (Rougé 1987; Schoeffer *et al* 1987 in Wild and Wild 2001: 216; Black 1996: 111, figure 6). However, numerous depictions of sails in the iconographic record from the Mediterranean describe ancient square sails (Casson 1971: 234). In addition, rigging recovered from Greco-Roman wrecks in the Mediterranean (Parker 1992; Beltrame and Gaddi 2005; Whitewright 2007) serves to confirm the types of rigging portrayed in use on iconographic depictions of Roman vessels, such as the famous 3rd century AD relief depicting a vessel in the harbour of Portus (Casson 1971: figure 144). This image shows a square-sailed vessel, with reinforced sails, brails and blocks clearly visible.

Thus, recent finds from Myos Hormos and Berenike so far appear to represent sails and rigging elements similar in nature to those used in the Mediterranean, possibly on ships constructed by the Classical pegged mortise and tenon technique (Casson 1971: figure 144). However, these ships are not operating in the Mediterranean but out of Red Sea ports, conducting trade throughout the Indian Ocean.

Boats – the ethnographic analogy – who builds the boat?

The above evidence provides more clues as to the nature of vessels that plied the Indian Ocean in the first centuries AD, what these vessels looked like and how they were constructed. However, there is still one key point that remains unanswered, where were the ships built? Were they first constructed in the Mediterranean and then hauled across the Eastern Desert before being reconstructed at the ports of Myos Hormos and Berenike? A stele found at Coptos on the Nile, details rates charged in order to transport goods and passengers across the Eastern Desert to the Red Sea. These include charges on shipwrights as well as ships equipment such as masts and yards (Milne 1898: 123–4), and thus support the fact that at least some elements of ships timbers were transferred across the desert with the intention of being assembled at the Red Sea ports. Furthermore, a roster of tolls or fees between Coptos and a Red Sea port (Lewis 1960) details how a mast and a yard had been returned after one years rental. But in this case the goods were imports moving from the Red Sea to the Nile. Egypt lacked good sources for timber suitable for building large seagoing vessels (Wachsmann 1998: 310; McGrail 2001: 16; Ward 2000: 15–24) and therefore the importation of wood was not uncommon. A closer look at the evidence from Myos Hormos and Berenike would appear to shed some light on this issue.

Firstly, it has been noted that the material generally used for making sails for ships in the Mediterranean was linen (Casson 1971: 234; Black and Samuel 1991: 220), however, the material identified as sail cloth from Berenike and Myos Hormos, is as indicated, cotton. In addition, this cotton is Z-spun rather than S-spun, S-spun being the traditional method of weaving in 'Egypt and the neighbouring Roman provinces' (Wild and Wild 2001: 212). Thus, the implication from the Red Sea finds to date is that the materials and methods of weaving the sails are not of local origin or manufacture. They are described by Wild and Wild (2001: 213) as 'intrusive' [and] the weight of ancient literary and documentary evidence indicates India to be the only practical source'.

Secondly, selected timbers used to make some of the rigging elements from Myos Hormos have been analysed in order to determine their species (M Van der Veen pers comm). Similar analysis has been undertaken on reused planks of pegged mortise and tenon construction recovered from Berenike (Vermeeren 1999: 316). Of all the species identified a few were from East Africa, however, the majority were made of teak from India. Thus, it would seem that ships operating in the Indian Ocean during the Roman Imperial period were constructed and rigged in the Greco-Roman style, but in some cases at least with Indian teak. As to the place of construction of these vessels, a number of alternative scenarios are possible.

Perhaps vessels initially constructed in the Mediterranean, that subsequently sailed to India, were being repaired in India, either by the local population or groups of westerners (Yavanas) (Sidebotham 1986: 23; Casson 1989: 24–5, 33) known to have settled in India (PME 60). Alternatively, the ships were built in ports along the Red Sea coast using timber imported from India for the hull and rigging elements (perhaps transported from the East on board vessels as a form of ballast) and Indian cotton for the sails. Again, the PME (36, 48) refers to the export of teak and 'a considerable amount of cloth of ordinary quality' from, amongst others, the port of Barygaza in north-west India (Casson 1989: 73, 81; Hourani 1995: 90). The final scenario is that perhaps some of the vessels involved with trade between the Red Sea and India were constructed in India either by 'Roman' shipwrights or Indian craftsmen, using Indian teak for the hull and rigging components, and had sails made from Indian cotton.

Pliny (NH 16.80.221) amongst other authors refers to the import of wood from the East from at least the 4th century BC. PME 36 refers to the transportation of 'teakwood', 'beams' of wood, saplings and logs exported from Barygaza to modern day Oman, as well as sandalwood (native to southern India), timbers of teakwood (northern India), logs of blackwood (Punjab and western India) and ebony (India).

In later periods India still seems to be providing timber for ship construction purposes. After AD 878 when direct trade links with China were severed, 'Indian ports such as Cochin, Calicut and Cannanore became even more frequently used by Arabian Ocean going ships not just, as had long been customary, to collect teak and benteak from the forests of the Malabar Coast for the construction of their ships (there being no suitable trees available anywhere in Arabia)…' (Boxhall 1989: 292). In the early 20th century Hornell (1942: 13) describes how 'Mysore teak is employed [in shipbuilding] for the beams and spars with Malabar teak for the shell.' He continues to discuss how many Arab vessels were built and/or purchased from Indian ports and operated throughout the Indian Ocean, Red Sea and Gulf regions. This provides further support for the idea that India continued to play a substantial role in the supply of timber for shipbuilding practices throughout the India Ocean from the early days of Indo-Roman trade.

The ethnographic record as already indicated, can also be of potential assistance here. One example in this regard is the ubiquitous Indian *huri* or log boat. This vessel as the PME indicates: 'The island has sewn boats and dugout canoes that are used for fishing and for catching turtles' (PME 15) has been operating in the waters of the Indian Ocean for at least two millennia and continues to be built and used both for inshore fishing, lightering, and as ships-boats today. Boxhall (1989: 295) states 'the small *huri* a canoe made of mango wood from the Malabar Coast… is to be found on almost every coast of the Indian Ocean'. This has been confirmed by Hornell (1942: 30) who describes them having been 'imported (to the Red Sea) from India via Aden'. Villiers (1940: 307) comments how they were transported on the decks of dhows across the Indian Ocean from India to Arabia. Recent ethnographic studies of *huris* in the Red Sea region conclude that the majority were all imported from India and this is supported by analysis of the wood used to construct the boats (Blue personal observation; J van Rensburgh pers comm). An ethnographic study conducted by the author is ongoing to determine the current distribution, variety and origin of this craft throughout the Indian Ocean and Red Sea region.

However, to finally return to the sea-going vessels, the wood discovered in Roman contexts at Myos Hormos and Berenike seems to support an East African, and more commonly, Indian origin for these vessels. Yet there are further indications that in fact we should look to India for not just the wood used to construct the vessels of Greco-Roman Indian Ocean trade, but also the boat building skills. Thus, the observations made in this paper effectively challenge previous ideas concerning the origin of vessels that plied the Indian Ocean conducting trade during the Greco-Roman period. They confirm that vessels were probably constructed in the Mediterranean style, shell-first, secured by pegged mortise and tenon joints and rigged with a square sail, and yet the materials used in their construction would indicate an origin in coastal India.

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Strategies for Surface Documentation at the Early Historic Site of Pattanam, Kerala: the Malabar Region Archaeological Survey

SHINU A. ABRAHAM

Until recently, South Indian scholars have found it challenging to rely on archaeological data to derive models of Malabar socio-economic behaviour during the late prehistoric/early historic periods of Kerala history. Obstacles to model building have ranged from an over-emphasis on data collection and site identification (rather than problem-oriented data analysis), poor chronological control, and a lack of regional data management. While archaeologists and historians have been quite successful isolating and documenting various trade entrepots described in the *Periplus* and other historical sources, they have nevertheless struggled to understand the characteristics of those indigenous communities that made overseas exchange a consistent part of their coastal economies.

The current excavations of the earliest urban settlement in Kerala at Pattanam near the mouth of the Periyar River, however, have now presented south Indian archaeologists with a unique opportunity to rethink existing perspectives about the organisation of Malabar coastal communities and the nature of their participation in early Indian Ocean trade networks (Cherian *et al* 2009, Shajan *et al* 2008). The new data emerging from central Kerala is generating a variety of questions related to the internal processes that integrated overseas, coastal, and inland exchange networks. In addition to being able to investigate such macro-regional questions as the movement of goods and populations across Kerala's coastal, midland, and highland regions, or the relationship of early settlement patterns to their environmental contexts, we can now develop finer-scaled analyses on Kerala's western coast. The Malabar Region Archaeological Survey (MRAS) has been designed to launch this micro-regional perspective by mapping artefacts and features within and surrounding the site of Pattanam.

The MRAS project has been designed to investigate the layout and organisation of early South Indian settlements through the documentation and analysis of the surface data from Pattanam. Preliminary investigations indicate that Pattanam may have operated as a coastal site linking overseas maritime trade with inland exchange systems during the Early Historic period (c 300 BC to AD 300) and may correspond to the historically well-documented ancient Malabar port of Muziris (Shajan *et al* 2005). This project not only fits into the broader context of ancient trade and urbanisation in South Asia (e.g., Tomber 2008) but also addresses the nature of an early coastal system that integrated overseas maritime networks with local production and exchange systems (Abraham 2008). Four objectives guide the MRAS project: ascertaining the extent and scale of the site of Pattanam; mapping and defining internal site characteristics; developing a broadly applicable ceramic typology; and establishing a research baseline on which to build future investigations of early Malabar socio-economic organisation.

By employing a strategy of intensive surface survey, the MRAS project investigates the urban anatomy of Pattanam as a 'special purpose settlement' (Cowgill 2004:12): a coastal center

MIGRATION, TRADE AND PEOPLES, PART 1: INDIAN OCEAN COMMERCE AND THE ARCHAEOLOGY OF WESTERN INDIA, Strategies for Surface Documentation at the early Historic Site of Pattanam, Kerala: the Malabar Region Archaeological Survey, 14-28; ISBN: 978-0-9553924-5-0

that served, at least in part, to structure Malabar economic transactions. It is possible that Pattanam was established in response to the growing need of Malabar communities to efficiently merge escalating overseas trade with internal economic systems. An intensive surface analysis will help archaeologists appreciate the role of such coastal settlements as complex nodes linking lowland polities, upland foragers-traders, and non-local merchants (Morrison 2002) and will lead to a more nuanced characterisation of Malabar urbanism. The purpose of MRAS, however, is to move away from preconceived categories for urban settlements as 'mercantile' or 'administrative' (Fox 1977), or as 'primate centers' or 'disembedded capitals' (Blanton 1976: 257). Rather, the intent is to follow Cowgill's prescription to reconceptualise the organisational characteristics of early settlements in terms of a range of defining variables, including settlement size, nature of physical edges, spatial segmentation, dispositions of consumption activities, variability in labour investment, and environmental constraints (Cowgill 2004: 543) – variables that may be documented through intensive, problem-oriented surface survey. By shifting the focus from normative models, this research programme represents an effort to contribute to the growing diversity of expressions of early South Asian urbanism (Smith 2006). The findings will thus make it possible to evaluate the relevance of Pattanam as both a member of the greater South Indian cultural landscape and as a participant in Indian Ocean trade relations.

MRAS also seeks to present a new perspective on Early Historic social organisation in South India, which, despite a century of research, is still inadequately understood (Trautmann and Sinopoli 2002). Prevailing approaches to the emergence of urban forms is South Asia are being re-examined (Smith 2006; Morrison and Lycett 1994; Sinopoli 2001). In South India, much work remains to be done, for example, in standardising ceramic chronologies, delineating site categories, and exploring the interplay between the environment on socio-economic development. These are especially pressing questions in the southernmost states of Kerala and Tamil Nadu, where synthetic studies are largely lacking. Finally, framed as an intensive fine-scaled analysis of surface distributions within and surrounding Pattanam, this project balances concerns about broader interegional processes with questions about local agency (Stein 2002: 914); this is an opportunity to counter traditional views of Muziris and other South Asian ports as passive peripheral players in an interregional system dominated by certain non-local core members, and instead view South Asian communities as actively engaged and invested participants in their own right.

In addition, MRAS will contribute to Indian Ocean trade studies by supplementing the rich data being recovered from excavations at one of its most important participants: the Malabar port Muziris. Lacking better options, scholars located Muziris at the nearby Medieval site Kodungallur or Cranganore (Achan 1946; Gurukkal and Whittaker 2001). However, distance measurements provided in the *Periplus*, coastal geomorphological studies, and the presence of Roman wares at Pattanam provide stronger corroboration that instead Pattanam may be identified as Muziris (see also Shajan *et al* 2004). Although archaeological research on Indian Ocean trade exists for other regions within South Asia (Carswell 1996; Coningham 2002; Gogte 2004; Irani 2002; Pramanik 2004; Shinde *et al* 2002; Begley *et al* 2004) and throughout the Indian Ocean littoral (Ardika 1995; Chami 1999; Gogte 1999; Horton and Middletown 2000; Horton 1996; Reade 1996; Retzleff 2003; Rougeulle 1999; Sedov 1996; *Wendrich* et al 2003), systematic research along the Malabar coast has just begun. This is remarkable when we realise that Roman records provide detailed information about Malabar participation in long-distance maritime trade (Ray 2003; Parker 2002; Casson 1989). Further, the texts make numerous references to Muziris. Pliny's *Natural History* (NH 6.104), for instance, claims that sailors could use monsoon winds to reach Malabar ports in forty days. The Peutinger Tables, a series of maps composed in AD 222, include a rendering of the southwestern coast of India, on which can be found a notation for Muziris, as well as a possible nearby temple of Augustus (Gurukkal and Whittaker 2001: 337). The Vindob papyrus is a mid-2nd century AD document dealing with the shipment of goods imported to Egypt from Muziris (Casson 1986; Rathbone 2001). Finally, the *Periplus Maris Erythraei* (one of the earliest records of organised Roman maritime trade to India) is a mid-1st-century AD mariner's guide for merchants dealing with the ports and goods from Africa, Arabia, and India. With almost half the text devoted to Indian ports of trade (Casson 1989: 21), the writer makes it clear that Muziris was one of several important emporia along the Kerala coast. The proposed research therefore fills an important intellectual gap in Indian Ocean studies: the precise nature of Tamil participation in the trans-oceanic trade networks of the first centuries AD.

MRAS PROJECT AREA

The state of Kerala is a narrow strip of land in the south-western part of India with a long coastal front that incorporates the Malabar Coast. Three subregions subdivide the state into nar-

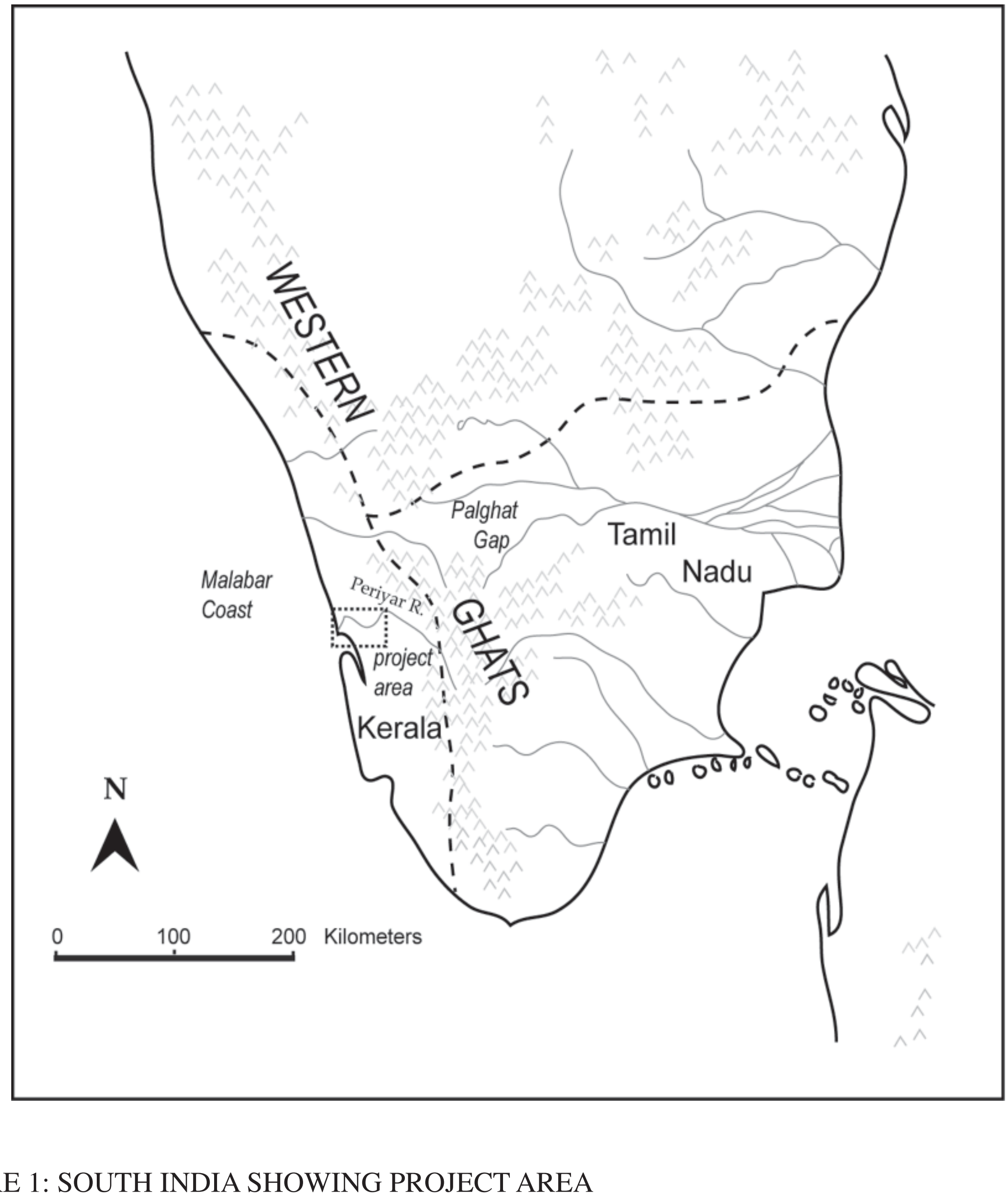

FIGURE 1: SOUTH INDIA SHOWING PROJECT AREA

row, east-west strips: the low-lying alluvial coastland, the middle laterite plateaus and foothills, and the gneissic highlands of the Ghat Mountains (Ramachandra Nair 1986; Spate and Learmouth 1967). The sub regions are in turn intersected by over 40 west-flowing rivers; the largest of these is the Periyar River, which drains into the Indian Ocean in the Malabar coastal region and at whose mouth the site of Pattanam is situated. The Malabar Coast (Figure 1) forms a part of the alluvial coast, which includes marshes, lagoons, and backwaters extending over 300 km (Spate and Learmouth 1967: 675). The physiography of the tropical coastal plain is characterised by low relief, generally 4–6 m above sea level, with numerous beach dune ridges that run roughly parallel to the shoreline. In the Malabar region, canals and backwater transport routes form complex networks along the coast that even today serve to integrate the local population.

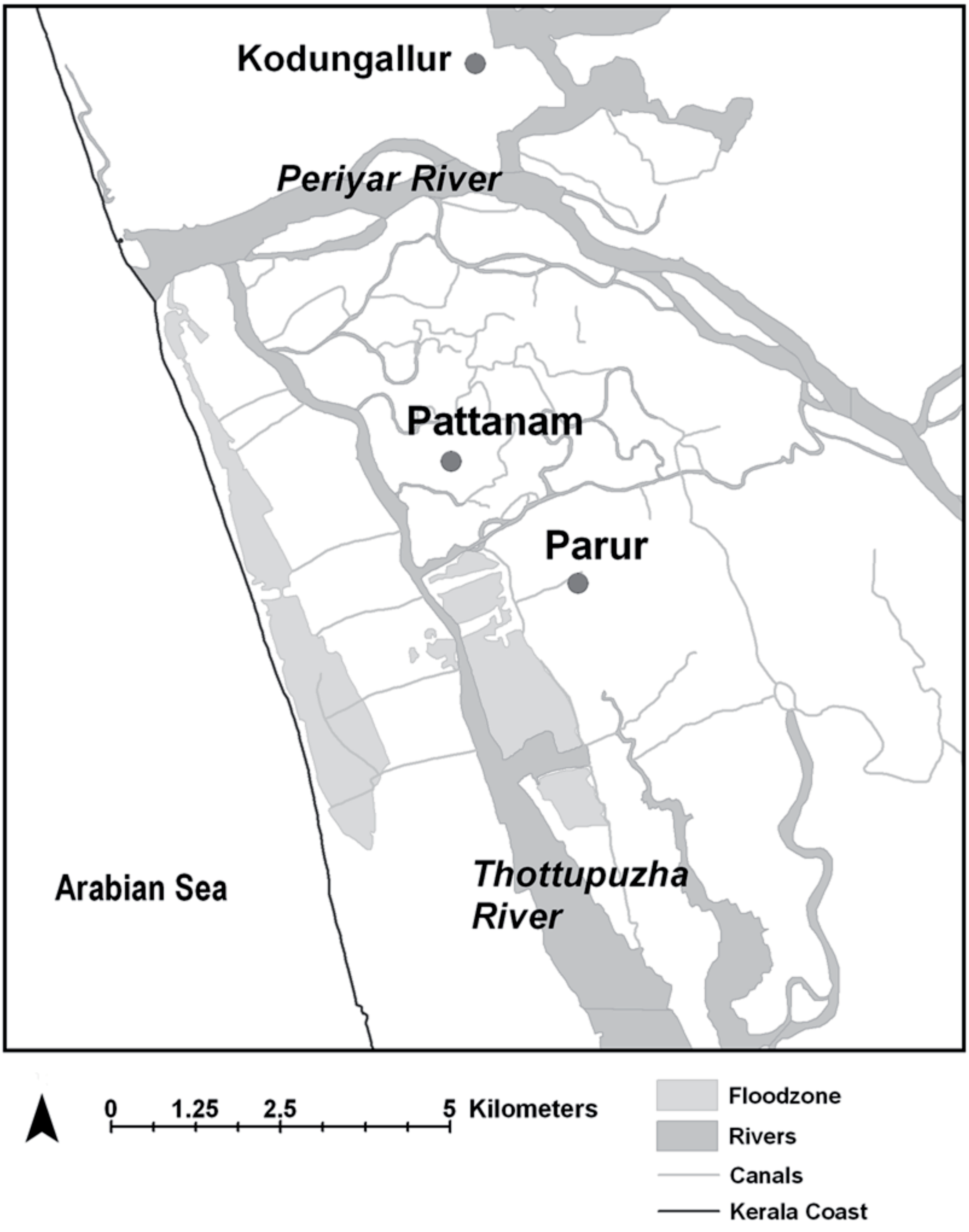

FIGURE 2: MALABAR COAST, KERALA

Geomorphological studies of the Malabar coast provide ample evidence for fluctuations in sea level during the Pleistocene and Holocene; the widest expanse of coastal build-up occurred during Holocene times in the stretch where Pattanam is located (Gurukkal and Varier 1999; Sreekala *et al* 1998). This region is characterised by sand ridges and paleo-beaches (Bhattacharya *et al* 1979; Shajan 2004; Ramachandra Nair 1986; Soman 2002). Based on archaeological and geological surveys, it has been argued that the coastline during the Early Historic period was located several kilometers inland from the coast, where the Thottupuzha River now lies (Shajan 2004).

Pattanam (Figure 2) is located about 0.5 km north-west of Parur city, and was discovered during geoarchaeological surface explorations along the Malabar coast (Selvakumar *et al* 2005; Shajan *et al* 2004). Situated near the mouth of the Periyar River, Pattanam is 5 km from the present Indian coastline and less than 2 km from the purported paleocoastline (Narayana *et al* 2001; Shajan 2004). This coastal zone is part of an extensive estuarine system of backwaters and forms a natural harbour that has been active throughout Kerala's long maritime history (Menon *et al* 2000; Soman 2002). Trial excavations by Shajan and Selvakumar show that Pattanam is a multi-phase site with occupational layers that include the Iron Age (c 1000 – 300 BC) and Early Historic (c 300 BC to AD 300) periods (Selvakumar *et al* 2005; Shajan *et al* 2004). The discovery of Roman amphora fragments and other non-local wares at Pattanam (Tomber 2005) supports the assertion that Pattanam was a port site engaged in trade with the Roman empire, whose merchant-sailors actively sought valued spices such as Malabar pepper (Casson 1986; Parker 2002; Ray 2003; Reade 1996; Thapar 1992; Casson 1989). Beyond initial surface explorations and trial excavations, no further detailed work took place at the site until the MRAS project.

The discovery of Pattanam/Muziris presents south Indian archaeologists with an opportunity to examine an urban center that was actively involved in integrating overseas and local trade networks. It has been suggested that the scale of overseas and inland trade at this time may have stimulated the rise of urbanism and other dimensions of complex social organisation (Maloney 1969; Maloney 1970; Thapar 2002), and that inland trade routes functioned principally as points of intersection designed to connect multiple coastal-based systems linked by port sites (Heitzman 1984). Pattanam may have functioned in ways similar to the south-eastern Indian port site Arikamedu, which is thought to have occupied a pivotal position balancing inland, coastal, and trans-oceanic networks (Begley 1996: 1). If so, then the investigation of environmental, settlement, and artefact distribution patterns at Pattanam will yield valuable information about the role of this port site as a socio-economic magnet for the collection, warehousing, and redistribution of trade goods, and perhaps even as a secondary political capital (Champakalakshmi 1996: 120–2). Rather than assuming the nature of socio-economic organisation in this emergent urban settlement, however, this project seeks to use material data to help determine how Pattanam was actually structured and organised.

FIELD RESEARCH GOALS AND METHODOLOGIES

The early seasons of MRAS are focused on collecting archaeological and spatial data associated with the site of Pattanam itself. Two seasons of surface survey at Pattanam have already taken place (in 2004–5 and 2005–6), resulting in the construction of a GIS site database and a preliminary artefact corpus (including nearly 10,000 ceramic sherds) from 10 hectares in the site core. Preliminary results from these two seasons (Abraham 2005) demonstrate both the feasibility of the proposed work and the value of a problem-oriented survey in order to address the key questions described above. Three intertwined goals structure the field research: 1) developing a ceramic typology for Pattanam; 2) documenting general site layout and organisation; and 3) documenting artefact density and distribution, especially for ceramics. The first goal, to develop a ceramic system, addresses a fundamental need for present and future archaeological investigation in Kerala. The second and third goals will contribute to our delineation of both formal characteristics of the overall site and functional variability within the site.

As noted earlier, effective ceramic chronologies and classification systems are largely lacking for South India. Because of this, the ceramics are being treated as a single assemblage; a series of qualitative and quantitative variables will be measured and recorded in a relational database, following strategies employed at other South Indian sites (Sinopoli 1999; Smith 2002; Abraham 2002). As a value-neutral strategy, this system will allow for comparison across sites within the Malabar region and with ceramic collections from other sites in South India in an effort to situate Pattanam as part of an inland coastal trade network (Guderjan and Williams-Beck 2001). Furthermore, when these ceramic data are eventually correlated with the huge database of local earthenwares recovered from stratified contexts in the Pattanam excavations, it will be possible to explore the range of chronological variation in the surface remains. During the winter field seasons, all collected ceramics sherds are weighed, counted, and sorted. During the summer lab seasons, the ceramics are analysed and catalogued by recording a variety of attributes: interior and exterior surface treatment, interior and exterior colour, vessel form, wall thickness, and inclusion type. Other relevant data include morphological and metric data on diagnostic sherds: rims, handles, bases, and decorated sherds. We know that Pattanam is a multi-period site, but a ceramic chronology is still under development (Selvakumar *et al* 2005). Once the chronology is published, it may be possible to link the ceramic categories derived from the MRAS project with chronologically controlled data, allowing investigation of the distribution and range of datable ceramics across the site. In addition, we plan during this project to collect samples from clay sources in the survey domain, and selected sherds will undergo X-ray diffraction (XRD) analysis to help determine possible production sources. Compatibility will be an important reason for choosing XRD, especially for sherds identified as Rouletted ware, which have undergone similar examination from Arikamedu and other sites (Gogte 1997; Gogte 2002). Such analysis will have a number of benefits, not only for understanding Pattanam, but more generally for relating Pattanam to other Early Historic sites in South India. It is hoped that eventually the south Indian archaeological community will together produce a comprehensive ceramic classification system that can be adapted for future investigations within India and throughout the Indian Ocean littoral.

A key goal of MRAS is to confirm and establish the surface morphology of the site, the distinctiveness and nature of site borders, and the presence of satellite sites. Other concerns are to identify patterns of surface variability, to interpret the reasons for these patterns, and to discriminate between those that are culturally relevant and those that may be post depositional (Gregg *et al* 1991). Post-depositional disturbance resulting from long-term occupation (ranging from construction activities to small cultivated zones) is inevitable; current activities are documented in the field through observation and village interviews. The ancient site currently sits under a small village; mapping and survey strategies have therefore been designed to try to mitigate problems associated with long-term occupation and subsequent site disturbance. The survey design employs three scales of measurement: 1) collection units, based on individual living compounds; 2) 250 x 250 m grid cells; and 3) nested subzones. The contemporary village is already subdivided into a collection of irregular, adjacent living compounds, so it was deemed most efficient to collect and record surface remains based on these divisions. These collection units are in turn grouped into a series of contiguous evenly-spaced grid cells, demarcated for the entire 2.5 sq km survey domain. The grid cells are then grouped into three concentric subzones:

the Core Zone, the Inner Zone, and the Outer Zone. A nested scale such as this will allow for the identification of the range and intensity of artefact distribution at different scales of analysis.

Surface architectural features will be mapped and described in detail, keeping in mind that the visibility of early architectural remains are subject to certain environmental forces in a semi-tropical setting (Johnston 2002: 56). The distribution and density of architectural features such as brick alignments, Early Historic roof tiles, and terracotta ring wells will allow for the spatial segmentation of functional and residential areas. The comparison of intrasite structural components may provide information about intrasite social groupings (Conlon and Moore 2003). Architectural debris will be recorded (and selected samples collected) for each survey unit (compounds, grid cells, and zones). Continuing with the strategy employed during the 2004–5 and 2005–6 seasons, the survey team will record in the field the location, count, circumstances, and relative density of material debris from each compound. Another important feature to be mapped is the network of active and residual canals that crisscross the site and its environs. As in Cambodia's Mekong Delta during the Early Historic period (Stark and Sovath 2001), Malabar canal systems very likely functioned as transport and communication routes linking Pattanam to the coast and to other sites in the immediate vicinity. Also informative will be the potential discovery of associated sites, such as craft activity areas or mortuary sites, in the 2.5 km area surrounding the site. Finally, Quickbird satellite imagery from Digital Globe (0.6 m panchromatic resolution and 2.4 m colour resolution) has already been purchased for the 430 sq km region around Pattanam; these digital data will provide an environmental context for the Pattanam study, in terms of landscape forms, coastal mapping, possible transport/communication corridors, and resource distributions.

Because historical records provide little detail on matters of community economy, social organisation, and spatial diversity at Pattanam, our understanding of these matters must derive from a detailed study of artefact distribution patterns. Of course, attributing cultural significance to these patterns is an analytic challenge, but it serves as a first step toward deciphering the multiple reasons for variability that range from temporal changes to consumer choices to inter-workshop differences (Sinopoli 1999: 125–6). At Pattanam, ceramics comprise the largest category of artefacts. The traits to be recorded will cross-cut those used to develop the ceramic typology described earlier. Other spatially relevant data include counts, weights, and percentages of different ceramic wares (both local and non-local) and vessel types (including vessel size and shape) for each collection unit, grid cell, and subzone. The distribution of ware categories and ceramic types will provide insights into intra-site consumption patterns and help to sharpen the discrimination among different neighbourhoods within the settlement. Across the site, spatial patterns in vessel morphology will provide information about functional distributions. For instance, an important feature of any urban settlement (and especially a trading port) is warehousing surplus goods; a higher-than-normal density of large storage vessels in certain zones may indicate storage facilities. Conversely, a concentration of smaller vessel types such as bowls may suggest residential areas. The investigation of these sorts of spatial relations are an important supplement to the recent discovery of below-ground features, especially the boat and wharf features at Pattanam (Cherian *et al* 2009). A question of particular interest is the range, distribution, and densities of non-local wares such as Rouletted ware, Roman amphorae, and West Asian ceramics. Based on surface distribution, do these foreign ceramics cluster in certain portions of the site, and are they associated with certain architectural features, local ware categories, or certain neighbourhoods?

Thus far, the MRAS team has completed almost 10 of the approximately 24 hectares comprising the core of the Pattanam site (Figure 3) in order to document fine-scaled ceramic, artefact, and architectural debris distributions as indicators of intra-site organisation. As mentioned, almost 10,000 sherds have been recovered; initial examination of the ceramic collection shows a variety of South Indian wares, including Black-and-Red ware, Red ware, Black ware, Grey ware, and Rouletted ware (Abraham 2005: 4). Also recovered were imported wares, including Roman amphorae and examples of possible West Asian wares. A small number of beads were also found, including one carnelian bead blank, perhaps an indication of craft production at Pattanam. The survey also documented extensive Early Historic bricks, roof tiles, and terracotta ring wells (some in situ), making it possible to speculate on intra-site organisation. The first lab season for ceramic analysis took place in is July/August 2006 and a preliminary data profile is

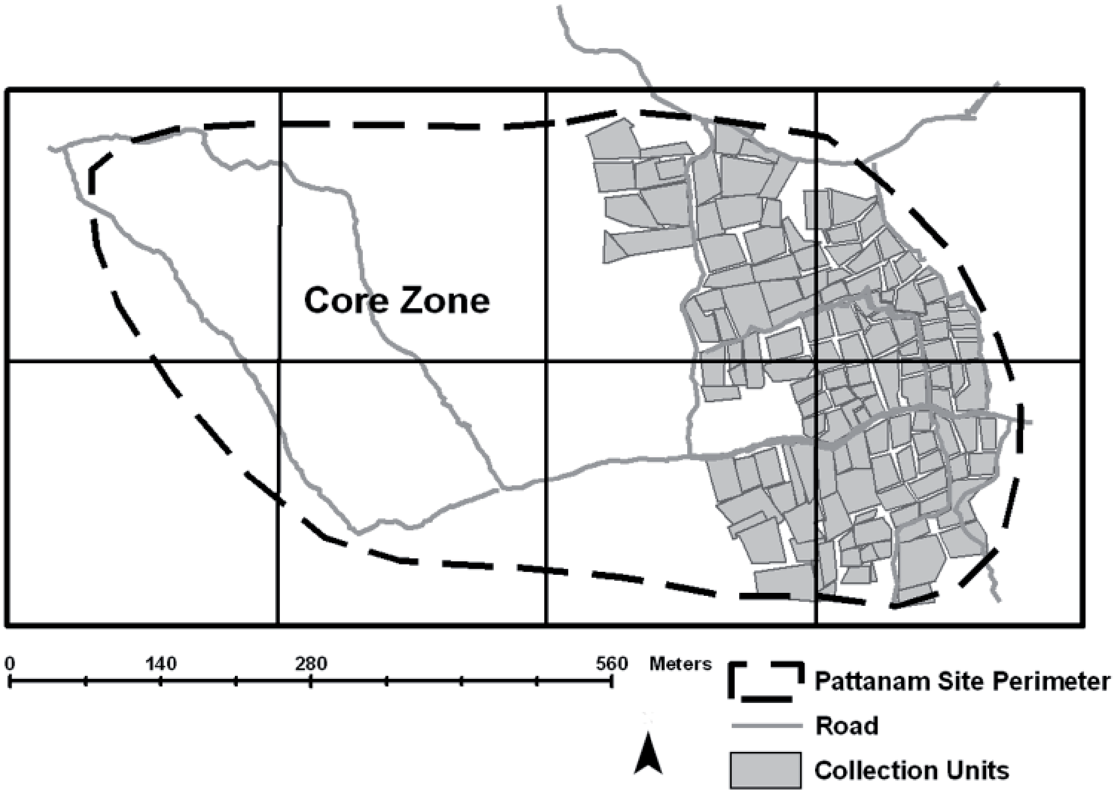

FIGURE 3: CORE ZONE, PATTANAM

currently in preparation, as is a MRAS GIS database.

SITE MAPPING STRATEGY

For the surface documentation of Pattanam and its immediate environs, a 6.25 sq km survey domain was blocked out around the site. This 2.5 sq km area was then subdivided into 100 cells, each measuring 250 x 250 m (6.25 hectares each). Just over 25% of the grids from the south-west corner of the survey domain were removed from the sampling domain, in order to eliminate 1) those units located on the western bank of the Thottupuzha River, which marks the paleocoastline during the Early Historic period, and 2) those units that are difficult to survey because of seasonal floodplains or paddy fields. Removing these cells left a total of 73 grid cells, equaling 456.25 hectares. These remaining cells were then subdivided into three nested, contiguous survey subzones (Figure 4). The innermost Core Zone comprises the 8 cells or 50

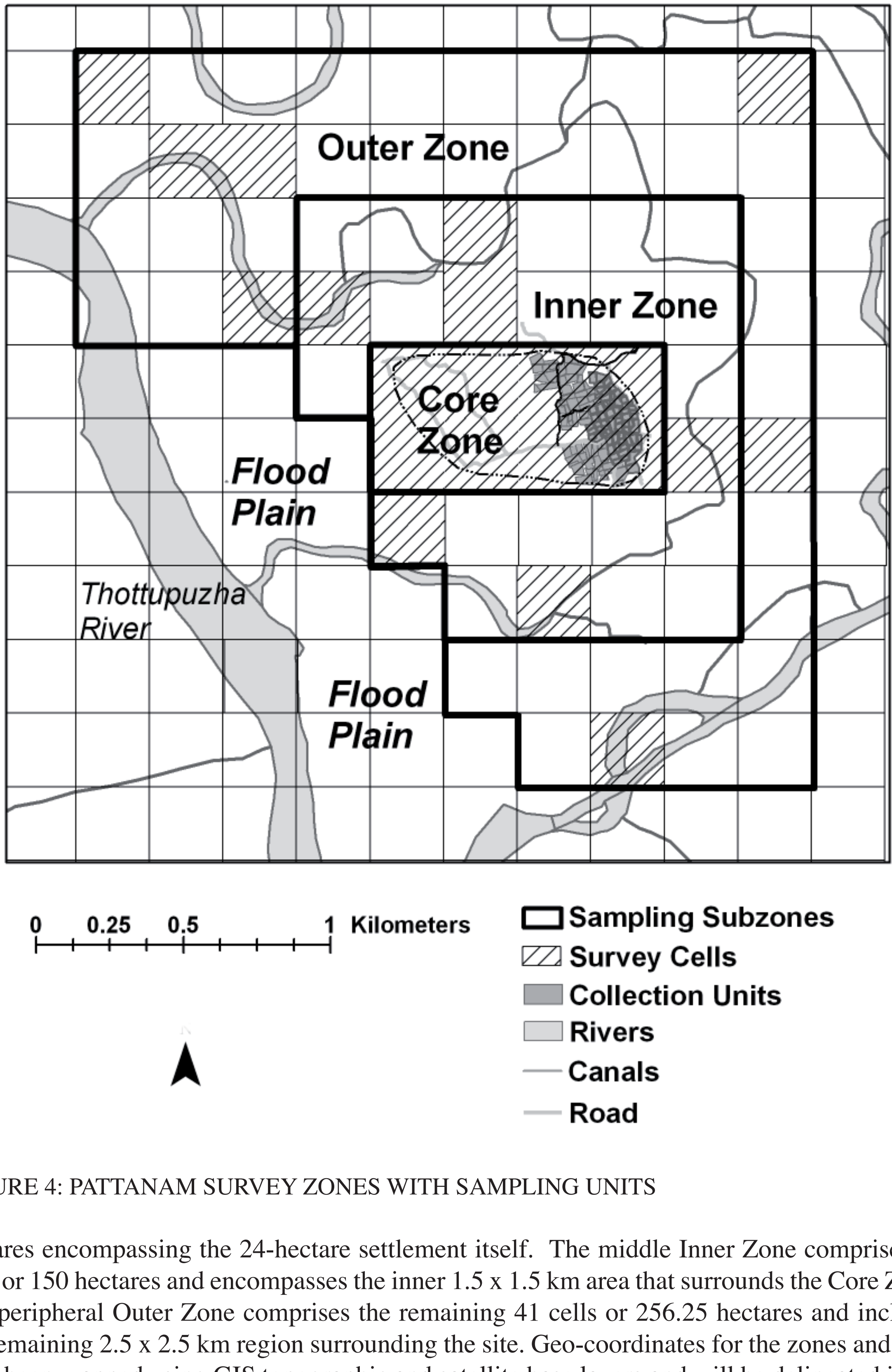

FIGURE 4: PATTANAM SURVEY ZONES WITH SAMPLING UNITS

hectares encompassing the 24-hectare settlement itself. The middle Inner Zone comprises 24 cells or 150 hectares and encompasses the inner 1.5 x 1.5 km area that surrounds the Core Zone. The peripheral Outer Zone comprises the remaining 41 cells or 256.25 hectares and includes the remaining 2.5 x 2.5 km region surrounding the site. Geo-coordinates for the zones and cells have been mapped using GIS topographic and satellite base layers and will be delineated in the field using Trimble GPS units.

The Core Zone is currently undergoing 100% survey coverage. Once the Core Zone is complete, the Inner Zone will undergo 25% coverage, and the Outer Zone will undergo 15%-20% survey coverage. The complete survey of the Core Zone will inform about the community layout and organisation, as well as the differential distribution of artefacts and architectural features. The selected sampling of the Inner and Outer Zones will allow us to confirm the extent and perimeter of the urban settlement, to map surrounding canal networks, and to recover information about ancillary craft and mortuary sites that may be linked with the urban core. The actual collection program involves the recovery of all diagnostic pieces and all body sherds larger than 20–30 mm. Ceramics are bagged and tagged by collection unit; later they are taken back to the lodging facility to be washed and sorted. Early Historic bricks, tiles, and other architectural debris are mapped and counted in the field, but not collected, unless they exhibit atypical characteristics. Special attention is given to features in situ such as brick alignments and terracotta ring wells.

Although GIS is a part of many current South Asian projects, this is the first time it is being used for the management of a long-term regional survey in Kerala. The value of GIS lies in its ability to manipulate large data sets (Bevan and Conolly 2002; Conolly and Lake 2006; Ebert *et al* 1996; Wheatley and Gillings 2002), making a logical foundation for the MRAS project. Currently, the database includes topographic data for central Kerala, results of all published surveys and explorations in three districts comprising the Malabar region (Chedambath 1997; Peter 2002), MRAS 2004–5 and 2005–6 survey results, and satellite images for the deltaic portion of the Periyar River.

The database, to date, comprises base layers that include topographic sheets and satellite imagery. Other layers currently in development are the collection units, canal and water systems, contemporary transport routes, etc. At the moment we are extracting and digitising data from topographic maps and satellite images, including contour lines, hydrology, vegetation zones, and geological formations. We are also collecting and digitising archaeological site data from published sources for the greater Malabar region, and will design and generate attribute layers resulting from the analysis ceramics and feature distributions. A relational database for ceramic attribute data is currently in development; the GIS database will also make it possible to examine easily the significance of intrasite spatial patterning of ceramics, including cluster analysis and density analysis (Conolly and Lake 2006).

CONCLUSIONS

Although problem-oriented archaeological investigations into Late Prehistoric and Early Historic South India are certainly growing, substantive contributions from sites in Kerala are only just now becoming available, triggered in no small part by the new insights made possible by the Pattanam excavations. Hence the MRAS project will advance our knowledge of a region in South Asia where systematic archaeological work is lacking. With relatively few studies specifically addressing ancient Tamil urbanism, the research at Pattanam will provide new data that can be integrated into the larger archaeological investigations on South Indian patterns of urban development. Whether or not Pattanam is conclusively identified as Muziris, the site and its environs will provide much needed information about how Indian coastal settlements structured themselves as active participants in trade relations with other Indian Ocean partners, and how they integrated overseas exchange with inland production/exchange systems. Finally, this project addresses the need to re-evaluate the utility of current models of the ‘state,’ ‘chiefdom,’ ‘city,’ and ‘urbanism’ by presenting a South Asian case study that explores in detail just one of the many diverse cultural, ecological, and historical landscapes in which urban settlements first emerged.

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Archaeological Investigations at Pattanam, Kerala: New Evidence for the Location of Ancient Muziris

V. SELVAKUMAR, K.P. SHAJAN AND ROBERTA TOMBER

The history of Indo-Roman or Indian Ocean trade on the Malabar Coast has traditionally been dominated by literary accounts because of the lack of archaeological evidence. In the absence of evidence for ports and settlements, no significant progress could be achieved in the understanding of the role of this important region, strategic both for distributing local products such as pepper to the Mediterranean and as a transshipment point for goods such as gems from the interior of India. What was intriguing in this context was that despite the discovery of characteristic Indian ceramics, including Rouletted ware, in regions as far as Egypt in the West (Tomber 2000) and Indonesia in the East (Walker and Santoso 1977), Kerala has drawn a blank for such material remains, until the identification of Pattanam. A well-established view has located the ancient port of Muziris – an important commercial port discussed by both Greco-Roman authors (including the *Periplus Maris Erythraei*, Casson 1989: 296) and the indigenous Sangam Tamil texts (*Akananuru* 149 in Zvelebil 1973: 35, n 1; Champakalakshmi 1996: 120–2) – at Kodungallur (Cranganore) on the northern bank of the river Periyar (Gurukkal and Whittaker 2001). Against this background the research undertaken at the site of Pattanam has, for the first time, brought out interesting material evidence for Indo-Roman trade in Kerala, as well as indicating a different location for ancient Muziris. This paper discusses the geological, archaeological and toponymical evidence that support Pattanam as the site of the ancient port of Muziris.

Location and environmental background of Pattanam (Figure 1)

Pattanam is in the delta of the river Periyar that drains the western slope of the Western Ghats in Kerala. This delta has played a significant role in the history of Kerala as the centre of occupation from the Early Historic to the modern period. The site of Pattanam is part of Vadekkekara village in Chittatukara Panchayat, Paravur Taluk, Ernakulam District. Pattanam is 2 km north-north-west of North Paravur, 4 km south of the river Periyar and c 4 km east of the Arabian Sea coast. Approximately 1 km south of the site flows the Paravur Todu, a distributary of the river Periyar; 1 km west of the site is the Tattapally River, a backwater body that runs parallel to the coast. To the west of the Tattapally River is the land stretch called Vaippin Island with the Cherai beach adjacent to the Arabian Sea. The delta is marked by coastal and alluvial sediments, a few marshy areas and sand deposits. A few networks of meandering canals are also found in this area, some of which are considered artificial.

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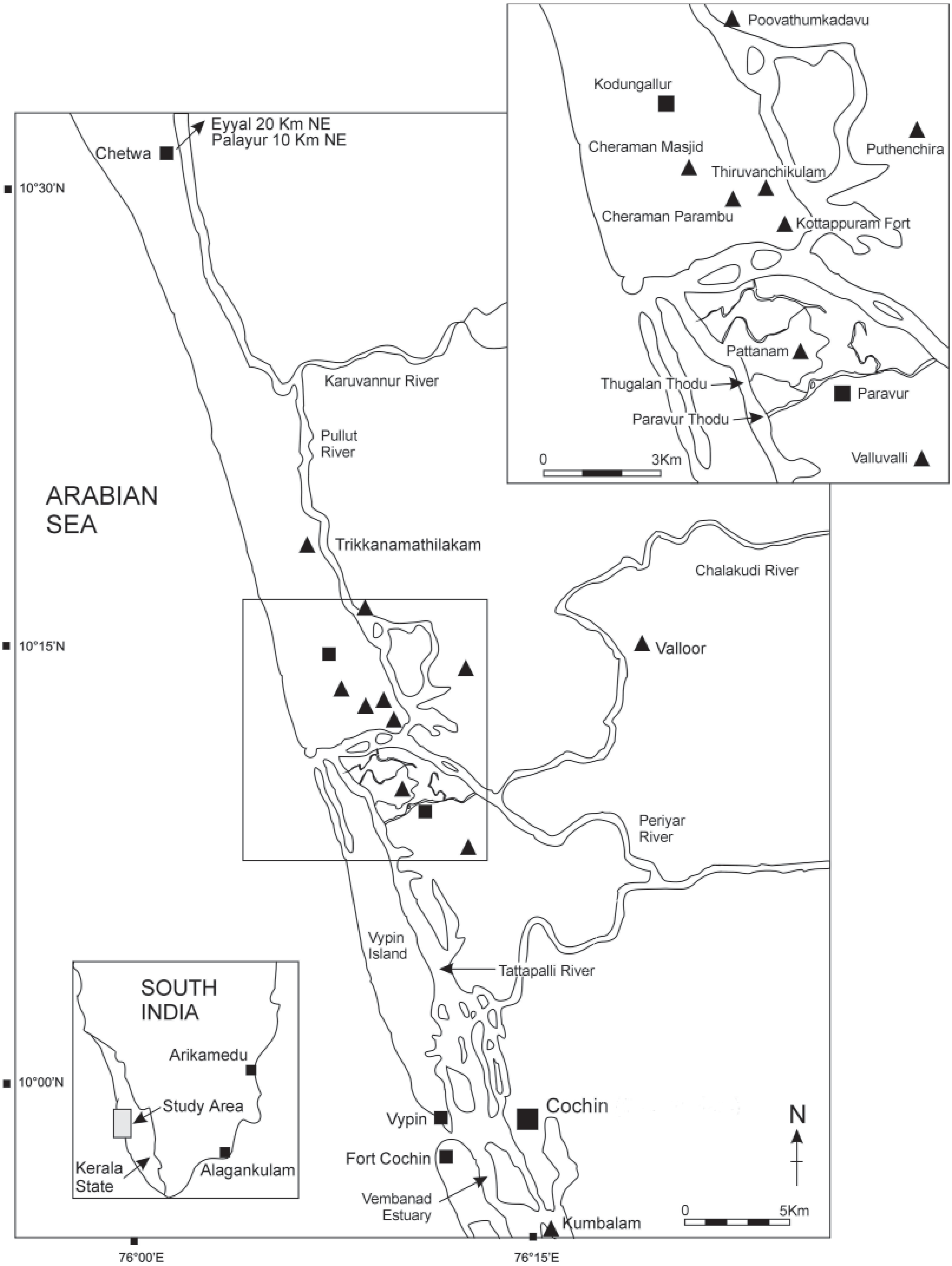

FIGURE 1: THE CENTRAL KERALA COAST SHOWING ARCHAEOLOGICAL SITES (AFTER SHAJAN *ET AL* 2004, FIG 1)

History of research

The location of Muziris has commanded the attention of Orientalists, archaeologists and historians for centuries and the view that Muziris is at Kodungallur has been strongly held since Logan (1887). The seat of the Medieval Cheras at Kodungallur and the proximity of the river Periyar have all encouraged researchers to locate Muziris at Kodungallur or its immediate neighbourhood. Attempts to locate ancient Muziris in the Kodungallur region are numerous (Achan 1946; Raman 1970; Gurukkal and Whittaker 2001). Cheraman Parambu (which lies in Methala village about c 500 m north of the Periyar and about 4 km south of Kodungallur town) was excavated by Achan (1946: 2–3 especially), and several locations such as Thiruvanchikulam and Mathilakam, on the northern side of the river Periyar were also excavated (Raman 1970). Begley examined the ceramic collections from Cheraman Parambu stored in Trissur Archaeological Museum (now housed at Shaktan Tamburan Palace) and antiquities collected by various individuals and museums in 1993 with the aim of identifying Indo-Roman trade (Begley 1996: 11, n 3). Explorations were undertaken around Kodungallur by Chedambath (1997) between 1993 and 1996 resulting in the discovery of a few Medieval habitation sites and a few Megalithic (Iron Age) burial sites. It is reported that Satyamurthy (pers comm) attempted underwater explorations near the mouth of the Periyar, in the expectation that Muziris is now submerged. Despite these explorations on the surface, in museum collections and from excavations, not a single sherd of characteristic habitation-related ceramics datable to the Early Historic period was identified. Equalling vexing has been the absence of Iron Age and Early Historic habitation sites throughout Kerala (Gurukkal and Varier 1999), but especially in the Periyar basin, despite the presence of numerous Megalithic burial sites, Roman coin hoards (eg Valluvalli, 10 km south-east of the mouth of the Periyar) and punch-mark coins (eg Kodussery near Angamali, 15 km north-east of the mouth of the Periyar) (Chedambath 1997; Satyamurthy 1999; Turner 1992: 79).

Against this background, the site of Pattanam was discovered by Shajan during geoarchaeological investigations along the central Kerala coast (Shajan 1998, 2004). Subsequently, further investigations were undertaken at the site by a team of researchers (Shajan *et al* 2004, 2005, 2008). Trial excavations conducted at this site by the Centre for Heritage Studies in association with Shajan have provided additional information on the site and material culture (Selvakumar *et al* 2005; Tomber 2005). Intensive surface explorations are in progress by Abraham (Abraham 2005, 2006, see also this volume) and since 2007 large scale excavations by the Kerala Council for Historical Research (KCHR).

GEOLOGICAL EVIDENCE

The archaeological site at Pattanam lies in the south-western part of the Periyar River delta, c 5 km interior to the river mouth. The present coastal landscape in the Paravur–Kodungallur coastal area is the combined result of the sea level fluctuations and various fluvio-marine processes during the recent geological past. Geomorphological features like the extensive backwaters and intervening barrier beaches in the near coastal areas are the remnants of this late Holocene marine regression. Various studies on this coast between Cochin and Kodungallur have shown that it is essentially an emergent coast (Mathai and Nair 1988; Rajendran *et al* 1989; Shajan 1998). The chronology of this evolution is important in the study of ancient settlements in the region. It appears that since antiquity the Periyar River has migrated northwards (Narayana *et al* 2001; Shajan 1998)

Rajendran *et al* (1989) proposed a transgression between 8000 to 6000 years BP and a regression from 5000 to 3000 years BP for the Kerala coast. The presence of innumerable Iron Age (Megalithic) burial urns in the barrier ridges and sand dunes often associated with Black-and-Red ware, iron implements and occasionally Russet-Coated White Painted ware (Shajan 1998) testifies to the stabilisation of coastal sand sheets before the Early Historic period. Thus the major changes on the coastline took place before the generally accepted date for the occupation of Muziris. According to Mathai and Nair (1988), the configuration of the coastline around 2000 BP is on the eastern margin of the Tattapalli River placing the coast line approximately 1 km west of the site at Pattanam when Muziris was an active port.

ARCHAEOLOGICAL EVIDENCE

The importance of Pattanam as a settlement site, unlike the non-occupation (Megalithic burial and coin hoard) sites mentioned above, cannot be overstated. The archaeological site at Pattanam covers c 1 sq km and a dense concentration of artefacts occurs within an area of about 600 m x 400 m. The site is marked by several terraces and undulating surfaces, perhaps resulting from human interventions, especially in the recent past. The mound is approximately 2 m in height from the surrounding surface level and is completely covered by modern habitation. The archaeological record is disturbed by current activities such as the digging of wells, pits and house construction, as well as trenches for agricultural operations and removal of soil for levelling marshy areas in the neighbourhood. All these activities periodically bring materials from the bottom-most layers to the surface. As a result surface surveys have revealed Early Historic materials in various parts of the site, though in differing concentration along with Medieval and modern period remains. There is a high concentration of occupational debris on the eastern and north-eastern edges; elsewhere there is relatively less material, probably because it was destroyed by natural or cultural activity. On the southern boundary and the south-west area of the site more sand is mixed with comparatively less occupational debris.

Trial excavations at Pattanam

Surface and sub-surface finds from dug-out areas provide firm evidence for Early Historic occupation at the site. In order to understand the cultural sequence and importance of the site, and to build a ceramic sequence for the historical period in Kerala, controlled excavations were necessary and it was felt that trail excavations would yield sufficient material evidence before larger scale excavations could be undertaken. Two trenches (see Figure 2) were excavated from the fairly well-preserved north-eastern area of the site, where more than 2 m of cultural deposit were visible from the surface. Excavation was stratigraphic, based on the definition of layers through colour, composition and texture.

Trench PTM I

The trench, measuring 2 m x 2 m, yielded evidence for the Iron Age–Early Historic transition (Megalithic), the Early Historic (period of foreign trade contacts), the Medieval and the modern periods. The total thickness of the habitation deposit in this trench was 2.6 m, divisible into seven layers. Part of a brick wall datable to the Early Historic period was exposed. Amphorae, Rouletted ware, beads, nails and several other artefacts were also recovered.

Trench PTM II

This trench, also measuring 2 m x 2 m, exposed a total deposit of 2.3 m consisting of eight

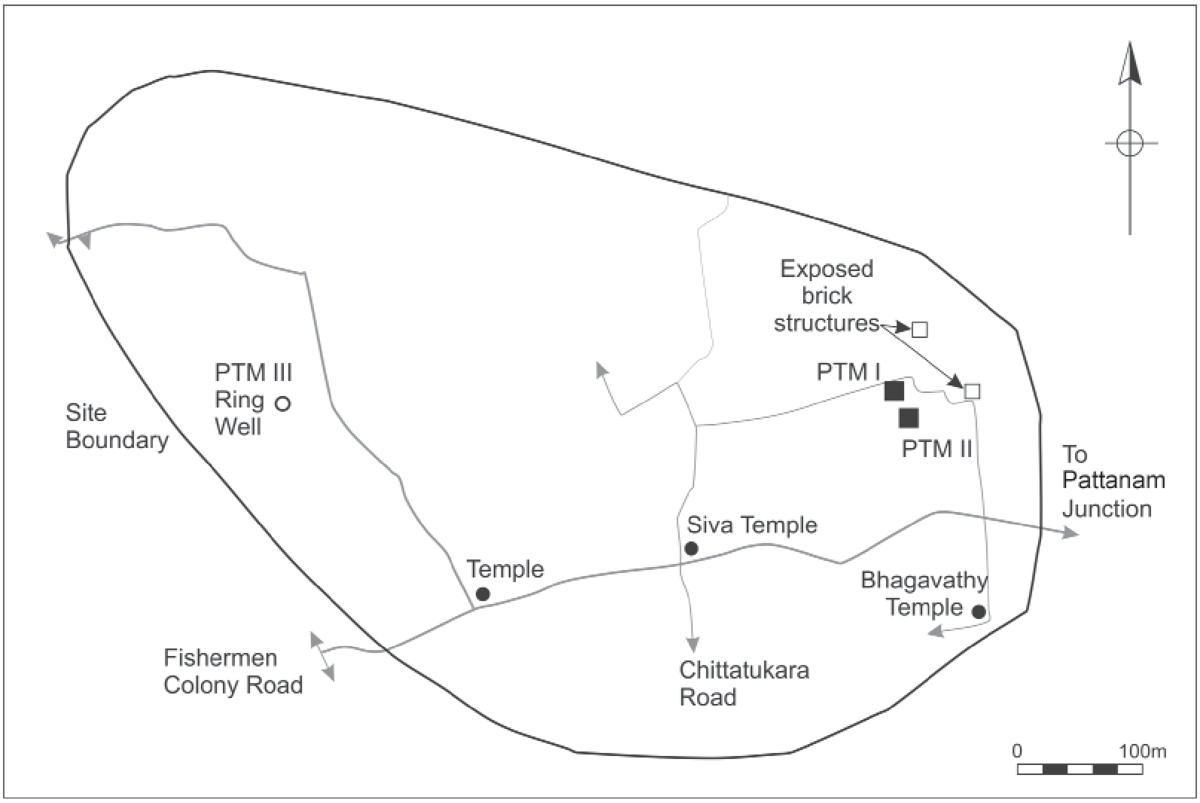

FIGURE 2: SITE MAP OF PATTANAM

layers. In the south-west corner of the trench a portion of a brick structure was noticed. The most important find from this trench was an early Chera copper coin (see below). A few other highly corroded, unidentifiable copper coins were also collected, as were amphora fragments, beads, iron nails and Rouletted ware.

A fragment of a polished stone, iron nails, a fishbone and a few shell fragments were collected from both the trenches.

Cultural sequence and chronology

The study of the layers and their finds indicate that the occupation deposits of both trenches can be classified into four cultural periods. In the absence of C-14 dates, a tentative chronology is proposed here on the basis of ceramic evidence.

Period I: Iron Age–Early Historic transition (Megalithic)

The lower-most layers in trenches PTM I and PTM II can be ascribed to the Iron Age–Early Historic transition phase, since typical Megalithic Black-and-Red ware and Coarse Red ware were found. No bricks were noted from these sandy layers; a few glass beads and a few Early Historic ceramics were found, most probably due to disturbance. Megalithic Black-and-Red ware and Coarse Red ware ('Megalithic') pottery fragments were found in Period I (Iron Age–Early Historic transition) in greater quantities than in the later periods. When the first people settled here during the late Iron Age this area was covered by beach sand. The situation here is identical to Arikamedu, which has typical 'Megalithic' pottery in the early layers of Southern Sector (Casal 1949: 37–54; Begley 1996: 16–17, 2004: 159–60). In the Iron Age–Early Historic transition the occupation at Pattanam does not appear intense, as a very limited amount of pottery was found in these layers. Although no C-14 date is available for this cultural period, the presence of amphora fragments of the Early Roman period in the succeeding Early Historic period (Period II) and in the surface contexts (Tomber 2005) in conjunction with Rouletted ware, indicates that this cultural period may predate the late 1st century BC.

In an earlier publication (Selvakumar *et al* 2005) this period was referred to as 'Iron Age', because of the presence of Megalithic Black-and-Red ware and Coarse Red ware, and was tentatively placed in the last quarter of the 1st millennium BC. However, here it is renamed the 'Iron Age–Early Historic transition' because of the reasons given below.

In ancient Tamil country (which includes the modern states of Tamil Nadu and Kerala), the beginning of the Early Historic period is placed at around the 3rd century BC based on the reference to the Tamil kingdoms in the 2nd and 13th Asokan rock edicts inscriptions (Smith 1920: 160–1, 185–7). The Early Historic period can be divided into three phases – Phase I (pre-1st century BC), Phase II (1st century BC to 3rd C A.D) coinciding with early 'Indo-Roman' or Indian Ocean trade, and Phase III (post-3rd century to AD 500) the post-Sangam Age (Selvakumar and Darsana 2008). Since the beginning of the succeeding Early Historic period at the site dated from c the late 1st century BC or early 1st century AD, the 600+ mm thick sand deposit that mostly has Black-and-Red ware and other typical 'Megalithic' pottery could be placed in the first phase of Early Historic period prior to Roman contacts and the earlier Iron Age. Therefore, tentatively this cultural period could be placed in the second half of the 1st millennium BC. Only further research and radiocarbon dating can reveal the exact beginning of this cultural period. It should be mentioned that a Megalithic burial from Mangadu has been dated to 1000 BC based on radiocarbon dating (Satyamurthy 1992a). Further investigations at Pattanam can help date the beginning of occupation precisely.

Period II: Early Historic overseas trade contact phase

The Early Historic period of the overseas (Roman) trade contact is very clearly represented at this site and saw intense occupation. Imported Roman amphorae and Rouletted and related fine wares, beads of glass and semi-precious stones and nail fragments occur in this cultural period. Intensive building activities in the form of a brick structure, bricks and triple grooved tiles are also seen. Based on the presence of Rouletted ware, amphora sherds of the early Roman period (Tomber 2005) and a potential Yemeni jar fragment, this cultural period could be dated between the late 1st century BC and the 4th century AD. As of now, no foreign ceramic material clearly datable to before the late 1st century BC has been found at this site.

Period III: Early Medieval

The layers of this period were above the layers of the Period II already discussed, and. produced three blue-glazed sherds. They are poorly dated, but may be Sasanian-Islamic. If Sasanian they may date from the 3rd century AD, although until now most glazed pottery in India has been dated between the 7th and the 10th centuries AD (Glover 2002). This evidence suggests that the site was occupied during the Early Medieval period. Several beads found at the site may come from Medieval layers.

Period IV: Modern

After a gap from the 11th to the 15th century AD, the site was reoccupied in the modern period as a silver Puthen coin of the Cochin or Travancore 19th dynasty was found in the Trench PTM II (Selvakumar and Shajan 2009). A Blue-on-White ceramic vessel assignable to the post-15th century was also found in this level. Oral tradition among the villagers of Pattanam also supports occupation in the modern period.

Ceramic evidence

Ceramics are the most important archaeological evidence at the site. Pottery was collected from surface contexts and trial trenches, but the surface sherds include more varieties than the trial trench collection, since they incorporate a wider chronological range. A total of c 10,000 sherds were collected from Trench PTM I with body sherds representing 86% and rims 14%. From Trench PTM II, 27,000 sherds consisting of 90% body sherds and 10% rim sherds were recovered.

Imported pottery

Given the amount of exploration that has taken place at Pattanam, the relative quantity of imported pottery is significant in demonstrating the long-distance contacts of the site and includes both Roman and non-Roman sources.

So far more than 50 imported amphora sherds have been collected from Pattanam from surface (by various individuals) and excavation levels. The most readily identified of these is a wine amphora with a double-rod handle, carinated shoulder, bead rim and peg base, known as the Dressel 2–4 amphora (Peacock and Williams 1986: 105–6, Class 10; see also Tomber this volume). Produced in a number of different centres, at least 10 of the Pattanam sherds from surface and excavation, including a rim, handle and sizeable base fragment, come from the Bay of Naples/Mt Vesuvius region where production took place from around the late 1st century BC through the first three-quarters of the 1st century AD. At least three other amphora fabrics were identified, none of which could be precisely assigned to source (Tomber 2005). A single sherd with organic temper and black lining was recovered from initial surface collections. It was allied to a Yemeni jar commonly found at port sites involved in Indo-Roman trade and dating between the late 1st century BC and the late 4th century AD (Tomber 2004). A relatively large number of sherds in a related organic-tempered fabric have subsequently been found at Pattanam. They have not yet been studied in detail and may alter the date and source of the first previously published sherd.

About 10 sherds of turquoise (blue/green) alkaline glazed ware of West Asian origin (Kennet 2004: 29–30) were collected from the surface as well as in the trenches. From the trenches only four tiny fragments were found and their exact shape could not be determined. In addition a few comparatively light body sherds with powdery surfaces and without any traces of glazing were found in the excavations and they too could belong to this category. This pottery could fall within the Sasanian or Islamic time frame. One sherd found on the surface has appliqué decoration may date between the 8th and 10th centuries.

Chinese ceramics are not common at the site. From the surface only a few sherds have been found. Two sherds of Blue-on-White porcelain, which appear to belong to the post-15th century period, were also encountered in the later trench layers. In colour and design they are very similar to those found at post-15th century settlements of Kottappuram, near Kodungallur (V Selvakumar, personal observation) and at Jingdezhen and Guangdon (N Karashima pers comm).

Several unidentifiable and definitely non-local ceramics were also recovered from the excavation. Thin section and more detailed chemical analysis would help to determine the exact nature and origin of these ceramics.

Indian pottery

Most of the pottery from Pattanam compares typologically with those from other Early Historic sites of India. Coarse Red ware is the dominant pottery from the site. Rouletted ware and other fine wares are the characteristic Early Historic ceramics from Pattanam. About 50 small fragments of Rouletted ware and related fine wares have been recovered from the trenches: three rim sherds clearly resemble Type 1 from Arikamedu (Wheeler *et al* 1946: 45–9, figure 12); the remainder (30+) are tiny body sherds. When first identified in India, Rouletted ware was considered non-local in origin (ibid: 45). Begley (1983) proposed that it was indigenous and recently Gogte has suggested that it was produced in the Bengal region on the basis of X-ray diffraction (XRD) analysis (Gogte 1997). Even by eye alone it is clear that the fine ware fabric is distinct from the clay used for the local pottery at Pattanam and that it was imported from elsewhere in India. Other forms in the same fabric present at Arikamedu, Wheeler *et al* 1946 Types 10 (ibid: 59, figure 17) and 18 (ibid: 60, figure 18), have not yet been found at Pattanam. Similar forms were also produced in coarse fabrics and an example of Wheeler's Type 1 occurs at Pattanam in a coarse fabric. The fabric of the coarse varieties is quite distinct from the finer one and is very similar to the thousands of coarse ware sherds found at Pattanam.

The majority of the ceramics from the site, ie more than 90%, was probably locally produced. The fabric and forms are different from imported amphorae, West Asian pottery and other fine wares. The pottery of the Iron Age–Early Historic transition (Period I) is quite distinct from the pottery of the Early Historic period (Period II), although the Black-and-Red ware pottery continues in reduced quantity during the Early Historic period. During the Megalithic it has a distinct red slip in comparison with the Early Historic pottery. Bowls with convex-sided rims (equating to Wheeler *et al* 1946: 59, Type 9, figure 16) are very frequent. The pottery is highly weathered, with slip abraded in most cases.

Antiquities

As is the case with many of the Early Historic settlements, the site produced a variety of antiquities. Beads are remarkable in terms of their variety in typology, colour, raw material and workmanship. Beads of glass and stones, such as agate, carnelian, and quartz, matching with those from other Early Historic sites of India in typology and material, were found. Not all the beads belonged to the Early Historic period; some instead dated to the Medieval period or later. Chips of carnelian and quartz, raw material blanks and rough-outs collected from the trenches indicate manufacture of beads at the site. However, drawn tubes of glass (an indication of local manufacture) that are frequently found at Arikamedu (Wheeler *et al* 1946: 29–34, figure 40; Francis 2006: 458, figure 7.10) have not been recovered from the limited digging and surface collection at Pattanam, and at present it appears that it was not a glass bead manufacturing centre.

An important find from the excavation is a square copper coin of the early (Sangam) Chera dynasty. The Chera dynasty that ruled around the turn of the Christian era is mentioned in Asokan inscriptions and controlled western Tamil Nadu and central Kerala (Smith 1920: 160–1, 185–7 see above). The coin weighs about 2 gm and has a right facing elephant with sacred symbols above on the obverse, and a bow and arrow, the emblem of the Cheras, along with elephant goad on the reverse. This is the first time that a Sangam Chera coin has been found in a stratified context in Kerala. This clearly attests to the Chera link with the settlement of Muziris mentioned in Sangam literature (*Akananuru* 149 in Zvelebil 1973: 35, n 1). A few other unidentifiable copper discs, probably coins, were also found in the excavations. Bricks measuring 390–420 mm x 170–190 mm x 50–60 mm from the site match the typical Early Historic bricks of India (Wheeler *et al* 1946: 33). The iron nails were mostly found in the layers adjacent to the brick walls.

TOPONYMICAL EVIDENCE

The importance of the site is preserved in its current name Pattanam, which in modern Malayalam means an urban centre. Pattanam is a term derived from Prakrit 'Patan' which originally meant a ferry point; later it was used to refer to coastal and port towns. Early Historic sites such as Manikpattana (Orissa), Kothapattanam (Andhra Pradesh), Kaveripattinam (Tamil Nadu) and Arikamedu-Virampattinam (Pondicherry) in India indicate the historical significance attached to places with the suffix 'pattanam' in their names. Most probably the present name is a survival representing the past activities at the town. References in the *Ramayana* mention Murachipattanam, which is identified with Muciri, the original Tamil or Malayalam word for the westernised Muziris (Menon 1970: 58). The linguistic evidence therefore supports the identification of Muziris with Pattanam.

DISCUSSION AND CONCLUSIONS

The research at Pattanam described here demonstrates that the settlement is important for a number of reasons. Firstly, this is the only settlement to produce Roman ceramic materials from primary contexts in Kerala. Secondly, it has yielded habitation remains for the Iron Age–Early Historic transition. No Iron Age–Early Historic (Megalithic) habitation site has been previously identified in Kerala, although 700+ Iron Age–Early Historic (Megalithic) burial sites (S Darsana, pers comm) have been found. Thirdly, it is a multicultural site with occupation extending at least from the second half of the 1st millennium BC to the modern period. In the past it has been argued that habitation sites are difficult to create and identify given the nature of the environment (with high rainfall, thick vegetation and steep slope) (Gurukkal and Varier 1999). Recent investigations have begun to show that the lack of sites reflects the lack of survey rather than a genuine absence of settlements. The following are the arguments for proposing Pattanam as Muziris:

- Satellite imagery studies by Narayana *et al* (2001) and geoarchaeological investigations conducted by Shajan (1998) have suggested the possible movement of the course of the Periyar River northwards, from the Paravur Todu in ancient times to the present course near Kodungallur. These geological studies have also suggested that the ancient coastline (c 2000 BP) is about 1 km west of Pattanam. The distance from the proposed coastline around 2000 BP and the site of Pattanam via the canal more or less matches with the distance of 20 stadia (3.5 km) mentioned in the *Periplus* (PME 54).
- There exist a number of channels present in the area south of the present course of the Periyar, some of which may date back to the early period. These channels must have enabled easy access to the site of Pattanam despite its location away from the main river course. Classical texts mention that the Roman ships stopped away from the settlement and that small boats transported the goods to Muziris (Pliny NH 6.104). Unlike the situation at Arikamedu, the main port of Muciri may not have been directly adjacent to the Periyar River; this difference may be attributed to the higher water discharge of the Peryar which made the location at Pattanam ideally suited for navigation.
- Pattanam abounds in typical Early Historic material remains, as well as being relatively rich in Mediterranean and West Asian ceramics.
- The *Valmiki Ramayana* mentions Muracipattinam which can be identified with Muciri; thus Pattanam could be a survival of the ancient name Muciripattanam.
- The absence of materials datable to the Early Historic in the excavations by Achan

(1946: 2–3) at Chearmanparambu (Kodungallur) provides negative evidence for placing Muziris at Kodungallur.

Based on the above considerations, it is suggested that Pattanam could be the ancient port of Muziris. We stress that the importance is not based solely on its location, but also an understanding of the patterns of settlement in the entire Periyar Basin, including the identification of associated settlements. The presence of Early Historic remains or even a major settlement north of the Periyar cannot be ruled out until detailed survey is conducted.

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ADDENDUM

Since the initial research and trial excavations at Pattanam through 2006, Kerala Council of Historical Research (KCHR) has excavated more than 300 sq m in the northeastern part of the site for three seasons between 2007 and 2009 (Cherian *et al* 2007a, 2007b, 2009a). These excavations have produced further evidence to support the claim that Pattanam could be the location of ancient Muziris. AMS radiocarbon dating has enabled better understanding of the chronology of the site (Cherian *et al* 2009b). It is likely that Pattanam was occupied before 500 BC. The findings such as the brick-built warehouse, dug-out canoe, a wharf with wooden posts for securing canoes and the large quantity of organic remains, glass beads, amphorae and other artefacts point to the importance of Pattanam as an important hub in the Indian Ocean trade network.

The three seasons of full-scale excavation has dramatically increased the finds of imported pottery of all categories, including glazed sherds, and they will be reported on in the forthcoming reports. The recent investigations suggest that the blue-green glazed ware is first found in Period I.

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Beyond Western India: the Evidence from Imported Amphorae

ROBERTA TOMBER

Roman texts, frequently relying on earlier Greek information, describe fantastical sights in India, including dragons, griffins, monsters with enormous bodies (Jerome *Letters* 125.3; see also Parker 2002: 50), and rivers of wine, honey and oil (Dio Chrysostom *Orations* 35: 18–24). Equally, Indians saw foreigners or Yavanas (incorporating Greeks, Romans and West Asians) in different ways, with their attitude best summarised as 'ambivalent' (Champakalakshmi 1996: 109). As traders they are referred to as 'the uncivilised Yavanas of harsh speech' (*Patirruppattu* 2 in Zvelebil 1956: 404) and as fierce-eyed soldiers (*Mullaippattu* 61 in Zvelebil 1973: 61). More favourably they were known by their 'fine physique and strange speech' (Achaya 2002: 216). Thus, it is obvious that Romans and Indians had exaggerated notions about each other that reflected the opposition, alterity or 'otherness' of their experiences (Whittaker 1998: 5–7). It was not just people, but Indian products that were fanciful and the rarity of Indian goods in the West and vice versa must have raised the value and the price of such objects (ibid: 14). Phrased differently, 'geographical distance brings social prestige' (Parker 2002: 59). It is interesting that these exceptionally long-distance imports continue to excite exceptional interest given their relatively small quantity within archaeological assemblages. However, by better understanding these objects and placing them in context we raise their meaning beyond their rarity.

Coinage is indisputably the most visible Roman find in India. It is the most widely published class of material, the most readily identifiable from photographs and the most prolific. Recorded since the 1790s, coins number in the thousands, with c 6,000 *denarii* (silver) from South India (Turner 1989: 23). Less visible and more difficult to identify is pottery. It is the second most frequent class of Roman material in India after coinage and the focus of this paper. The aim of this paper is to evaluate imported amphora in India based on the author's recent survey of this material and to demonstrate the potential of the amphora data. A further aim is to clarify the study of Roman amphorae to non-classical scholars.

'ROMAN' POTTERY TYPES IN INDIA

This category refers to three pottery types found in India that were previously considered Roman imports, but are now understood to be indigenous. The first, Rouletted or chattered ware (RW) so designated by the decoration on the base of platters is also known as Wheeler 1 from the 1946 Arikamedu typology (Wheeler *et al* 1946: 45–9, figure 12). It was assumed to be a Mediterranean import because of its decoration, fine fabric and slip. Similar rouletted vessels in a coarser fabric were referred to as 'imitated' rouletted ware and considered Indian. Begley has, however, convincingly demonstrated an indigenous source for both the well-made fineware and the coarser examples (Begley 1983: 469–71, 1988: 427; see also Schenk 2006). More recently

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Gogte has used X-ray diffraction (XRD) to propose a source in the Ganges Basin, near the sites of Chandraketugarh and Tamluk (Gogte 1997, 2002: 63; Begley 2004; Tomber 2008:44). Although definitely manufactured in India, the inspiration for the decoration is still a matter of debate, particularly whether it can be traced to Classical traditions (Begley 1988: 439). Roman red-slipped wares may be decorated with rouletting, but the occurrence of red-slipped wares in India post-dates the first production of RW and Salles (2002: 197–9) has instead suggested a Seleucid inspiration from Mesopotamia and the Persian Gulf.

Although RW is frequently black in colour, orange and red examples do exist. Of these, the orange rouletted vessels from Alagankulam have been prominent in the literature. Mistakenly allied with a similar late Roman African Red Slip ware (ARS), these vessels are now known to be Indian in origin (Begley 1988: 428; Sridhar 2005: 26). The confusion is understandable given the similarities between the two (cf Wheeler *et al* 1946 Type 1 with Hayes 1972 ARS Form 61A), but differences in the decoration and fabric can be seen when one is familiar with both types.

Similarly, many older publications refer to Red Polished ware (RPW) as a type of imported red-slipped ware. Distribution of the ware, its fabrics and forms (Orton 1992) all set it apart from Roman sigillata. True Roman red-slipped wares, of which there are a few sherds in India, belong to a distinctive repertoire of shapes (eg Hayes 1972, 1985) that do not overlap with RPW. A Gujarati source is now generally accepted for RPW (Orton 1992) and the literature can be re-interpreted accordingly. Thus, the current thinking on these two fineware types can be retrospectively applied with certitude.

Amphorae, jars used for the long-distance transport of foodstuffs, are more difficult to interpret from the literature alone, particularly if occurring as body sherds or unillustrated in publication. Rims, handles or bases are easier to evaluate and some are non-Roman imports. Until recently few amphorae have been precisely identified in India, but Arikamedu (Will 1996) and some of the Nevasa collection (Gupta *et al* 2001) provide notable exceptions. Since many Roman amphorae are well-dated and well-provenanced they, as recognised by Indian scholars (eg Gupta 1993, 2002; Tripathi 1993, 2004), represent an untapped resource for the understanding of Indian Ocean contact.

Other sherds published as imported amphorae are Indian in origin and the most prominent examples of this are conical jars found in South India, particularly Tamil Nadu. The largest, best-known concentration of these vessels is from Kanchipuram where more than 50 have been found, many inset into the ground and perhaps used as storage jars for wine or toddy (Raman 1992: 127), the latter being a local sap-based alcoholic drink. Wheeler identified them at Arikamedu and as a result they are frequently referred to by his nomenclature as Wheeler Type 74 or 75 (Wheeler *et al* 1946: 77, figure 29). Recently sherds have also been identified from Pattanam in Kerala (Shajan *et al* 2005: 70–1).

IMPORTED AMPHORAE IN INDIA

Unlike RW or RPW, which can universally be regarded as indigenous, amphorae provide a more complex situation for not only are some of them locally produced as outlined above, but imported ones represent a wide variety of source areas and vessel forms, which in the Indian context span between approximately the 2/1st century BC and early 7th century AD.

Fieldwork in India conducted by this author in 1998, 2003, 2004 and 2006 has included a systematic programme particularly to view and identify imported amphorae from throughout the country. Such an undertaking was workable because of the extensive list of amphora sites compiled by Sunil Gupta (Gupta 1993, 1997), who listed over 50 potential find spots. As yet it has not been possible to locate the material from all these find spots. Nevertheless, many sites traditionally associated with amphorae such as Tamluk in West Bengal, Manikpatna in Orissa and Shamalaji and Dhatva in Gujarat can now be excluded from this list. Figure 1 shows sites from which imported vessels have been confidently identified, either from first hand examination or reliably verified through publication. It is not exhaustive, as not all published amphorae have been located and some sites are evaluated only through museum displays rather than their entire assemblage; furthermore new sherds are constantly added to the list from current excavations. Although this session focuses on western India, the gateway to India from the West, the distribution maps include the entire country since the patterns are clarified by comparison between the east and west coasts.

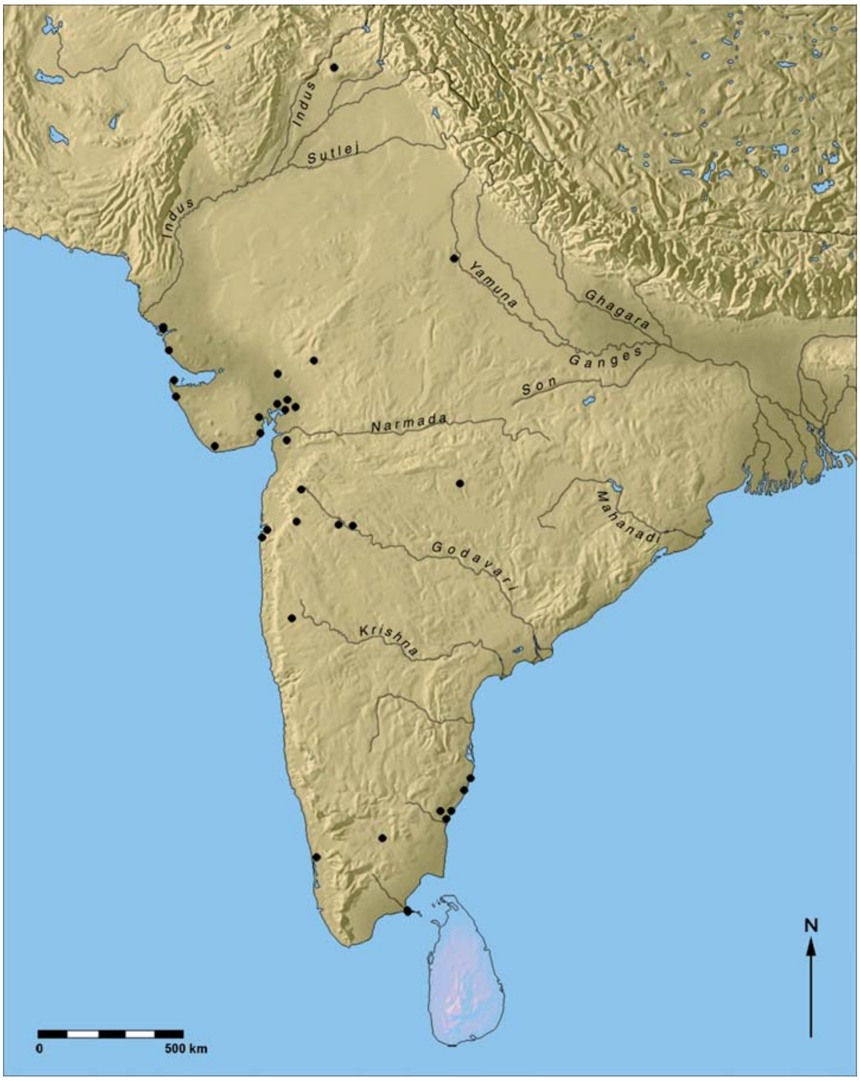

FIGURE 1: SITES WITH IMPORTED AMPHORAE (ANTONY SPENCE)

METHODOLOGY FOR THE STUDY AND CLASSIFICATION OF ROMAN AMPHORAE

Roman amphorae include a multitude of types, from different sources and of different date. The most recent source for Roman amphorae, created by Williams and Keay, is the web-based 'Roman amphorae: a digital resource' (http://ads.ahds.ac.uk/catalogue/archive/amphora_ahrb_2005/index.cfm). Although the methodology employed by classicists in the study of pottery shares approaches with Indian archaeologists, notably the examination of clay fabrics in conjunction with vessel shape, the long tradition of scholarship requires some explanation to those outside the discipline.

Amphorae were widely traded during the Roman period, and used primarily to carry wine, oil and *garum* (fish sauce produced from salt and decomposed fish), all of which were mainstays to the Roman way of life. Because of their close association with agriculture, many amphorae were manufactured on the estates where these foodstuffs were produced. During the early Roman period amphorae are normally tall with thick walls, weighing between 15–20 kg empty and having a capacity of up to 80 litres, but more generally between 25 and 50 litres (Peacock and Williams 1986: table 1; Sealey 1985, table 2). In addition to being double handled they frequently have a spike base, thought to facilitate stacking in ships, as well as providing a make-shift third handle for these heavy vessels. Around the late 4th or early 5th century, the shape of amphorae alter quite dramatically, becoming shorter, thinner walled, frequently ribbed, and often with a rounded base. Their capacity is also reduced, with the most common type, Late Roman Amphora 1 (see below) just over 6 and less than 10 litres (van Alfen 1996: 203). The rationale behind this change has been widely debated, whether it represents a more efficient method for transporting liquid commodities, or if it relates to a change in agricultural systems at this time.

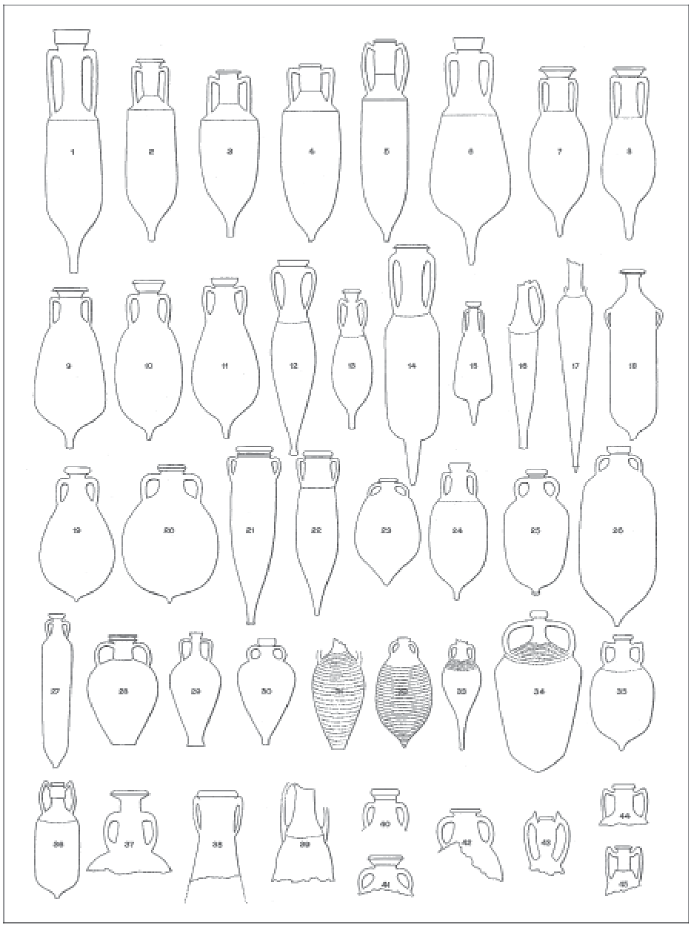

FIGURE 2. DRESSEL'S AMPHORA TYPOLOGY (AFTER DRESSEL 1899: FIGURE 2)

The first systematic classification for Roman amphorae was published by Heinrich Dressel in 1899. His work was based on the mound of amphorae near the Tiber quayside in Rome known as Monte Testaccio, translated as Mountain of Sherds. From this study he isolated 43 major amphora types, and his typology is reproduced here in Figure 2 (Dressel 1899: figure 2). The composition of the mound meant that Dressel's work emphasised Spanish and to a lesser extent North African vessels dating from the mid-2nd to the mid-3rd century. Epigraphic evidence, through stamps and written inscriptions, was exceptionally common.

Stamps are most frequently placed on the handle, although also on the rim and neck, and are thought to refer usually to the agricultural estate on which the vessel was made. Written inscriptions on the neck and shoulder, known as *tituli picti*, may contain details on the contents, the empty weight of the vessel and weight of its contents, and in some cases the estate where the contents was produced and information relating to shipping and customs procedures. Not all vessels were inscribed and those that were do not necessarily survive.

Although Dressel's classification has been greatly enlarged and refined, it nevertheless remains at the core of amphora studies today. Numerous other typologies exist alongside Dressel's, whose numeration is based on either place (eg Carthage as Riley 1981 or Camulodunum as Hawkes and Hull 1947) or personal name (eg Kapitän 1972; Peacock and Williams 1986 with a useful correlation list of types in Appendix 1). Fieldwork at Monte Testaccio has continued to interest scholars and spawned a vast literature, particularly on amphora epigraphy (eg Bláquez Martinez and Remesal Rodriguez 1999, 2001, 2003).

In the context of Indian archaeology, Dressel's Forms 2–4 are the most important. This incorporates three vessels united in overall body shape by a double-rod handle (comprising two rounded handle sections that are joined together lengthwise), peg base and carinated shoulder. The rim is either a rounded or flattened bead. Remarkably, this amphora shape was manufactured in virtually every province, from Britain to Egypt and Syria making it the most widely reproduced early Roman type. It is also the most widely distributed early Roman amphora type found in India. The shape derives from a wine amphora produced on the Greek island of Kos (Koan amphora) from the 4th century BC into the 1st century AD (Whitbread 1995: 81) which, most notably, shares its double-rod handle with the Dressel 2–4. Will (1996, 2004b) has identified Koan amphorae in some numbers at Arikamedu.

Like the Koan, the main function of Dressel 2–4 amphorae was as a wine container. The Dressel 2–4 seems to have been particularly associated with wines made from the Aminean grape, renowned from Campania (incorporating the region around Mt Vesuvius/the Bay of Naples) but also commonly grown in central Italy, Bruttium, Sicily, Spain and Syria (Rathbone 1983: 85). According to ancient sources, Aminean wine was of high quality (Tchernia 1986: 352; contra Will 2004b: 330). Thus, the association between a particular kind of wine and its vessel shape allowed product identification for consumers (Wendrich *et al* 2003: 77), such as exists today by bottling wines from the Bordeaux region into narrow bottles and those from Burgundy into broader ones.

The different sources for Dressel 2–4 can sometimes be distinguished by typological idiosyncrasies when a large portion of the vessel is preserved. For example, the key typological distinction between Koan and non-Koan vessels is that the former have a button base, while the others have a peg or spool-shaped base (Slane 1992: 204). In many cases, when dealing with fragmentary sherds, variations in clay or fabric are a more reliable means of differentiation.

As noted above, the examination of fabric for analysing ceramics is a method shared by classical and Indian scholars. Carla Sinopoli's *Approaches to Archaeological Ceramics* (Sinopoli 1991) outlines the available techniques and approaches, using many examples from the Indian context. The long-established scholarship on Roman amphorae means that many of the clay fabrics have been systematically investigated in the past, and therefore new examples can be classified by visual examination in reference to a pre-existing database. Nevertheless, some sherds will require more detailed analysis and in these cases the coarse-grained texture of many amphora fabrics make thin-section analysis a suitable technique. It is a relatively simple and inexpensive method of characterising the clays and sometimes assigning them to source area. The method, described by Sinopoli (1991: 57–8), enables the sample to be viewed through a polarising microscope for more precise identification of the rock and mineral constituents in the clay than by binocular microscope.

Some amphora fabrics are very distinctive; others are less so and rely more heavily on form or the combination of fabric and form. As a result some of the sherds examined in India cannot be assigned to a source area or type at present. Nevertheless it is useful to analyse these sherds in order to build up a systematic database for India that will enable identification in the future. The more examples that can be added to this, the greater the possibility of refined sourcing and dating, not only for new examples, but for previously recorded ones.

The Campanian/Bay of Naples amphora fabric is particularly distinctive. Its clay is usually red or orange, coarse in appearance comprising well-sorted inclusions of what looks to be black sand, but is identifiable in thin section as volcanic minerals (particularly pyroxenes). In contrast, Koan amphorae are red to pale or buff, relatively fine-textured and described by Will (2004b: 329) as typically having a greenish surface. Mica can be a distinguishing feature, as can a sprinkling of volcanic rocks, but there is considerable variability within the fabric.

In other instances the stylistic differences between early and late amphorae means that even unsourced types can at times be assigned to one of these categories and provide evidence for dating. The presence of Islamic amphora sherds in India presents a different challenge for it can be difficult to distinguish them from Roman ones when only a body sherd is available; this reinforces the importance of good stratigraphic contexts.

AMPHORA CONTENTS AND THE INDIAN PALATE

Amphorae for the three primary contents – wine, oil and fish products – have all been identified in India. As noted above, vessel shape is closely associated with contents, which is also informed by inscriptions; location of production may also have a bearing, such as kilns sited near *garum* tanks. Scientific analysis can also be used to detect ancient residues in the vessel walls (eg Evershed *et al* 2001). Without a doubt, in India those carrying wine are the most common, *garum* and oil substantially less. There has been some discussion as to whether Indians had the taste for wine. Will has suggested that the wines most agreeable to the Indian palate were those made with salt water such as the Koan and Koan imitators (Campanian Dressel 2–4s) (Will 2004b: 328–31, 2004a: 435–6). Based on the quantity of the different amphora types at Arikamedu, Will (2004a: 438) concluded that wine was probably for Indians and westerners alike, and *garum* and oil for westerners only.

The Sangam poetry's reference to 'cool and fragrant wines' from Purananuru 56 has been quoted by scholars in support of Indian's liking wine since Wheeler's time (Wheeler *et al* 1946: 21; Begley 1996: 23). Whether grapes were cultivated in India for the production of wine is another matter and it is difficult to be precise about the point of introduction in India. In the 7th century the Chinese Buddhist Xuan Zang mentions grape growing brought from Kashmir (Achaya 1994: 148), and the north of India would provide the most suitable conditions.

A range of alcoholic drinks are known to have been fermented and distilled in India at the time and while these do not necessarily equate to our wine a taste for alcoholic beverages clearly existed. The *Purananuru* notes that for the king at Muziris 'toddy is no more valuable than water' (*Purananuru* 343 in Harte and Heifetz 1999: 196). In his *History of Alexander the Great,* written from secondary sources during the 1st century AD, Quintus Curtius describes an Indian king (taken as Chandragupta, Achaya 1994: 144): 'Women prepare his food. They also serve his wine, the use of which is lavish with all the Indian peoples' (Quintus Curtius 8.9 30). In direct contrast, in the early 5th century AD, the Chinese Buddhist Fa Xian wrote 'Throughout the country no one kills any living things, nor drinks wine…' (Achaya 1994: 147). Textual references to wine drinking vary according to date and situation.

Amphorae for *garum* and oil are much less common than for wine, and as yet Arikamedu is the only site from which the entire range has been recovered for the early Roman period (Will 1996, 2004b). This reflects the greater intensity of excavation rather than archaeological patterns, and excavations at Pattanam have now yielded large quantities of amphorae (see Selvakumar *et al* this volume).

Garum was important to the Roman diet. Its over-riding taste is salty and it was added to both sweet and savoury dishes. Today fish sauce is produced and consumed in great quantity throughout Southeast Asia. Manufactured with similar techniques as *garum*, it is known by a variety of names, such as 'nuoc-mam' in Vietnam (Curtis 2001: 409). It is not eaten in India, but as salted fish were available in Tamil country (modern Kerala and Tamil Nadu) and elsewhere (Achaya 2002: 70) one can speculate that there was a taste for it in antiquity. Olive oil is more difficult to evaluate, but other oils, including fish oil (Achaya 1994: 50) are and were used in India.

It seems that Indians had a taste for wine and *garum*; for oil we can make no suggestions. These foods were familiar to the Romans, necessary to their way of life, and importation into India allowed them to maintain this way of life while residing abroad. Whitehouse cites another example, that of pre-Roman Colchester (Camulodunum, UK) where a small amount of imported amphorae, sigillata and glass may represent the needs of a resident foreign (Roman) community (Whitehouse 1990: 490). We cannot know for certain whether Indians enjoyed the actual contents of amphorae, but there was no doubt status attached to their acquisition. Another parallel from the Iron Age (Tomber 2005: 231) comes from Welwyn in Hertfordshire, where imported Roman amphorae, silver cups and ceramic cups and plates were excavated from the graves of non-Roman wealthy aristocrats (Potter and Johns 2002: 128, 138; Stead 1967). Similarly in India, amphorae may have been restricted to wealthier segments of indigenous society, such as those controlling or benefiting from the long distance trade.

IMPORTED AMPHORAE IN INDIA

Amongst a variety of early Roman amphorae found in India (Figure 3), the Dressel 2–4 Campanian one is the most widely distributed type. Roughly dating between the late 1st century BC and the late 1st century AD, it falls into the period considered to be the apex of Indo-Roman trade. Other source areas for Dressel 2–4 are also identified: it is interesting, for example, that vessels from Mareotis near Alexandria are present in India given the importance of the Egyptian Red Sea ports in this trade. Highly praised by ancient authors (see Tomber 2004b: n. 30 for a summary), these Mareotic vessels are also likely to have carried Aminean wine (Empereur 1986: 608) and demonstrate the diversity of amphora sources in India even within a single form.

Although Roman finds in India remain biased towards the late 1st century BC through the 2nd century AD, a growing corpus of material reflects contacts from the 4th through the early 7th century AD (Figure 4). Coins of this period are fairly well known (eg Krishnamurthy 1994) and corresponding amphora evidence is now available (eg Tomber 2005). One of the most widely represented types in India is a Red Sea amphora, produced at modern Aqaba in Jordan between the 4th and 7th centuries. Although its content is not certain, one suggestion is that it was used for the transportation of *garum* (Parker 1998: 390–1). A characteristically hard fabric, with inclusions of granite and mica, it has a lid-seat rim, tapered and heavily ribbed body and loop handles (Figure 5). Interestingly, it seems to be primarily linked to Indian Ocean trade with distribution almost exclusively on trade sites in the region (Tomber 2004a).

A Mediterranean amphora, Late Roman Amphora 1 (Figure 6; Riley 1981: 120 or Peacock

FIGURE 3: DISTRIBUTION OF EARLY ROMAN AMPHORAE IN INDIA (ANTONY SPENCE)

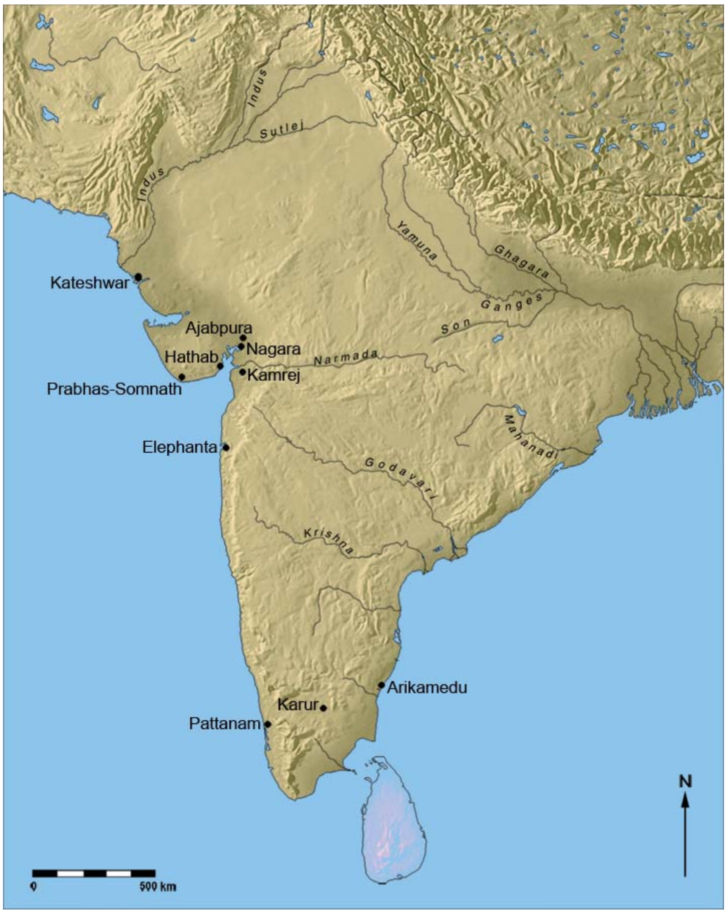

FIGURE 4: DISTRIBUTION OF LATE ROMAN AMPHORAE IN INDIA (ANTONY SPENCE)

and Williams 1986: 185–7, Class 44), is the most ubiquitous of late Roman amphorae throughout the Roman world, but is fairly rare in India. While its origins can be traced to the early Roman period, the vessel we are concerned with here dates to the same period as the Aqaba type and was produced in Cyprus and eastern Turkey/Syria for the transport of both wine and oil. A rounded amphora, with grooved handles and variable ribbing on the body, the fabric is normally white or off-white with well-sorted multi-coloured sand-sized inclusions consisting of limestone, quartz, volcanic rocks and ferromagnesian minerals.

The most surprising discovery of this survey is that many vessels published as Roman instead belong to a distinctive class of later Parthian and Sasanian (0-651 AD) to early Islamic (9th century) vessels known as the torpedo jar (Adams 1970: 100, figure 6 c-e, see also Killick 1988; Northedge 1988 for quantified assemblages). Of the sites with imported amphorae, over half of them yielded Mesopotamian sherds and in a number of cases Roman sherds were entirely absent with only Mesopotamian ones present (Figure 7). The dating of these vessels is difficult, but it is argued elsewhere that some at least belong to the Sasanian (AD 224-651) period (Tomber 2007 for a full discussion of the vessels and their dating in India).

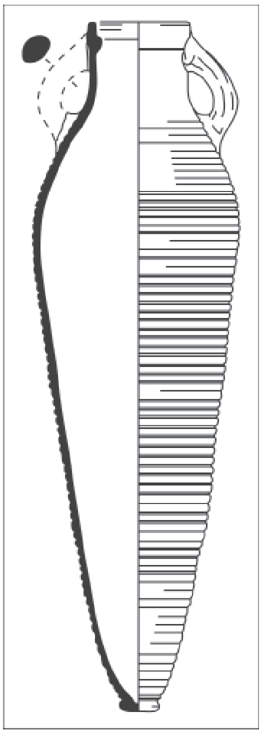

FIGURE 5: AQABA AMPHORA (c 820 MM HIGH) (PENNY COPELAND AFTER WHITCOMB 1989: FIGURE 5A)

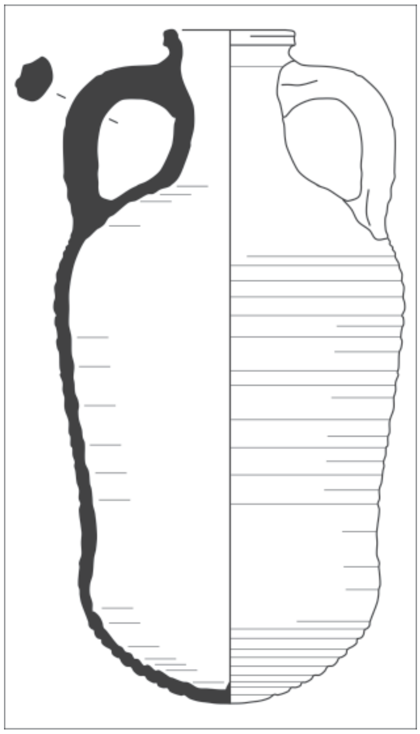

FIGURE 6: LATE ROMAN AMPHORA 1 (c 456 MM HIGH) (PENNY COPELAND AFTER VAN ALFEN: FIGURE 2)

The torpedo is characterised by a bead rim on a neckless, cylindrical shape and a tall, hollow base with small diameter (Figure 8). The uniform lack of handles distinguishes them from their Roman counterparts. Macroscopically the clay is very similar to that described for Late Roman Amphora 1, but the inclusions are typically finer and better sorted. Although no kilns sites have as yet been located Mesopotamia is generally accepted as their production region (Tomber 2007). Many, but not all, sherds have a thick black internal coating, a feature frequently found on Roman wine amphorae. Analysis by Carl Heron on torpedo sherds from Anuradhapura in Sri Lanka has identified the lining as bitumen (Seely *et al* 2006: 107). Wine was also an important part of Sasanian life and it has been suggested that torpedoes were used for the transport of wine (Simpson 2003: 353–5).

FIGURE 7: DISTRIBUTION OF TORPEDO JARS IN INDIA (ANTONY SPENCE)

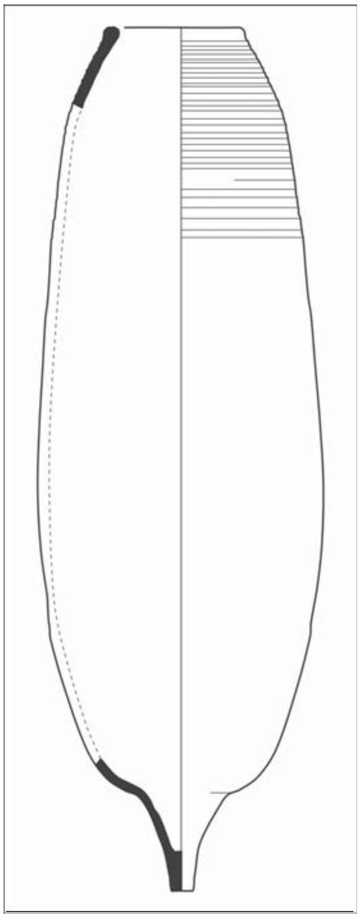

FIGURE 5.8. TORPEDO JAR (830 MM HIGH) (PENNY COPELAND)

PATTERNS OF DISTRIBUTION: INTERPRETING IMPORTED AMPHORAE

This paper has demonstrated the wide range of dating and source information that can be gained by closer examination of imported amphorae in India. These three groupings illustrated on Figures 3, 4 and 7, show distinct patterns that were obscured when grouping them together. The widest distribution occurs amongst the Early Roman amphorae, reinforcing the intensity of trade during this period, particularly in South India. Vessels dated from the 3rd century onwards, late Roman and torpedoes, have a very different profile, clustered on the north-west coast and particularly Gujarat and Maharashtra. Detailed comparison, however, suggests that they relate to two different supply patterns (Tomber 2007). The majority of torpedoes are in the territory of the Western Kshatapas and the presence of them reflects the cultural milieu that was largely influenced first by the Parthians and then the Sasanians. On the other hand, that of Roman vessels in this area may owe more to the overall social and economic climate of the region which, due to successive foreign invaders, was very much at the heart of thriving international trade routes connecting coastal ports with inland sites. In this way a richer picture of East–West contact is gained by separating the amphorae into early Roman, late Roman and Mesopotamian vessels.

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